



BIOTECH-AUGUST-2022- SELF ASSESSMENT REPORT (SAR)
UNDERGRADUATE ENGINEERING PROGRAMS (TIER-I)

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PART-B: Criteria Summary
Name of the program : Biotechnology

Criteria No.	Criteria	Mark/Weightage
Program Level Criteria		
1.	Vision, Mission and Program Educational Objectives	50
2.	Program Curriculum and Teaching –Learning Processes	100
3.	Course Outcomes and Program Outcomes	175
4.	Students’ Performance	100
5.	Faculty Information and Contributions	200
6.	Facilities and Technical Support	80
7.	Continuous Improvement	75
Institute Level Criteria		
8.	First Year Academics	50
9.	Student Support Systems	50
10.	Governance, Institutional Support and Financial Resources	120
	Total	1000

NBA-BT-Self Evaluation report

Criteria/ Sub.crit eria No.	Particulars	Max. Score	Availia ble score
1	Criterion 1: Vision, Mission and Program Educational Objectives (50)	50	50
1.1	State the Vision and Mission of the Department and Institute	5	5
1.2	State the Program Educational Objectives (PEOs)	5	5
1.3	Indicate where and how the Vision, Mission and PEOs are published and disseminated among stakeholders	15	15
1.4	State the process for defining the Vision and Mission of the Department, and PEOs of the program	15	15
1.5	Establish consistency of PEOs with Mission of the Department	10	10
2	Criterion 2: Program Curriculum and Teaching–Learning Processes (100)	100	100
2.1	Program Curriculum 30	30	30
2.1.1	State the process for designing the program curriculum	10	10
2.1.2	Structure of the Curriculum	5	5
2.1.3	State curriculum the components of the Curriculum	5	5
2.1.4	State the process used to identify extent of compliance of the curriculum for attaining the Program Outcomes(POs) & Program Specific Outcomes(PSOs)	10	10
2.2	Teaching-Learning Processes 70	70	70
2.2.1	Describe the Process followed to improve quality of Teaching Learning	15	15
2.2.2	Quality of end semester examination, internal semester question papers, assignments and evaluation	15	15
2.2.3	Quality of student projects	20	20
2.2.4	Initiatives related to industry interaction	10	10
2.2.5	Initiatives related to industry internship/summer training	10	10
3	Criterion 3: Course Outcomes and Program Outcomes (175)	175	175
3.1	Establish the correlation between the courses and the POs & PSOs	25	25
3.2	Attainment of Course Outcomes 75	75	75
3.2.1	Describe the assessment tools and processes used to gather the data upon which the evaluation of Course Outcome is based	10	10
3.2.2	Record the attainment of Course Outcomes of all courses with respect to set attainment levels	65	65
3.3	Attainment of Program Outcomes and Program Specific Outcomes 75	75	75
3.3.1	Describe assessment tools and processes used for assessing the attainment of each of the POs & PSOs	10	10
3.3.2	Provide results of evaluation of each PO & PSO	65	65
4	Criterion 4: Students' Performance (100)	100	85.23
4.1	Enrolment Ratio	20	14
4.2	Success Rate in the stipulated period of the program 20	20	11.65
4.2.1	Success rate without backlog in any Semester/year of study	15	6.75
4.2.2	Success rate in stipulated period (actual duration of the program) [Total of with backlog + without backlog]	5	4.9
4.3	Academic Performance in Second Year	10	10
4.4	Placement, Higher studies and Entrepreneurship	30	29.58
4.5	Professional Activities 20	20	20
4.5.1	Professional societies / chapters and organizing engineering events	5	5

4.5.2	Publication of technical magazines, newsletters, etc.	5	5
4.5.3	Participation in inter-institute events by students of the program of study (at other institutions)	10	10
5	Criterion 5: Faculty Information and Contributions (200)	200	200
5.1	Student-Faculty Ratio (SFR)	20	20
5.2	Faculty Cadre Proportion	20	20
5.3	Faculty Qualification	20	20
5.4	Faculty Retention	10	10
5.5	Faculty competencies in correlation to Program Specific Criteria	10	10
5.6	Innovations by the Faculty in Teaching and Learning	10	10
5.7	Faculty as participants in Faculty development /training activities /STTPs	15	15
5.8	Research and Development 75	75	75
5.8.1	Academic Research	20	20
5.8.2	Sponsored Research	20	20
5.8.3	Development Activities	15	15
5.8.4	Consultancy (From Industry)	20	20
5.9	Faculty Performance Appraisal and Development System (FPADS)	10	10
5.10	Visiting/Adjunct/Emeritus Faculty etc.	10	10
6	Criterion 6: Facilities and Technical Support (80)	80	80
6.1	Adequate and well equipped laboratories, and technical manpower	40	40
6.2	Laboratories: Maintenance and overall ambience	10	10
6.3	Safety measures in laboratories	10	10
6.4	Project laboratory/Facilities	20	20
7	Criterion 7: Continuous Improvement (75)	75	75
7.1	Actions taken based on the results of evaluation of each of the POs and PSOs	30	30
7.2	Academic Audit and actions taken during the period of Assessment	15	15
7.3	Improvement in Placement, Higher Studies and Entrepreneurship	10	10
7.4	Improvement in the quality of students admitted to the program	20	20
8	Criterion 8: First Year Academics (50)	50	47.36
8.1	First Year Student- Faculty Ratio (FYSFR)	5	5
8.2	Qualification of Faculty Teaching First Year Common Courses	5	5
8.3	First Year Academic Performance	10	7.356
8.4	Attainment of Course Outcomes of first year courses 10	10	10
8.4.1	Describe the assessment processes used to gather the data upon which the evaluation of Course Outcomes of first year is based	5	5
8.4.2	Record the attainment of Course Outcomes of all first year courses	5	5
8.5	Attainment of Program Outcomes of all first year courses 20	20	20
8.5.1	Indicate results of evaluation of each relevant PO/PSO	10	10
8.5.2	Actions taken based on the results of evaluation of relevant POs /PSOs	10	10

9	Criterion 9: Student Support Systems (50)	50	50
9.1	Mentoring system to help at individual level	5	5
9.2	Feedback analysis and reward /corrective measures taken, if any	10	10
9.3	Feedback on facilities	5	5
9.4	Self – Learning	5	5
9.5	Career Guidance, Training, Placement	10	10
9.6	Entrepreneurship Cell	5	5
9.7	Co-curricular and Extracurricular Activities	10	10
10	Criterion 10: Governance, Institutional Support and Financial Resources (120)	120	120
10.1	Organization, Governance and Transparency 55	55	55
10.1.1	State the Vision and Mission of the Institute	5	5
10.1.2	Availability of the Institutional Strategic Plan and its Effective Implementation and Monitoring	25	25
10.1.3	Governing body, administrative setup, functions of various bodies, service rules procedures, recruitment and promotional policies.	10	10
10.1.4	Decentralization in working and grievance redressal mechanism	5	5
10.1.5	Delegation of financial powers	5	5
10.1.6	Transparency and availability of correct/unambiguous information in public domain	5	5
10.2	Budget Allocation, Utilization, and Public Accounting at Institute level 15	15	15
10.2.1	Adequacy of Budget allocation	5	5
10.2.2	Utilization of allocated funds	5	5
10.2.3	Availability of the audited statements on the institute's website	5	5
10.3	Program Specific Budget Allocation, Utilization 30	30	30
10.3.1	Adequacy of budget allocation	10	10
10.3.2	Utilization of allocated funds	20	20
10.4	Library and Internet 20	20	20
10.4.1	Quality of learning resources (hard/soft)	10	10
10.4.2	Internet	10	10
	Gross Total	1000	982.59

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:

<input type="radio"/> Institute of National Infortance	<input type="radio"/> Autonomous
<input type="radio"/> University	<input type="radio"/> Any other(please specify)
<input checked="" type="radio"/> Deemed University	

5 Ownership Status:

<input type="radio"/> Central Government	<input type="checkbox"/> Trust
<input type="radio"/> State Government	<input type="checkbox"/> Society
<input type="radio"/> Government Aided	<input type="checkbox"/> Section 25 Company
<input checked="" type="radio"/> Self financing	<input type="checkbox"/> Any Other(Please Specify)

6 Other Academic Institutions of the Trust/Society/Company etc., if any

Name of Institutions	Year of Establishment	Programs of Study	Location

7 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)	2018	2021	Yes	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)	--	--	0	4
B.Tech. Automobile Engineering	UG	2011	2011	60	Yes	30	Not accredited (specify visit dates, year)	--	--	0	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)	--	--	0	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)	--	--	0	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	--	--	No	4
B.Tech. Mechanical Engineering	UG	2007	2007	180	Yes	120	Granted accreditation for 5 years for the period (specify period)	2017	2023	0	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	--	--	0	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
										0	2
M.Tech. Industrial Safety & Engineering	PG	2011	2011	12	No	12	Applying first time	--	--	0	2
M.Tech. Manufacturing Engineering	PG	2014	2014	12	No	12	Not accredited (specify visit dates, year)	--	--	0	2
M.Tech. Renewable Energy Technologies	PG	2015	2015	12	No	12	Not accredited (specify visit dates, year)	--	--	0	2
M.Tech. Civil Structural Engineering	PG	2015	2015	12	No	12	Applying first time	--	--	0	2
M.Tech. VLSI Design	PG	2007	2007	12	No	12	Eligible but not applied	--	--	0	2
M.Tech. Automotive Systems Engineering	PG	2009	2009	12	No	12	Not accredited (specify visit dates, year)	--	--	0	2
MCA. Computer Applications	PG	2007	2007	30	No	30	Not accredited (specify visit dates, year)	--	--	0	2
MBA. Business Administration	PG	2007	2007	120	No	120	Not accredited (specify visit dates, year)	--	--	0	2
MBA. Insurance and Risk Management	PG	2007	2007	18	No	18	Not accredited (specify visit dates, year)	--	--	0	2
B.Tech. Civil Engineering	UG	2007	2007	60	Yes	60	Granted accreditation for 3 years for the period (specify period)	2018	2021	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)	2018	2021	0	4
B.Tech. Electronics and Communication Engineering	UG	2007	2007	300	Yes	240	Granted accreditation for 3 years for the period (specify period)	2018	2021	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	0	4
B.Tech. Information Technology	UG	2007	2007	300	Yes	60	Applying first time	--	--	0	4

8 Programs to be considered for Accreditation vide this application:

S No	Level	Discipline	Program
1	Under Graduate	Engineering & Technology	Biotechnology
2	Under Graduate	Engineering & Technology	Computer Science & Engg.
3	Under Graduate	Engineering & Technology	Electronics & Communication Engg.

9 Total number of employees

A. Regular* Employees (Faculty and Staff):

Items	2021-22		2020-21		2019-20	
	MIN	MAX	MIN	MAX	MIN	MAX
Faculty in Engineering (Male)	228	232	292	309	254	265
Faculty in Engineering (Female)	89	92	96	100	80	87
Faculty in Maths, Science & Humanities teaching in engineering program (Male)	49	55	41	45	40	42
Faculty in Maths, Science & Humanities teaching in engineering program (Female)	29	30	14	17	20	21
Non-teaching staff (Male)	442	461	457	476	501	518
Non-teaching staff (Female)	167	174	172	179	209	223

B. Contractual* Employees (Faculty and Staff):

Items	2021-22		2020-21		2019-20	
	MIN	MAX	MIN	MAX	MIN	MAX
Faculty in Engineering (Male)	0	0	0	0	0	0
Faculty in Engineering (Female)	0	0	0	0	0	0
Faculty in Maths, Science & Humanities teaching in engineering Programs (Male)	0	0	0	0	0	0
Faculty in Maths, Science & Humanities teaching in engineering Programs (Female)	0	0	0	0	0	0
Non-teaching staff (Male)	0	0	0	0	0	0
Non-teaching staff (Female)	0	0	0	0	0	0

10 Total number of Engineering students:

Engineering and Technology- UG	<input type="checkbox"/> Shift1	<input type="checkbox"/> Shift2
Engineering and Technology- PG	<input type="checkbox"/> Shift1	<input type="checkbox"/> Shift2
Engineering and Technology- Polytechnic	<input type="checkbox"/> Shift1	<input type="checkbox"/> Shift2
MBA	<input type="checkbox"/> Shift1	<input type="checkbox"/> Shift2
MCA	<input type="checkbox"/> Shift1	<input type="checkbox"/> Shift2

Engineering and Technology- UG Shift-1

Course Name	2021-22	2020-21	2019-20
Total no. of Boys	3529	2535	1690
Total no. of Girls	1226	2677	2531
Total	4755	5212	4221

Engineering and Technology- PG Shift-1

Course Name	2021-22	2020-21	2019-20
Total no. of Boys	57	124	27
Total no. of Girls	24	132	36
Total	81	256	63

11 Vision of the Institution:

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

12 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.

13 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: Program Level Criteria

CRITERION 1	Vision, Mission and Program Educational Objectives	50
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1.1. State the Vision and Mission of the Department and Institute (5)

Kalasalingam Academy of Research and Education (KARE) formerly Arulmigu Kalasalingam College of Engineering was established in 1984 by the pioneering Kalasalingam Anandam Ammal Charities. Located at the pristine foothills of scenic Western Ghats, the college obtained the Deemed to be University status in 2006. The Institution has been serving the society for the past thirty-seven years and it caters to the needs of the students from all walks of the society. KARE offers UG, PG and Ph.D. programmes in various disciplines of engineering, science and humanities. The Institution has been re-accredited by NAAC with 'A' grade with a CGPA of 3.11 in 2015. The university has been producing technically competent professionals as evidenced by the placement records of the institution.

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 department of excellence in quality education and research in the multidisciplinary areas of Biotechnology

Department Mission

1. To imbibe the ability of critical thinking, scholastic attitude and provide solutions for critical problems

2. To embed acumen of life-long learning and zeal to pursue research in various disciplines of Biotechnology.
3. To nurture the ability to create sustainable solutions with a blend of socio-ethical understanding.

The Department was initiated in 2002 by starting a UG program (B.Tech. in Biotechnology) with an initial intake of 30 students that was later increased to 60. After it became part of Kalasalingam University (Kalasalingam Academy of Research and Education), to meet the growing demands, the intake was increased to 120. A PG program (M.Tech. in Biotechnology) was started in the year 2007 with an intake of 12. A Ph.D. program in Biotechnology was also started in the same year. The B.Tech. Biotechnology program was accredited by NBA in 2015 and ABET in 2019.

1.2.State the Program Educational Objectives (PEOs) (5)

Program Educational Objectives

PEO1 - Graduates will attain a general level of competence in order to pursue advanced courses and / or acquire specialized training and skills relevant to their professions.

PEO2 -Graduates will be engineering practitioners and leaders in public and private sector undertakings, who would help solve industry's technological problems and serve our society.

PEO3 - Graduates will learn to uphold ethical conduct in their professions, have effective communication skills, and an affinity towards lifelong learning.

1.3. Indicate where the Vision, Mission and PEOs are published and disseminated among stakeholders (15)

The programme identified the following as stakeholders: Student, Faculty, Alumni, Employers and Parents.

Students are the most prominent players in the program; their feedback is taken into consideration in designing new curricula / or modifying existing curricula, in introducing new elective courses on state-of-the-art technologies or ones that meet prevailing employment requirements; and in improving the teaching-learning process.

Faculty play a vital role in designing the curriculum, establishing the PEOs and / POs of the program, and in the teaching-learning process; they check the consistency of the program

Alumni are an important segment of the program as they are the measure of the long-term success of our program; alumni feedback helps in curriculum design to meet recent trends; they help and guide the students so that PEOs and POs are met.

Employers represent the major end-users of our products, the graduates; they direct the process of designing the program by creating an awareness of current industry needs, thereby providing us inputs to train our students according to industry demands.

Parents are an integral part of the program as they always expect their sons/daughters to succeed in education and land good jobs or pursue higher education.

The Vision and Mission are published in the website of the University (www.kalasalingam.ac.in) and the Department (www.kalasalingam.ac.in/departments.php?getid=1); displayed prominently in the Department premises (in the office and laboratories); published in the Syllabus & Regulations Book, Laboratory Manuals, Course Plans and on the Notice Boards. The Mission and Vision are disseminated to all the stakeholders during Parent-Teachers Association meetings, Class Committee meetings, Student meetings and Freshmen Induction Programs.

The PEOs of the program are published in the University website (<http://kalasalingam.ac.in/site/programme-educational-objectives/>). It is also published in the Curriculum and Syllabus Handbook and in the CoursePlan provided to the students. The PEOs are also displayed at various places in the department. Apart from this, the PEOs are disseminated to all the stakeholders during various interactive sessions including Parent-Teachers Association meetings, meetings with the students, Board of Studies Meetings etc.

Vision, Mission and PEOs Published in University Website



DEPARTMENT OF BIOTECHNOLOGY

ABOUT THE DEPARTMENT

The Department of Biotechnology, one of the vibrant departments of Kalasalingam University (KSU), had its humble beginnings in the year 2002 with its offering of a 4-year undergraduate program in Biotechnology. This young and academically active department has rapidly won many laurels to its credit. In 2004, the department moved to an independent three-story building which houses its research labs, discipline-specific teaching labs, individual faculty offices and classrooms. In 2006, the department was recognized as a research centre for pursuing doctoral programs.

Besides pursuing their regular academic activities, students are encouraged to participate in symposia and workshops. Our students have won many prizes in paper presentations and academic quiz competitions conducted at neighbouring colleges. Students are encouraged to take part in the on-going research activities of the department. Every year our students are selected for prestigious National Academy of Sciences summer fellowships and many have undergone summer training in premier laboratories in India.

The department has five independent teaching laboratories and a centralized instrumentation facility which house sophisticated equipment for the use of both the students and faculty. The equipment at the facility include fluorimeter, densitometer, gel-documentation system, deep freezer, liquid chromatography system, bioscience, UV-VIS Spectrophotometer, dialysis unit and microplate reader.

In addition, the department has a 1000-sq ft research laboratory and a state-of-the-art animal cell-culture facility and Proteomics facility. These facilities have all the basic instruments needed for culturing animal cells, including an inverted microscope, a laminar air-flow system and a CO₂ incubator and 1D Electrophoresis system.

Our faculty members have diversified research expertise. They have been trained in premier institutions in India and abroad and a few of them have held senior positions in biotechnology and pharmaceutical companies. The faculty members of the department are actively involved in research and have ongoing projects funded by major funding agencies of the country.

VISION OF THE DEPARTMENT

Building an indelible reputation as a frontrunner in teaching and research at the National and International levels

MISSION OF THE DEPARTMENT

To provide well-crafted curricula in the various branches of Biotechnology and inculcate the requisite technical and research skills in students so as to render them employable in academic, industrial and health care institutions, in the service of society



Programme Educational Objectives for B.Tech

Programme Educational Objectives(PEO)

The graduates of B.Tech (Biotechnology) are expected to have:

- PEO1: Attained a general level of competence in order to pursue advanced courses and / or acquire specialized training and skills relevant to their chosen profession
- PEO2: Taken up responsible positions in contributing to the society through Academics, Industry and Law
- PEO3: Demonstrated effective managerial skills, and possess the urge to learn and update themselves life-long.

Programme Outcomes(PO)

Graduates will be able to:

1. Understand the fundamental principles of molecular biology, biochemistry, genetics, gene manipulation, gene transfer, chemical engineering and biostatistics.
2. Analyse the problems in the production of biopharmaceuticals and agricultural products as well as optimizing bioprocesses.
3. Recognize the importance of cleaning up the environment, preventing pollution and optimizing the use of resources for sustainable development.
4. Identify, analyse and address complex biological and engineering problems associated with biotechnology.
5. Design a method and apply the techniques of biotechnology towards the prevention, diagnosis and treatment of hereditary and infectious diseases in humans, plants and animals.
6. Communicate effectively in oral and written language with their peers, teachers and the outside world.
7. Work individually and / or as part of a team towards the successful execution of their individual and / or collective responsibilities.
8. Keep them updated on the modern trends and developments in the theory and practice of biotechnology.
9. Grasp the essentials of managing various projects.
10. Perceive the importance of learning throughout their lives about developments in their respective fields.
11. Recognize engineers as responsible technicians who impact society through their knowledge and actions.
12. Realize the importance of ethics and ethical behavior in their professional lives.

Display of Vision, Mission and PEO statements in the Department Premises





B. Tech. - Biotechnology

CURRICULUM AND SYLLABUS
2018-19

School of Bio and Chemical Engineering
KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION
(Deemed to be University)
Aanged Nagar, Krishnagudi - 626 126

Institutional Issues	Technical Issues
To be a Center of Excellence of International Programs in Economics and Business	To Transfer Technical Knowledge, Facilitate Cross-Cultural Understanding and Administrative Management Education and Research
Programmatic Issues	Programmatic Issues
Establishing an independent organization at a University in teaching business studies at the University and International levels	To generate a critical mass of students of business studies and to establish the programs national and research study in order to be a leader from regional to global and adaptation to the various of changes

Programs Educational Objectives (PEOs)

1. Graduates would have obtained a general level of competence in order to pursue advanced studies and to acquire specialized training and skills relevant to their professions.
2. Graduates would be capable to apply independently programs in Public and Private sector workplaces to solve various through Economics, History and Law.
3. Graduates would have become to applied various skills in their professions, have effective communication and managerial skills, and possess the ability to manage and improve their own learning.

IMMUNOLOGY
LABORATORY MANUAL
Course Code: BIT10R 374

School of Bio and Chemical Engineering
KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION
(Dedicated to be University)
Anand Nagar, Kottasaithal - 626 126

Name _____
Reg. No. _____
Year/Sec _____

<p>Academic Vision</p> <p>To be a Center of Excellence in Education and Research</p>	<p>Academic Mission</p> <p>To Produce Technically Competent, Creatively Connected Technologists and Academicians through Quality Education and Research</p>
<p>Department Vision</p> <p>Building an empowered organization, as a team/center in teaching and research at the National and International level.</p>	<p>Department Mission</p> <p>To provide well-crafted curricula in the various branches of technology and in the various branches of knowledge and in the various branches of research and in the various branches of research that are available in the various branches of research, and in the various branches of research, and in the various branches of research.</p>
<p>Program Educational Objectives (B.Tech., B.Arch/Design)</p> <ol style="list-style-type: none"> Graduates would have attained a general level of competence in order to pursue advanced courses and to acquire specialized training and skills relevant to their profession. Graduates would be ready to take up organization positions in Public and Private sectors. Graduates would have acquired the necessary knowledge, skills and attitude to be able to take up research and development work in the various branches of research and in the various branches of research, and in the various branches of research. Graduates would have attained the necessary knowledge, skills and attitude to be able to take up research and development work in the various branches of research and in the various branches of research, and in the various branches of research. 	

Source: Working on college graduation rates as a function of housing and income at the National Longitudinal Study.

KALANJINGAM ACADEMY OF RESEARCH AND EDUCATION
ANANTHAPUR, SRIHILLS AND CO. 426 126

DEPARTMENT OF METALLURGY
SCHOOL OF BIO AND CHEMICAL ENGINEERING
EVEN SEMESTER 2009-2020

COLUMBIAN PLAIN

Table 1. Demographic characteristics of the study population	
Age (years)	Mean (SD)
Gender	Male (n)
Marital status	Married (n)
Education level	High school (n)
Occupation	Unemployed (n)
Religion	Islam (n)
Family size	Mean (SD)
Income (Iranian Rial)	Mean (SD)
Health insurance	Yes (n)
Smoking status	Smoker (n)
Alcohol consumption	Yes (n)
Physical activity	Yes (n)
Stress level	High (n)
Depression level	High (n)
Life satisfaction	Low (n)
Quality of life	Low (n)
Health status	Good (n)
Chronic diseases	Yes (n)
Medication use	Yes (n)
Compliance with treatment	Yes (n)
Healthcare utilization	Yes (n)
Healthcare satisfaction	Low (n)
Healthcare accessibility	Low (n)
Healthcare quality	Low (n)
Healthcare cost	High (n)
Healthcare coverage	Low (n)
Healthcare equity	Low (n)
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ABSTRACT. The primary focus of the contents of the course of Instruction in Engineering is the application of the principles of design, analysis, and synthesis of mechanical systems.

2022.22.00101010 *Basic knowledge about principles of linguistic-theoretical grammar and literature is required*

[illegible]

上海國家書院 圖書館 藏

1. Source: Engineer - BERNARD PETERSON, BALLHALLING MANUFACTURING SYSTEMS CORPORATION
2. Manufacturing Technology - DEVELOPMENT OF THE FUTURE IN THE FUTURE
3. The Future of Manufacturing

EXTENDED ABSTRACTS

at the end of the course, students would be able to:

- 010 3 Explain what an interest rate is and describe the configuration and operation of interest rates.

Abstract: To provide well-earned currency in the various branches of knowledge, and increase the capacity, interest and reward, ILL is custom as is to make the employee's assistance, not be precise and hard to understand, in the nature of service.

Vision, and Mission Displayed in the Notice Board



1.4.State the process for defining the Vision and Mission of the Department, and PEOs of the program (15)

Process of defining Vision and Mission of the Department:

The process of defining of vision and mission is carried out in two stages: viz. Consultative process, Deliberative process. The process of definition is depicted in fig. 1.1.4.1. During the consultative process, the department head consults with various stakeholders including the Sponsoring trust, University administrators, Local community, Industry experts, faculty and alumni. Hence the requirements of the local community, industry focus, faculty expertise, alumni interests, administrative and sponsoring supports are augmented and analysed.

With the analysed report, the department proposes the draft Vision and Mission statements. The draft document will be subjected to the deliberative process composing members from Academic council and Board of Management. The deliberated Vision and Mission are then released for follow up.

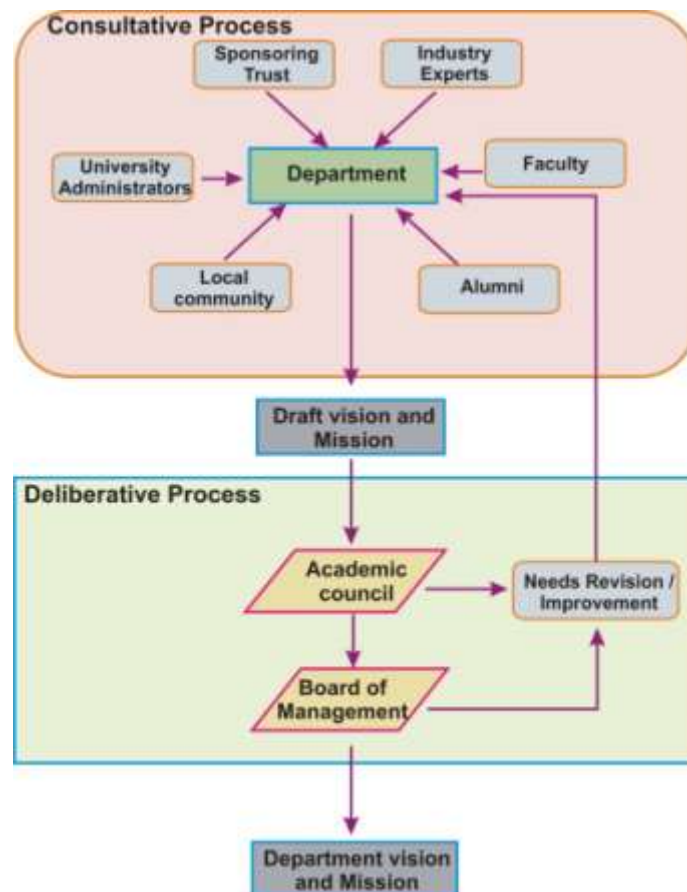


Fig. 1.1.4.1 Process of defining the Vision and Mission of the Department

Process of defining PEOs of the Program:

Definition of PEOs of the Program is carried out in two stages: viz. Consultative process, Deliberative process. Fig. 1.1.4.2 depicts the process of defining the PEO. During the consultative process, the department head consults with various stakeholders including the Parents, Student representatives, Recruiters, Industry experts, faculty and alumni.

With the data received from the stakeholders, the department proposes the draft PEOs of the Program. The draft document will be subjected to the deliberative process composing members from Program Advisory Board, Board of Studies, Academic Council and Board of Management. The deliberated PEOs are then released for follow up.

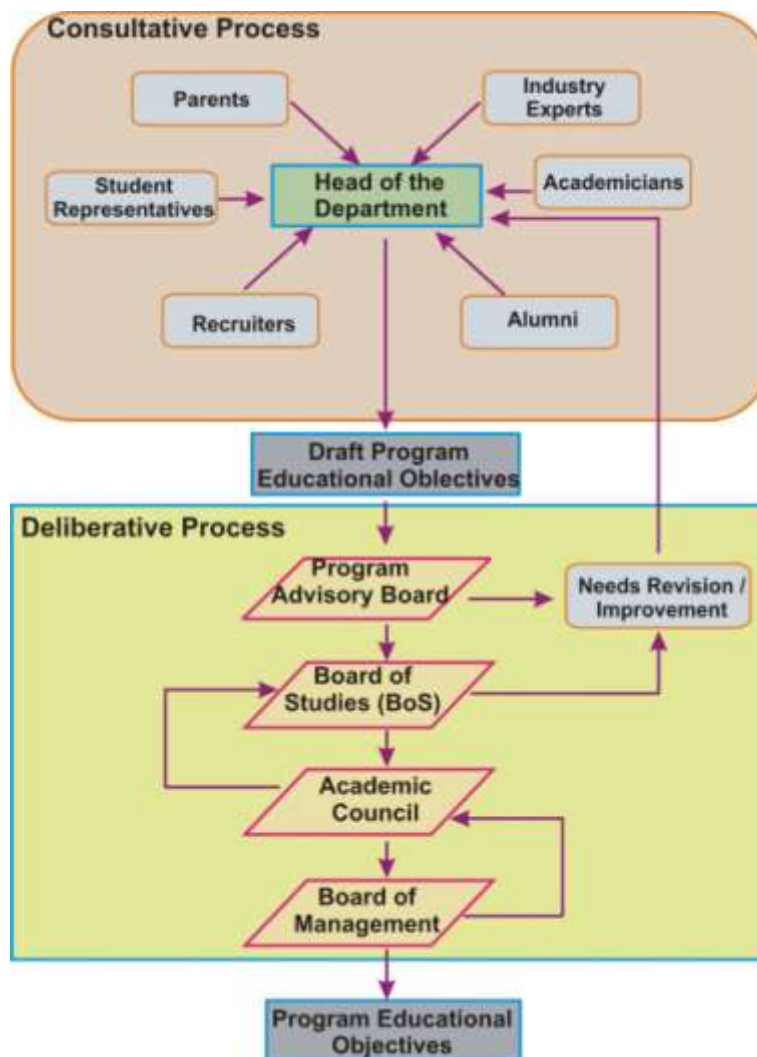


Fig. 1.1.4.2 Process of defining the Program Educational Objectives (PEOs) of the Program

1.5. Establish consistency of PEOs with Mission of the Department

(10)

The mission of the program is to offer quality education to the students.

The first PEO of this program ensures that graduates attain the necessary level of theoretical and practical knowledge to pursue higher education or absorb job-specific training and skills by imparting quality education.

The second PEO lays strong emphasis on how well graduates can translate their knowledge and skills into viable solutions to problems encountered in the various areas of biotechnology, such as healthcare, food, the environment and industrial manufacturing, which is in line with the Department's Mission.

The third PEO stresses on the fitness of graduates for taking up responsible positions as academics, industrial personnel and biomedical specialists in Public and Private sectors after having acquired higher education and training. This is in line with the Mission of the Department.

The Consistency of PEOs with Mission of the Department is displayed in Table B.1.5

PEO Statements	M1 Technical skills and Critical thinking	M2 Research skills and Life-long learning	M3 Sustainable solution and Socio-ethical understanding
PEO1: Graduates will attain a general level of competence in order to pursue advanced courses and / or acquire specialized training and skills relevant to their professions.	3	3	2
PEO2: Graduates will be engineering practitioners and leaders in public and private sector undertakings, who would help solve industry's technological problems and serve our society.	3	2	3
PEO3: Graduates will learn to uphold ethical conduct in their	2	3	3

professions, have effective communication skills, and an affinity towards lifelong learning.			
--	--	--	--

Table B.1.5

<i>Low</i>	1
<i>Moderate</i>	2
<i>High</i>	3

CRITERION 2	Program Curriculum and Teaching –Learning Processes	100
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2.1. Program Curriculum (30)

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

(Describe the process that periodically documents and demonstrates how the program curriculum is evolved considering the POs and PSOs)

The curriculum has been designed in such a way to cater the industrial and research needs. The curriculum design process involves both consultative and deliberative processes involving various committees as per the statutory bodies norms and as well the institute rules, which includes Academic Council (AC), Board of Studies (BoS) and Program Advisory Board (PAB). The curriculum design, development and update process framework are depicted in Fig. 2.1.1.1.

Curriculum design process at KARE can broadly be categorized in three stages:

(i) Need Analysis and Assessment: Need assessment is the basic element of curriculum design, development, and revision. The need assessment shall be carried out to identify the key competencies, desirable characteristics, and desirable learning experiences in curriculum development process. Need Analysis includes but not limited to the following:

- Policy Revision at the National Level National Education Policy
- Statutory and Regulatory Bodies
- UNESCO Curriculum competencies
- Accreditation Bodies
- Professional Bodies
- Stakeholders Feedback
- Industry Associations
- Emerging Thrust Areas

The illustration of the student centric curriculum is depicted in Fig. 2.1.1.2.

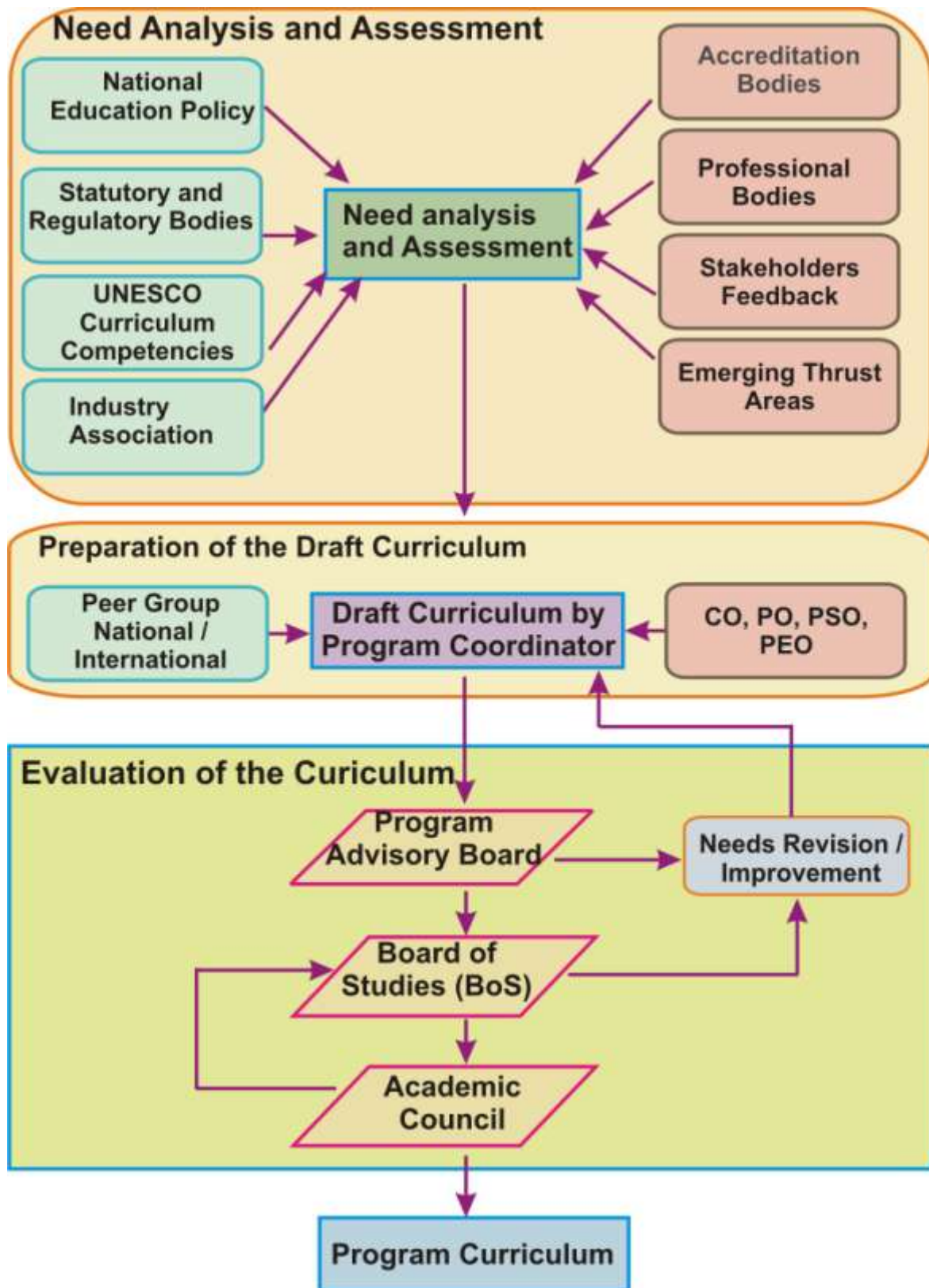


Fig. 2.1.1.1 Process of Designing the Program Curriculum

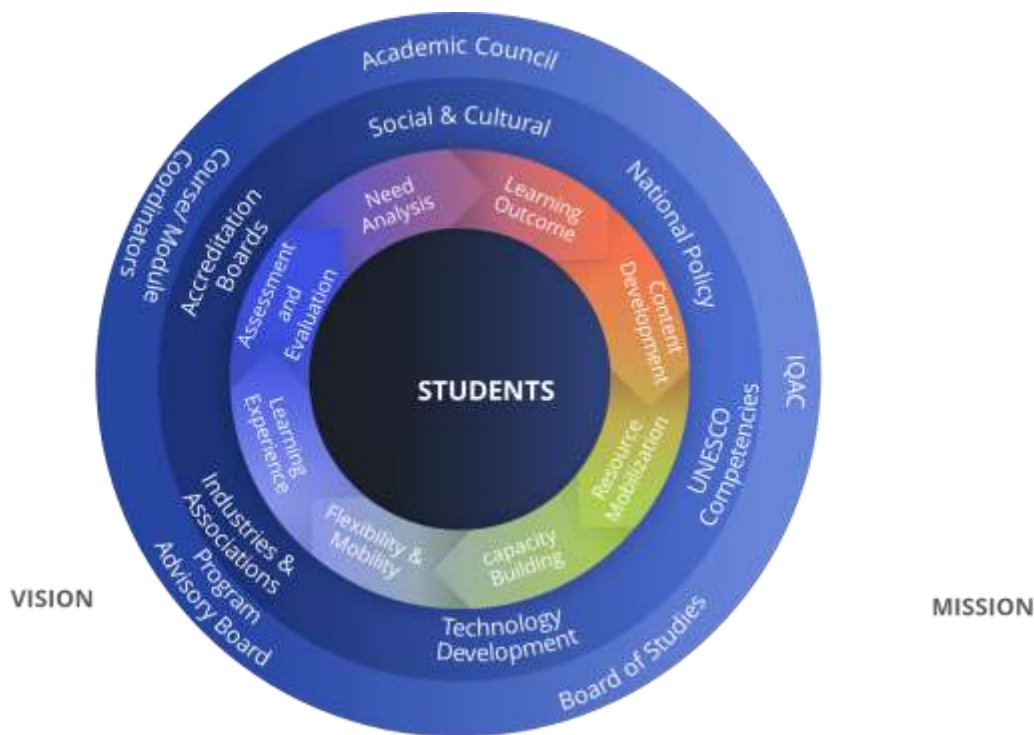


Fig. 2.1.1.2 Illustration for design and development of student-centred curriculum

- (ii) Draft Curriculum:** The Program Coordinator consolidates the Need Analysis report with the team of Course/Module Coordinators and proposes a draft curriculum. The draft curriculum is prepared with the references of peers from National and International Universities, as well as with the compliance of Course Outcomes (COs), Program Outcomes (POs), Program Specific Outcomes (PSOs), Program Educational Objectives (PEOs).
- (iii) Review of the Draft Curriculum:** The draft curriculum will be reviewed by the Program Advisory Board (PAB). PAB will consider revision/improvement for the curriculum, if required. The BoS duly constituted as per norms, consisting of members including experts from Academia and Industry, will review the curriculum. The BoS considers revision/improvement for the curriculum, if required. The Academic Council will

consider the recommendations of the BoS and provide suggestions/approval for the program curriculum.

The curriculum of the Under Graduate Biotechnology program combines the breadth and depth of biotechnology that includes basic mathematics and sciences, Program Electives and Humanities Electives besides Program Cores so that the students can be prepared for a professional career in the biotechnology industries and for higher studies in the field of biotechnology and allied fields.

The program specific criteria specified by two lead Professional Societies, the **American Society of Agricultural and Biological Engineers** and the **American Institute of Chemical Engineers** were consulted and that was taken as input in defining the curriculum. The criteria specified by Agricultural and Similarly Named Engineering Programs and, Biological and Similarly Named Engineering Programs of the lead society American Society of Agricultural and Biological Engineers and by Chemical, Biochemical, Biomolecular, and Similarly Named Engineering Programs of the lead society American Institute of Chemical Engineers was considered for framing our curriculum.

S. No.	Lead society	Program	Criteria	Courses satisfying the criteria
1.	American Society of Agricultural and Biological Engineers	Agricultural and Similarly Named Engineering Programs	The curriculum must include mathematics through differential equations and biological and engineering sciences consistent with the program educational objectives. The curriculum must prepare graduates to apply engineering to agriculture, aquaculture, forestry, human, or natural resources.	<u>Mathematics:</u> <ul style="list-style-type: none"> ✓ Mathematics I ✓ Mathematics II ✓ Mathematics III <u>Engineering Sciences:</u> <ul style="list-style-type: none"> ✓ Basic Civil and Mechanical Engineering ✓ Basic Electrical and Electronics Engineering ✓ Environmental Sciences <u>Biological Sciences:</u> <ul style="list-style-type: none"> ✓ Microbiology ✓ Cell Biology and Genetics

				<ul style="list-style-type: none"> ✓ Principles of Biochemistry ✓ Biochemistry Laboratory ✓ Microbiology Laboratory ✓ Bioenergetics and Metabolism ✓ Cell and Molecular Biology ✓ Cell and Molecular Biology Laboratory ✓ Genetic Engineering ✓ Animal Biotechnology ✓ Plant Biotechnology ✓ Health care Biotechnology ✓ Molecular diagnostics and Therapeutics
		Biological and Similarly Named Engineering Programs	The curriculum must include mathematics through differential equations, a thorough grounding in chemistry and biology and a working knowledge of advanced biological sciences consistent with the program educational objectives. The curriculum must prepare graduates to apply engineering to biological systems.	<u>Mathematics:</u> <ul style="list-style-type: none"> ✓ Mathematics I ✓ Mathematics II ✓ Mathematics III <u>Chemistry:</u> <ul style="list-style-type: none"> ✓ Chemistry ✓ Principles of Biochemistry ✓ Biochemistry Laboratory <u>Biological sciences:</u> <ul style="list-style-type: none"> ✓ Microbiology ✓ Microbiology Laboratory ✓ Cell Biology and Genetics ✓ Cell and Molecular Biology ✓ Cell and Molecular Biology Laboratory ✓ Immunology ✓ Genetic Engineering Laboratory

				<ul style="list-style-type: none"> ✓ Immunology Laboratory <u>Advanced biological sciences:</u> <ul style="list-style-type: none"> ✓ Genetic Engineering ✓ Animal Biotechnology ✓ Plant biotechnology ✓ RNAi Technology ✓ Vaccinology ✓ Functional Genomics
2.	American Institute of Chemical Engineers	Chemical, Biochemical, Biomolecular, and Similarly Named Engineering Programs	The curriculum must provide a thorough grounding in the basic sciences including chemistry, physics, and/or biology, with some content at an advanced level, as appropriate to the objectives of the program. The curriculum must include the engineering application of these basic sciences to the design, analysis, and control of chemical, physical, and/or biological processes, including the hazards associated with these processes.	<u>Mathematics:</u> <ul style="list-style-type: none"> ✓ Mathematics I ✓ Mathematics II ✓ Mathematics III <u>Basic Sciences:</u> <ul style="list-style-type: none"> ✓ Physics I ✓ Physics II ✓ Chemistry ✓ Physics Laboratory ✓ Chemistry Laboratory <u>Biological sciences:</u> <ul style="list-style-type: none"> ✓ Microbiology ✓ Microbiology Laboratory ✓ Cell Biology and Genetics ✓ Cell and Molecular Biology ✓ Cell and Molecular Biology Laboratory ✓ Immunology Laboratory <u>Engineering applications:</u> <ul style="list-style-type: none"> ✓ Bioprocess Calculations ✓ Unit Operations ✓ Bioprocess Principles ✓ Enzyme Technology ✓ Reaction Engineering for

				Biotechnologists ✓ Metabolic Engineering ✓ Bioprocess Instrumentation and Control ✓ Transport Phenomena InBioprocesses ✓ Bioreactor Design And Analysis ✓ Chemical Engineering Laboratory ✓ Bioprocess Laboratory ✓ Biochemical Engineering ✓ Biochemical Engineering Laboratory ✓ Downstream Processing ✓ Downstream Processing Laboratory
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2.1.2. Structure of the Curriculum (5)

Currently three curricular paths are followed: regulations 2013, regulations 2018 and regulations 2021. This program is offered on a Semester Pattern and each academic year consists of two semesters. The odd semester starts from July and ends in November and the even semester starts in December and ends in April. Each semester consists of 90 working days devoted to teaching-learning process and the students are required to maintain 80% attendance for each course so that they are eligible to write their examinations.

Regulation 2021

The structure of B.Tech. Biotechnology curriculum- regulation 2021 is provided in Table B.2.1.2a. A student has to earn a total of 160 credits to obtain the degree in B. Tech., Biotechnology. In addition to the credit requirement for award of degree, students have to complete the required mandatory and complimentary skill courses.

Course Code	Course Title		Total Number of contact hours				Credits
		Lecture (L)	Tutorial (T)	Practical# (P)	X-Component (X)	Total Hours/week	
Foundation Core							
211ENG1301	English for Engineers	2	0	0	3	5	3
211PHY1301	Physics	3	0	2	0	5	4
211MAT1301	Linear Algebra and Calculus	3	2	0	0	5	4
211MEC1201	Introduction to Engineering Visualization	0	0	2	3	5	2
211CSE1401	Problem Solving using computer Programming	1	0	2	3	6	3
211BIT1101	Biology for Engineers	3	0	0	0	3	3
211EEE1301	Basic Electrical and Electronics Engineering	3	0	2	0	5	4
211CHY1301	Chemistry	3	0	2	0	5	4
211MAT1303	Multiple Integration, ODE and complex variable	3	0	2	0	5	4
211MEC1401	Sustainable Design and Manufacturing	1	0	2	3	6	3
211CSE1402	Python Programming	1	0	2	3	6	3
211ECE1301	IoT Sensors and Devices	1	0	0	3	4	2
211MEC1301	Innovation and Entrepreneurship	1	0	0	3	4	2
211MAT1302	Statistics for Engineers	2	0	0	3	5	3
Program Core							
212BIT1301	Microbiology	3	0	3	0	6	4
212BIT1302	Biochemistry	3	0	3	0	6	4
212BIT1303	Cell and Molecular Biology	3	0	3	0	6	4

212CHE1304	Principles of Chemical Engineering	3	1	3	0	7	5
212BIT1304	Bioinformatics	3	0	3	1	7	5
212BIT2305	Bioprocess Principles	3	1	4	0	8	5
212BIT2306	Genetic Engineering	3	1	4	0	8	5
212BIT3307	Biochemical Engineering	3	1	6	1	11	6
212BIT3308	Immunology	3	1	3	0	7	5
212BIT3309	Bio separations: Principles and Applications	3	1	6	1	11	6
212MAT2102	Numerical Methods and Laplace Transforms	3	0	0	0	3	3
Program Elective							
213BITXXXX	Elective I	3	0	0	0	3	3
213BITXXXX	Elective II	3	0	0	0	3	3
213BITXXXX	Elective III	3	0	0	0	3	3
213BITXXXX	Elective IV	3	0	0	0	3	3
213BITXXXX	Elective V	3	0	0	0	3	3
213BITXXXX	Elective VI	3	0	0	0	3	3
213BITXXXX	Elective VII	3	0	0	0	3	3
213BITXXXX	Elective VIII	3	0	0	0	3	3
University Elective Courses							
214XXXXXX X	Open Elective I	4	0	0	0	4	4
214XXXXXX X	Open Elective II	3	0	0	0	3	3
214XXXXXX X	Open Elective III	3	0	0	0	3	3
214XXXXXX X	Open Elective IV	3	0	0	0	3	3
214XXXXXX X	Open Elective V	3	0	0	0	3	3

Experiential Core							
215BIT1101	Design Project I	0	0	9	0	9	3
215BIT1201	Design Project II	0	0	9	0	9	3
215BIT1301	Capstone Project	0	0	30	0	30	10
Experiential Elective							
216BIT2201	(CSP/Internship/ UG Research /Competitions)	0	0	100	0	100	8
Total		100	8	202	26	336	160

Table B.2.1.2a

List of Program Electives

S. No	Course Code	Course Name	L	T	P	C
1.	213BIT1101	Genetics	3	0	0	3
2.	213BIT1102	Human Anatomy and Physiology	3	0	0	3
3.	213BIT1103	Bioorganic Chemistry	3	0	0	3
4.	213BIT1104	Industrial Biotechnology	3	0	0	3
5.	213BIT1105	Protein Science and Engineering	3	0	0	3
6.	213BIT1106	Food Processing and Technology	3	0	0	3
7.	213CHE1122	Reaction Engineering for Biotechnologists	3	0	0	3
8.	213CHE1123	Mass Transfer	3	0	0	3
9.	213BIT2107	Clinical Biochemistry	3	0	0	3
10.	213BIT2108	Environmental Biotechnology	3	0	0	3
11.	213BIT2109	Healthcare Biotechnology	3	0	0	3
12.	213BIT2110	Enzyme Technology	3	0	0	3
13.	213BIT2111	Agricultural Biotechnology	3	0	0	3
14.	213BIT2112	Bioenergy	3	0	0	3
15.	213BIT2113	Drug Design and Development	3	0	0	3
16.	213BIT2114	Infectious Diseases	3	0	0	3
17.	213BIT3115	Animal Biotechnology	3	0	0	3
18.	213BIT3116	Plant Biotechnology	3	0	0	3
19.	213BIT3117	IPR in Biotechnology	3	0	0	3
20.	213BIT3118	Bioreactor Design and Analysis	3	0	0	3
21.	213BIT3119	Biosensors	3	0	0	3
22.	213BIT3120	Molecular Diagnostics and Therapeutics	3	0	0	3
23.	213BIT3121	Radiation Biology	3	0	0	3

24.	213BIT3122	Clinical Trials and Management	3	0	0	3
25.	213BIT3123	Biomaterials	3	0	0	3
26.	213BIT3124	Entrepreneurship in Biotechnology	3	0	0	3
27.	213BIT3125	Stem Cell Technology	3	0	0	3
28.	213BIT3126	Cell Culture Technologies	3	0	0	3
29.	213BIT3127	Evolutionary Biology	3	0	0	3
30.	213BIT3128	Tissue Engineering	3	0	0	3

Regulations 2018

The structure of B.Tech., Biotechnology curriculum- regulation 2018 is provided in Table B.2.1.2b. A student has to earn a total of 160 credits to obtain the degree in B. Tech., Biotechnology. In addition to the credit requirement for award of degree, students have to complete the required mandatory and non-CGPA courses.

Course Code	Course Title	Total Number of contact hours				Credits
		Lecture (L)	Tutorial (T)	Practical # (P)	Total Hours/week	
Basic Sciences and Mathematics						
PHY18R176	Physics for Biotechnology	3	1	2	6	5
CHY18R171	Chemistry	3	1	2	6	5
MAT18R101	Calculus and Linear Algebra	3	1	0	4	4
MAT18R102	Multiple Integration, Ordinary Differential Equations and Complex Variable	3	1	0	4	4
MAT18R201	Biostatistics	3	1	0	4	4
BIT18R101	Biology for Engineers	3	0	0	3	3
Humanities and Social Science						
HSS18R151	English for Technical Communication	2	0	2	4	3
Soft skills						
HSS18R101	Soft skills-I	2	0	0	2	1
HSS18R102	Soft skills-II	2	0	0	2	1

HSS18R201	Soft skills-III	2	0	0	2	1
Basic Engineering						
EEE18R171	Basic Electrical and Electronics Engineering	3	1	2	6	5
MEC18R151	Engineering Graphics and Design	3	0	2	5	3
CSE18R171	Programming for Problem Solving	3	1	2	6	5
MEC18R152	Engineering Practice	3	0	2	5	3
BIT18R102	Cell Biology and Genetics	3	0	0	3	3
CHE18R275	Principles of Chemical Engineering	3	1	3	7	5
Program Core						
a. Core Courses						
BIT18R271	Microbiology	3	1	3	7	5
BIT18R272	Principles of Biochemistry	3	1	3	7	5
BIT18R273	Molecular Biology	3	0	3	6	4
BIT18R274	Bioinformatics	3	1	3	7	5
BIT18R205	Bioenergetics and Metabolism	3	1	0	4	4
BIT18R371	Bioprocess Principles	3	1	4	8	5
BIT18R372	Genetic Engineering	3	1	4	8	5
BIT18R373	Biochemical Engineering	3	1	6	10	5
BIT18R374	Immunology	3	1	3	7	5
BIT18R471	Bioseparations: Principles and Applications	3	1	6	10	5
b. Community Service Project						
BIT18R399	Community Service Project	0	0	3	3	3
c. Project Work						

BIT18R498	Project work-I	0	0	6	6	2
BIT18R499	Project work-II	0	0	30	30	8
Elective Courses						
a. Professional Elective						
BIT18RXXX	Elective I	3	0	0	3	3
BIT18RXXX	Elective II	3	0	0	3	3
BIT18RXXX	Elective III	3	0	0	3	3
BIT18RXXX	Elective IV	3	0	0	3	3
BIT18RXXX	Elective V	3	0	0	3	3
BIT18RXXX	Elective VI	3	0	0	3	3
b. Open Elective						
XXX18RXXX	Open Elective I	3	0	0	3	3
XXX18RXXX	Open Elective II	3	0	0	3	3
XXX18RXXX	Open Elective III	3	0	0	3	3
XXX18RXXX	Open Elective IV	3	0	0	3	3
XXX18RXXX	Open Elective V	3	0	0	3	3
XXX18RXXX	Open Elective VI	3	0	0	3	3
c. Humanities Elective						
HSS18RXXX	Humanities Elective I	3	0	0	3	3
HSS18RXXX	Humanities Elective II	3	0	0	3	3
Internship/ Industry Training						
BIT18R397	Internship/ Industry Training	0	0	90	90 (15 days)	2
Total		116	17	181	314	160

Table B.2.1.2b

List of Professional Electives

S. No	Course Code	Course Name	L	T	P	C
1.	BIT18R310	Pharmaceutical Biotechnology	3	0	0	3
2.	BIT18R311	Healthcare Biotechnology	3	0	0	3
3.	BIT18R402	Animal Biotechnology	3	0	0	3

4.	BIT18R409	Cancer Biology	3	0	0	3
5.	BIT18R419	Molecular Diagnostics and Therapeutics	3	0	0	3
6.	BIT18R422	Radiation biology	3	0	0	3
7.	BIT18R424	Clinical Trials and Management	3	0	0	3
8.	BIT18R427	Biomaterials and Bioimaging	3	0	0	3
9.	BIT18R206	Protein Science and Engineering	3	0	0	3
10.	BIT18R315	Biophysics	3	0	0	3
11.	BIT18R314	Drug Design and Development	3	0	0	3
12.	BIT18R420	Signal transduction	3	0	0	3
13.	BIT18R421	Functional Genomics	3	0	0	3
14.	BIT18R425	Systems Biology	3	0	0	3
15.	BIT18R426	Structural Biology	3	0	0	3
16.	BIT18R204	Industrial Biotechnology	3	0	0	3
17.	BIT18R309	Food Processing and Technology	3	0	0	3
18.	BIT18R312	Enzyme Technology	3	0	0	3
19.	BIT18R313	Metabolic Engineering	3	0	0	3
20.	CHE18R320	Reaction Engineering for Biotechnologists	3	0	0	3
21.	CHE18R321	Mass Transfer	3	0	0	3
22.	BIT18R407	Bioreactor Design and Analysis	3	0	0	3
23.	BIT18R417	Biosensors	3	0	0	3
24.	BIT18R207	Analytical Techniques in Biotechnology	3	0	0	3
25.	BIT18R403	Plant Biotechnology	3	0	0	3
26.	BIT18R406	IPR in Biotechnology	3	0	0	3
27.	BIT18R423	Recombinant Protein Production	3	0	0	3
28.	BIT18R429	Entrepreneurship in Biotechnology	3	0	0	3
29.	BIT18R430	Stem Cell Technology	3	0	0	3
30.	BIT18R431	Bioenergy	3	0	0	3
31.	BIT18R322	Nanobiotechnology	3	0	0	3
32.	BIT18R323	Plant Bioinformatics	3	0	0	3
33.	BIT18R324	Molecular pathogenesis	3	0	0	3
34.	BIT18R412	RNAi Technology	3	0	0	3
35.	BIT18R413	Vaccinology	3	0	0	3
36.	BIT18R414	Bioprocess Instrumentation and Control	3	0	0	3
37.	BIT18R415	Transport Phenomena in Biological Systems	3	0	0	3

List of Humanities Electives

S. No	Course Code	Course Name	L	T	P	C
1.	HSS18R001	Management Concepts and Techniques	3	0	0	3
2.	HSS18R002	Marketing Management	3	0	0	3
3.	HSS18R003	Organizational Psychology	3	0	0	3
4.	HSS18R004	Project Management	3	0	0	3
5.	HSS18R005	Stress Management and Coping Strategies	3	0	0	3
6.	HSS18R006	Engineering Economics	3	0	0	3
7.	HSS18R007	Human Resource Management and Labour Law	3	0	0	3
8.	HSS18R008	Entrepreneurship Development	3	0	0	3
9.	HSS18R009	Cost Analysis and Control	3	0	0	3
10.	HSS18R010	Product Design and Development	3	0	0	3
11.	HSS18R011	Business Process Reengineering	3	0	0	3
12.	HSS18R012	Political Economy	3	0	0	3
13.	HSS18R013	Professional Ethics	3	0	0	3

Regulations 2013

The structure of B. Tech., Biotechnology curriculum- regulation 2013 and credit distribution is provided in Table 2.1.2c. A student has to earn a total of 183 credits to obtain the degree in B. Tech. Biotechnology from Semester I to Semester VIII. The curriculum is designed to incorporate basic sciences, engineering and core courses. In the fifth, sixth and seventh semesters the students are offered elective courses; two interdisciplinary (free) elective courses are made mandatory in the curriculum. In the eighth semester a project work which carries 10 credits and a self- study elective with 3 credits are offered.

Course Code	Course Title	Total Number of contact hours				Credits
		Lecture (L)	Tutorial (T)	Practical # (P)	Total Hours	
Semester I						
HSS101	English for Technical Communication I	2	0	0	2	2
MAT103	Mathematics I	3	0	0	3	3
PHY131	Physics I	3	0	0	3	3
CHY106	Chemistry	3	0	0	3	3

CSE102	Programming Languages	2	0	0	2	2
EEE101	Basic Electrical and Electronics Engineering	4	0	0	4	4
CHY182	Chemistry Laboratory	0	0	3	3	1
CSE181	Programming Language Laboratory	0	0	3	3	1
Semester II						
HSS102	English for Technical Communication II	2	0	0	2	2
MAT104	Mathematics II	3	0	0	3	3
PHY132	Physics II	3	0	0	3	3
CIV101	Basic Civil and Mechanical Engineering	4	0	0	4	4
CHY102	Environmental Sciences	2	0	0	2	2
MEC101	Engineering Drawing	1	0	3	4	2
BIT103	Cell Biology and Genetics	3	0	0	3	3
MEC181	Workshop	0	0	3	3	1
PHY183	Physics Laboratory	0	0	3	3	1
HSS036	Soft skills-I	2	0	0	2	1
Semester III						
MAT202	Mathematics III	3	0	0	3	3
CHE253	Bioprocess Calculations	3	1	0	4	4
BIT204	Microbiology	3	0	0	3	3
BIT209	Molecular Biology	3	0	0	3	3
BIT211	Principles of Biochemistry	3	0	0	3	3
BIT214	Analytical Techniques in Biotechnology	3	0	0	3	3
BIT281	Biochemistry Laboratory	0	0	3	3	2
BIT283	Microbiology Laboratory	0	0	3	3	2
BIT286	Cell and Molecular Biology Laboratory	0	0	3	3	2
HSS037	Soft skills-II	2	0	0	2	1

Semester IV						
HSSXXX	Humanities Elective I	3	0	0	3	3
CHE252	Unit Operations	3	1	0	4	4
BIT203	Bioenergetics and Metabolism	3	1	0	4	4
BIT205	Industrial Biotechnology	3	0	0	3	3
BIT215	Bioinformatics and Computational Biology	3	1	0	4	4
BIT216	Protein Science and Engineering	3	0	0	3	3
BIT288	Computational Biology Laboratory	0	0	3	3	2
CHE291	Chemical Engineering Laboratory	0	0	3	3	2
HSS038	Soft skills-III	2	0	0	2	1
Semester V						
BITXXX	Major Elective I	3	0	0	3	3
	Minor Elective I	3	0	0	3	3
BIT303	Bioprocess Principles	3	1	0	4	4
BIT304	Genetic Engineering	3	1	0	4	4
BIT322	Enzyme Technology	3	1	0	4	4
CHE357	Reaction Engineering for Biotechnologists	3	0	0	3	3
BIT387	Bioprocess Laboratory	0	0	4	4	2
BIT388	Genetic Engineering Laboratory	0	0	4	4	2
BIT398	Community Service Project-Phase I	0	0	2	2	1
Semester VI						
BITXXX	Major Elective II	3	0	0	3	3
HSSXXX	Humanities Elective II	3	0	0	3	3
	Free Elective I	3	0	0	3	3
	Minor Elective II	3	0	0	3	3
BIT305	Biochemical Engineering	3	1	0	4	4

BIT306	Immunology	3	1	0	4	4
BIT389	Immunology Laboratory	0	0	3	3	2
BIT390	Biochemical Engineering Laboratory	0	0	6	6	2
BIT399	Community Service Project-Phase II	0	0	3	3	2
Semester VII						
HSSXXX	Humanities Elective III	3	0	0	3	3
	Free Elective II	3	0	0	3	3
BITXXX	Major Elective III	3	0	0	3	3
BITXXX	Major Elective IV	3	0	0	3	3
BIT401	Animal Biotechnology	4	0	0	4	4
BIT402	Plant Biotechnology	3	0	0	3	3
BIT403	Downstream Processing	3	1	0	4	4
BIT491	Downstream Processing Laboratory	0	0	6	6	2
Semester VIII						
BITXXX	Self-study Elective	3	0	0	3	3
BIT499	Project Work	0	0	26	26	10
Total		138	10	84	232	183

Table B.2.1.2c

List of Major Electives

Course Code	Course Title	L	T	P	C
BIT308	Spectroscopic Methods For Structure Determination	3	0	0	3
BIT309	Food Processing and Technology	3	0	0	3
BIT310	Pharmaceutical Biotechnology	3	0	0	3
BIT311	Healthcare Biotechnology	3	0	0	3
BIT313	Metabolic Engineering	3	0	0	3
BIT314	Drug Design and Development	3	0	0	3
CHE352	Bioprocess Instrumentation and Control	3	0	0	3
CHE358	Transport Phenomena in Biological Systems	3	0	0	3

BIT405	Nanobiotechnology	3	0	0	3
BIT406	IPR in Biotechnology	3	0	0	3
BIT407	Bioreactor Design and Analysis	3	0	0	3
BIT409	Cancer Biology	3	0	0	3
BIT410	Biomedical Engineering	3	0	0	3
BIT412	RNAi Technology	3	0	0	3
BIT413	Vaccinology	3	0	0	3
BIT417	Biosensors	3	0	0	3
BIT418	Molecular Pathogenesis	3	0	0	3
BIT419	Molecular Diagnostics and Therapeutics	3	0	0	3
BIT420	Signal Transduction	3	0	0	3
BIT421	Functional Genomics	3	0	0	3
BIT422	Radiation Biology	3	0	0	3
BIT423	Recombinant Protein Production	3	0	0	3
BIT424	Clinical Trials and Management	3	0	0	3

List of Minor Electives

Course Code	Course Title	L	T	P	C
CHE354	Mass Transfer	3	0	0	3
CHE355	Bioprocess Plant Design Economics	3	0	0	3
CHE356	Chemical and Bio-thermodynamics	3	0	0	3
CHE314	Colloids & Surface Science	3	0	0	3
CIV322	Environmental Impact Assessment	3	0	0	3
CIV415	Solid Waste Management	3	0	0	3
CIV416	Industrial Wastewater Management	3	0	0	3
CSE103	Data Structures	3	0	0	3
EIE409	Biomedical Instrumentation	3	0	0	3
EIE416	Optimization Techniques	3	0	0	3
INT303	Database Management systems	3	0	0	3

List of Humanities Electives

Code No.	Subject	L	T	P	C
HSS001	Total Quality Management	3	0	0	3
HSS002	Engineering Management	3	0	0	3
HSS004	Industrial Psychology	3	0	0	3
HSS005	Consumer Psychology	3	0	0	3
HSS006	Professional Ethics	3	0	0	3
HSS007	Operations Management	3	0	0	3
HSS008	Introduction to Economics	3	0	0	3

HSS010	International Trade and Finance	3	0	0	3
HSS011	Information Systems for Managerial Decision Making	3	0	0	3
HSS013	Cost Analysis and Control	3	0	0	3
HSS014	Introduction to Marketing Management	3	0	0	3
HSS016	Organizational Psychology	3	0	0	3
HSS017	International Economics	3	0	0	3
HSS018	Communication Skills	3	0	0	3
HSS022	Banking Theory and Practice	3	0	0	3
HSS023	Entrepreneurship Development	3	0	0	3
HSS025	Science Fiction: An Appreciation	3	0	0	3
HSS026	German - I	3	0	0	3
HSS028	French - I	3	0	0	3
HSS030	Science Technology and Medicine in India: A Historical Perspective	3	0	0	3
HSS033	Modern Science in India	3	0	0	3
HSS035	History of Science and Technology	3	0	0	3

2.1.3. State the components of the curriculum (5)

Program curriculum grouping based on course components

Regulations 2021

The total 160 credits are distributed in the following six different categories which are described below.

- i. Foundation Core
- ii. Program Core
- iii. Program Elective
- iv. University Elective Courses
- v. Experiential Core
- vi. Experiential Elective

i. Foundation Core:

Foundation core courses ensure the attainment of generic engineering competencies of UG engineering graduates of all programmes to the expected level. The foundation core courses comprise courses related to basic sciences and mathematics, basic engineering sciences, humanities and design and development of multi-disciplinary solutions using modern tools.

ii. Program Core:

Programme core consists of set of courses required for the students to attain program

outcomes. Core courses cover a total of 52 credits. Microbiology, Biochemistry, Cell and Molecular Biology, Principles of Chemical Engineering, Bioinformatics, Bioprocess Principles, Genetic Engineering, Biochemical Engineering, Immunology, Bio separations: Principles and Applications and Numerical Methods and Laplace Transforms are the courses that are included in the ‘core courses’ category. These courses are offered as “Integrated Course” (Theory plus Laboratory). Courses such as Bioinformatics, Biochemical Engineering and Bio separations: Principles and Applications include other forms of learning called X-activity with one credit for activity session of three hours per week.

iii. Program Elective:

Programme electives shall cover the depth and breadth to further strengthen the programme specific knowledge and if chosen by a student in a particular subject area shall lead to specialization in that area.

iv. University Elective:

University electives are the courses offered across the schools to enhance the breadth and professional competency of the students. The students can register for courses in engineering (offered by schools other than the program of study), liberal arts, and sciences and mathematics.

v. Experiential Core

Experiential core courses shall provide project experiences to enhance technical competence and creativity through reflective problem-solving with multiple potential avenues of inquiry. Apart from Capstone Design course (conceive, design, build, and test prototypes), students shall have two other courses (three credits each) with project experiences from Design-Build and Design-Build-Operate. Capstone project will be a semester long project work in the final year of study for which 10 credits are allotted.

vi. Experiential Elective

Experiential elective courses will provide the scope to transform learning into action to achieve the unique goals of the students. The courses may include competitions to drive solution-oriented and critical thinking, internships with dynamic companies, community-focused project/activity and research-oriented project.

In addition of above components, curriculum for B.Tech. Biotechnology (2021 regulation) also includes the following components:

Mandatory Courses

The courses offered in this category are prescribed by All India Council of Technical Education (AICTE), a mandatory learning for the undergraduate students. The mandatory courses don't carry any credit; however, students should pass the end semester examination. The following courses are offered as part of Mandatory Courses:

1. Environmental Sciences
2. Indian Constitution
3. Essence of Indian Traditional Knowledge

One-credit courses

To enhance the skills of UG biotechnology students and to give them real-time exposure to what is happening in industry/ research, 15hour, one-credit courses are offered by the department. These courses are offered either by Industrial experts or Scientists from Research Laboratories or faculty from universities abroad on the topics of industrial relevance. These courses shall enhance the student's professional competencies and give exposure to current industry practices. The course content, schedule, and expert profile shall be approved by the Board of Studies. The mode of teaching includes case studies, industrial visits and/or hands-on-training sessions. Their understanding of knowledge will be evaluated by two examinations conducted by the course instructor. The courses are normally offered to students in their V semester of the program or later. Credits accumulated by completing three or four such courses can be compensated for an elective course (Honors / Professional Elective courses).

Online Courses

The students are also encouraged to enroll for courses offered by MOOC platforms such as NPTEL, Swayam, Coursera and edX to improve their self-learning capacity and to enhance their breadth/depth of knowledge in the discipline. Credit transfer for the courses from the MOOC platforms will be considered under Program Elective Courses and University Open Elective courses. The students can earn up to 20% of the total credits required for the program.

Honors Course:

The students can also enroll for Honors courses, which are advanced level courses included in the program that helps in expanding the knowledge of the students in the field of biotechnology. Students who earn 20 extra credits in addition to the program requirement are eligible for B.Tech.

Honors degree.

List of Honors Courses

S.No	Course Code	Course name	L	T	P	C
1.	217BIT1101	Analytical Techniques in Biotechnology	3	0	0	3
2.	217BIT1102	Biophysics	3	0	0	3
3.	217BIT1103	Nanobiotechnology	3	0	0	3
4.	217BIT2104	Metabolic Engineering	3	0	0	3
5.	217BIT2105	Molecular Pathogenesis	3	0	0	3
6.	217BIT2106	Cancer Biology	3	0	0	3
7.	217BIT2107	Plant Bioinformatics	3	0	0	3
8.	217BIT3108	Functional Genomics	3	0	0	3
9.	217BIT3109	Recombinant Protein Production	3	0	0	3
10.	217BIT3110	RNAi Technology	3	0	0	3
11.	217BIT3111	Vaccinology	3	0	0	3
12.	217BIT3112	Bioprocess Instrumentation and Control	3	0	0	3
13.	217BIT3113	Transport Phenomena in Biological Systems	3	0	0	3
14.	217BIT3114	Signal Transduction	3	0	0	3
15.	217BIT3115	Structural Biology	3	0	0	3
16.	217BIT3116	Systems Biology	3	0	0	3

Complimentary Skill Courses:

The courses offered under this category are to complement the knowledge, skill and attitude acquired through the regular curricular courses through co-curricular and extra-curricular activities. No credits shall be awarded for the courses under this category.

The percentage of content, total contact hours and total number of credits for each component of B.Tech. Biotechnology Curriculum as per 2021 regulations is tabulated in Table B.2.1.3a. Credit distribution in B. Tech., Biotechnology Curriculum as per 2021 regulation is depicted in the Figure 2.1.3a.

Course Component	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total number of credits
Basic Sciences (including Mathematics)	13.75	420	22
Engineering Sciences	8.75	390	14
Humanities and Social Sciences	5.00	240	8
Program Core	32.50	1200	52
Program Electives	15.00	360	24
Open Electives (University Electives)	10.00	240	16
Project(s) (Final year Project + Design project I & II)	10.00	720	16
Internships/Seminars	5.00	100	8
Any other (Please specify) Mandatory Course	-	24	-
Total number of Credits			160

Table B.2.1.3a

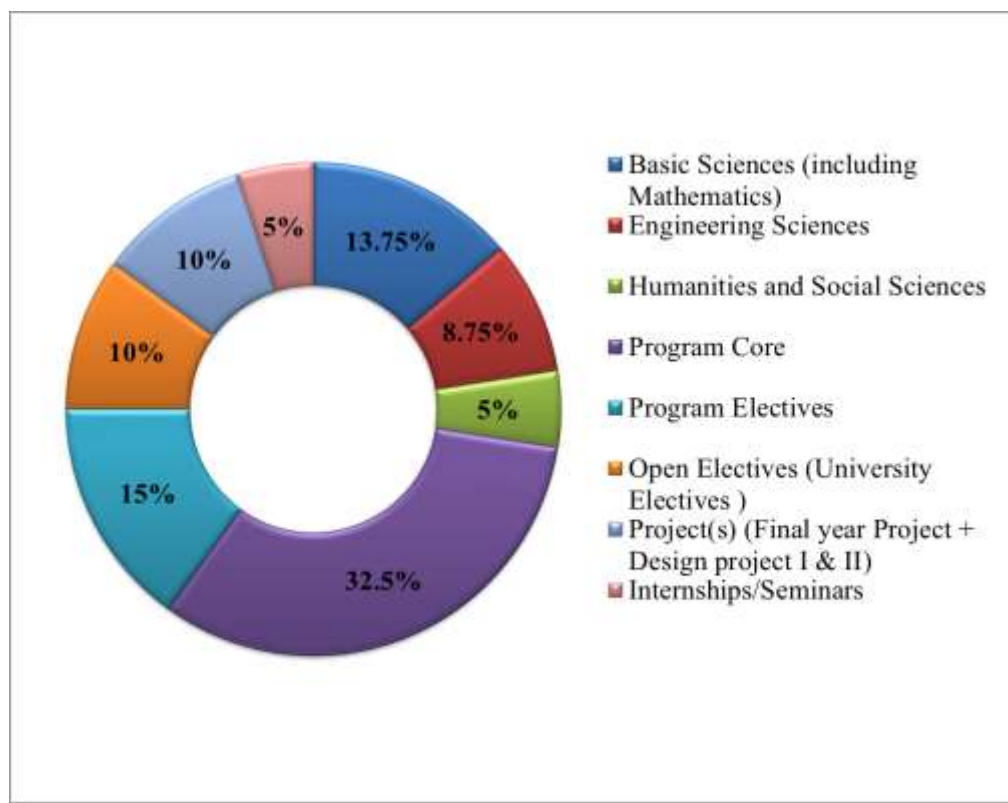


Figure 2.1.3a: Credit distribution in B. Tech., Biotechnology Curriculum (2021R)

Regulations 2018

The total 160 credits are distributed in the following six different categories which are described below.

- I. Basic Sciences and Mathematics
- II. Humanities and Social Science
- III. Basic Engineering
- IV. Program Core
- V. Elective courses
- VI. Internship/ Industry Training

I. Basic Sciences and Mathematics

A total of 25 credits are allotted for basic sciences and mathematics courses. Basic sciences courses include 'Physics for Biotechnology' with laboratory and chemistry with laboratory. The Physics syllabus is designed specifically for biotechnology students that comprises of concepts and theories that are necessary for understanding the principles involved in Computational Biology, Bioprocess Modeling and Biophysics. Calculus and Linear Algebra, Multiple Integration, Ordinary Differential

Equations and Complex Variable and Biostatistics are the mathematics courses included in the curriculum. These courses are absolutely necessary for understanding various concepts in Biotechnology. Biostatistics is a mathematics course specifically designed for biotechnology students which provide basic concepts that are vital for understanding of core concepts in Computational Biology, Bioprocess Engineering, Bioprocess Modeling, Chemical Engineering and Biochemical Engineering and analysis of experimental results obtained during project work.

II. Humanities and Social Science

Humanities and social science courses cover a total of 12 credits. English for Technical Communication and soft-skills courses are included in this category. These courses provide students an opportunity to learn English as a language and help them to improve in reading, listening, writing and speaking skills in English. Soft-skills courses are intended to inculcate personal attributes and harmonious interaction abilities in students. Humanities electives are courses that improve managerial and professional skills in students. Humanities electives cover a total of 6 credits.

III. Basic Engineering

Basic engineering courses include Basic Electrical and Electronics Engineering, Engineering Graphics and Design, Programming for Problem Solving, Engineering Practice, Principles of Chemical Engineering, Cell Biology and Genetics. A total of 24 credits are allotted for this category.

IV. Program Core

Program core includes three categories namely core courses, community service project and project work. Core courses cover a total of 48 credits. Microbiology, Principles of Biochemistry, Molecular Biology, Bioinformatics, Bioenergetics and Metabolism, Bioprocess Principles, Genetic Engineering, Biochemical Engineering, Immunology and Bioseparations: Principles and Applications are the courses that are included in the ‘core courses’ category. These courses are offered as “Theory” or “Integrated Course” (Theory plus Laboratory). Students will complete a community service project as part of the curriculum, which enables them to understand and analyze the real-time problems of a community and applying the technical skills that they have earned to

find solutions to the problem. 3 credits are provided to the community service project. Apart from this, students will undergo a project work during the final year of the program for which 10 credits are allotted.

V. Elective courses

Elective courses are classified into major electives and open electives. Major electives are allied courses that add strength to the core courses. A total of 18 credits are covered by major elective courses. Open elective courses are offered with an intention of inculcating the interdisciplinary ideas and knowledge in students. A student can choose open elective courses from a department other than what he/she studies. For example, a biotechnology student can opt for a course offered by food technology department. 18 credits are provided to the open elective courses.

VI. Internship/ Industry Training

Two credits are provided to students for attending an internship or industry training program during the summer/winter holidays.

The percentage of content, total contact hours and total number of credits for each component of B.Tech. Biotechnology Curriculum as per 2018 regulations is tabulated in Table B.2.1.3b. Credit distribution in B. Tech., Biotechnology Curriculum as per 2018 regulation is depicted in the Figure 2.1.3b.

Course Component	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total number of credits
Basic Sciences and Mathematics	15.63	405	25
Engineering Sciences	15.00	480	24
Humanities and Social Sciences (including Humanities Electives)	7.50	240	12
Program Core (Core Courses)	30.00	1110	48
Program Electives	11.30	270	18
Open Electives	11.30	270	18

Project(s) (Final year Project + Community Service Project)	8.13	585	13
Internships/Seminars	1.25	90	2
Any other (Please specify) Mandatory Course	-	24	-
Total number of Credits			160

Table B.2.1.3b

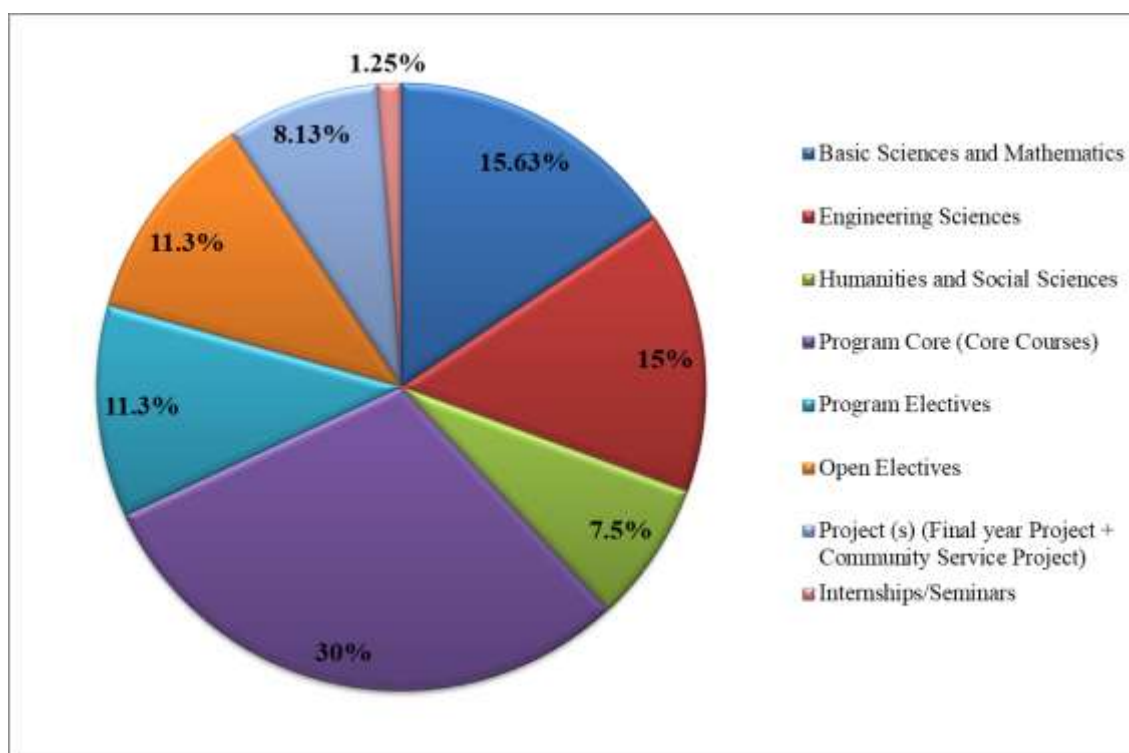


Figure 2.1.3b: Credit distribution in B. Tech., Biotechnology Curriculum (2018R)

In addition of above components, curriculum for B.Tech. Biotechnology also includes the following components:

Mandatory Courses

The courses offered in this category are prescribed by All India Council of Technical Education (AICTE) a mandatory learning for the undergraduate students. The mandatory courses don't carry any credit; however, students should pass the end semester examination. The following courses are offered as part of Mandatory Courses:

1. MAN18R001 - Environmental Sciences
2. MAN18R002 - Indian Constitution

3. MAN18R003 - Essence of Indian Traditional Knowledge

One-credit courses

To enhance the skills of UG biotechnology students and to give them real-time exposure to what is happening in industry/ research, 15 hr, one-credit courses are offered by the department. These courses are offered either by Industrial experts or Scientists from Research Laboratories or faculty from universities abroad on the topics of industrial relevance. These courses shall enhance the student's professional competencies and give exposure to current industry practices. The course content, schedule, and expert profile shall be approved by the Board of Studies. The mode of teaching includes case studies, industrial visits and/or hands-on-training sessions. Their understanding of knowledge will be evaluated by two examinations conducted by the course instructor. The courses are normally offered to students in their V semester of the program or later. Credits accumulated by completing three or four such courses can be compensated for an elective course (Honors / Professional /Open Elective courses).

List of One-credit courses offered by the Department of Biotechnology

S. No	Course Code	Name of the Course
1.	BITX001	Current Good Manufacturing Practice
2.	BITX002	Biological Networks
3.	BITX003	Bio-separation in Phytochemistry
4.	BITX004	Entrepreneurship development
5.	BITX005	Biopharmaceutical Production: An industry Perspective
6.	BITX006	Bioelectrochemical Engineering

Online Courses

The students are also encouraged to enroll for courses offered by MOOC platforms such as NPTEL, Swayam, Coursera and edX to improve their self-learning capacity and to enhance their breadth/depth of knowledge in the discipline. Credit transfer for the courses from the MOOC platforms will be considered under Program Elective Courses and University Open Elective courses. The students can earn up to 20% of the total credits required for the program.

List of Online courses completed by the students

S.No	Course code	Name of the Course	Platform
1	BITO001	Medical Biomaterials	NPTEL
2	BITO002	Biostatistics and Design of Experiments and Fundamentals of optical and scanning Electron	NPTEL

		Microscopy	
3	BITO003	Fundamentals of optical and scanning Electron Microscopy and Introduction to biology of cancer	NPTEL
4	BITO004	Introduction to System Biology	Coursera
5	BITO005	Network Analysis in Systems Biology	Coursera
6	BITO006	Biomedical Nanotechnology	NPTEL
7	BITO007	Genetics and Society & The addicted brain	Coursera
8	BITO009	Dairy Production and Management	Online
9	BITO010	Preventing Chronic Pain: A Human Systems Approach	Coursera
10	BITO011	Medical Neuroscience	Coursera
11	BITO012	Animal Physiology	NPTEL
12	BITO013	Cell Culture technologies	NPTEL
13	BITO014	Introduction to Forensic Science	Coursera
14	BITO015	Human Molecular Genetics	NPTEL
15	BITO016	Wild life Conservation	NPTEL
16	BITO017	Bioengineering: An Interface with Biology and Medicine	NPTEL
17	BITO018	Epigenetic control of Gene expression	Coursera
18	BITO019	Dairy and Food Process and Products Technology	Coursera
19	BITO020	Wild Life Ecology	NPTEL
20	BITO021	Bioinformatics: Algorithms and Application	NPTEL

Honors Course

The students can also enroll for Honors courses, which are advanced level courses included in the program that helps in expanding the knowledge of the students in the field of biotechnology. Students who earn 20 extra credits in addition to the program requirement are eligible for B.Tech. Honors degree.

Non-CGPA Courses

Students are encouraged to acquire complimentary skills such as co-curricular and extracurricular courses and are categorized as Non-CGPA. The students shall take least one course/activity each from group I, group II and III.

Category of Courses with Non-CGPA Credit

S. No.	Group	Group Course/Activity
1.	I	NCC
2.		NSS
3.		Sports
4.		Extra-Curricular Activity

5.	II	Value Added Courses
6.		International Certification (Technical)
7.		Co-Curricular Activity
8.	III	English Proficiency Certification (TOFEL/IELTS/BEC etc.)
9.		Aptitude Proficiency Certification (GRE/ GMAT/ CAT/ GATE etc.)
10.		National/ international Languages (Hindi/ French/ German/ Japanese/ Korean etc.)

Regulations 2013

A student has to earn a total of 183 credits to obtain the B. Tech. degree. The 183 credits are distributed in the following six different categories which are described below.

I. Basic Sciences and Mathematics

II. Humanities and Social Science

III. Engineering Sciences

IV. Program Core

V. Elective Courses

VI. Project

I. Basic Sciences and Mathematics

A total of 22 credits are allotted for basic sciences and mathematics courses. Basic sciences courses include Physics I and II with laboratory, Chemistry with laboratory and Environmental Sciences. Three mathematics courses are also included in the curriculum. These courses are absolutely necessary and serve as foundation courses for understanding various concepts in biotechnology. Mathematics courses provide inputs for understanding core concepts in Computational Biology, Bioprocess Calculations, Principles of Chemical Engineering, Enzyme Technology and Biochemical Engineering and analysis of experimental results during project work.

II. Humanities and Social Science

Humanities and social science courses cover a total of 16 credits. English for Technical Communication, soft-skills courses and Humanities Electives are included in this category. These courses provide students an opportunity to learn English as a language and help them to improve their reading, listening, writing and speaking skills in English. Soft-skills courses

are intended to inculcate personal attributes and harmonious interaction abilities in students. Humanities Electives are offered to students to enhance their management, entrepreneurial, professional and communicational skills and to promote ethics within the students.

III. Engineering Sciences

Engineering Sciences courses include Basic Civil and Mechanical Engineering, Basic Electrical and Electronics Engineering, Engineering Drawing, Programming Languages along with laboratory and Workshop. A total of 14 credits are allotted for this category.

IV. Program Core

Program Core courses cover a total of 91 credits. Cell Biology and Genetics, Microbiology, Bioprocess Calculations, Principles of Biochemistry, Analytical Techniques in Biotechnology, Molecular Biology, Unit Operations, Industrial Biotechnology, Protein Science and Engineering, Bioinformatics and Computational Biology, Bioenergetics and Metabolism, Bioprocess Principles, Genetic Engineering, Enzyme Technology, Reaction Engineering for Biotechnologists, Biochemical Engineering, Immunology, Animal Biotechnology, Plant Biotechnology and Downstream Processing are the courses that are included in the ‘core courses’ category. Laboratory courses for Microbiology, Biochemistry, Cell and Molecular Biology, Chemical Engineering, Computational Biology, Bioprocess Principles, Genetic Engineering, Biochemical Engineering, Immunology, and Downstream Processing are included in the curriculum. For the theory courses which do not have the allied laboratory course, practical component is added to the course and categorized as “Theory with Practical Component” course. Protein Science and Engineering, Enzyme Technology and Animal Biotechnology are offered as “Theory with Practical Component” course.

V. Elective courses

Elective courses are classified into major, minor and open electives. Major electives are programme specific courses offered to the students to suit their individual needs based on their choice from a wide range of elective courses. A total of 12 credits are covered by major elective courses. Minor electives are allied courses that add strength to the core courses. A total of 6 credits are covered by minor elective courses. Free elective courses are offered

with an intention of inculcating interdisciplinary ideas and knowledge in students. A student can choose free elective courses offered by any department other than Biotechnology. For example, a biotechnology student can opt for a course offered by Food Technology department. Six credits are provided to the open elective courses. Self-study elective, with 3 credits, is offered in the final semester of study to promote self-learning among the students.

VI. Project

Students will complete a community service project as part of the curriculum, which enables them to understand and analyze the real-time problems of a community and applying the technical skills that they have acquired to find solutions to the problems. Three credits are provided for community service project. Apart from this, students will complete a major project during the final year of the program for which 10 credits are allotted.

The credits are distributed in the following different categories as indicated in Table B.2.1.3c. Credit distribution in B. Tech. Biotechnology Curriculum as per 2013 regulation is depicted in the Figure 2.1.3c.

Course Component	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total number of credits
Basic Sciences (and Mathematics)	12.02	390	22
Engineering Sciences	7.65	300	14
Humanities and Social Sciences	8.74	285	16
Program Core	49.73	1635	91
Program Electives (Major+ Minor)	9.84	270	18
Open Electives (Free Electives)	3.28	90	6
Project(s)	7.10	465	13
Any other (Please specify) Self-study Elective	1.64	45	3
Total number of Credits			183

Table B.2.1.3c

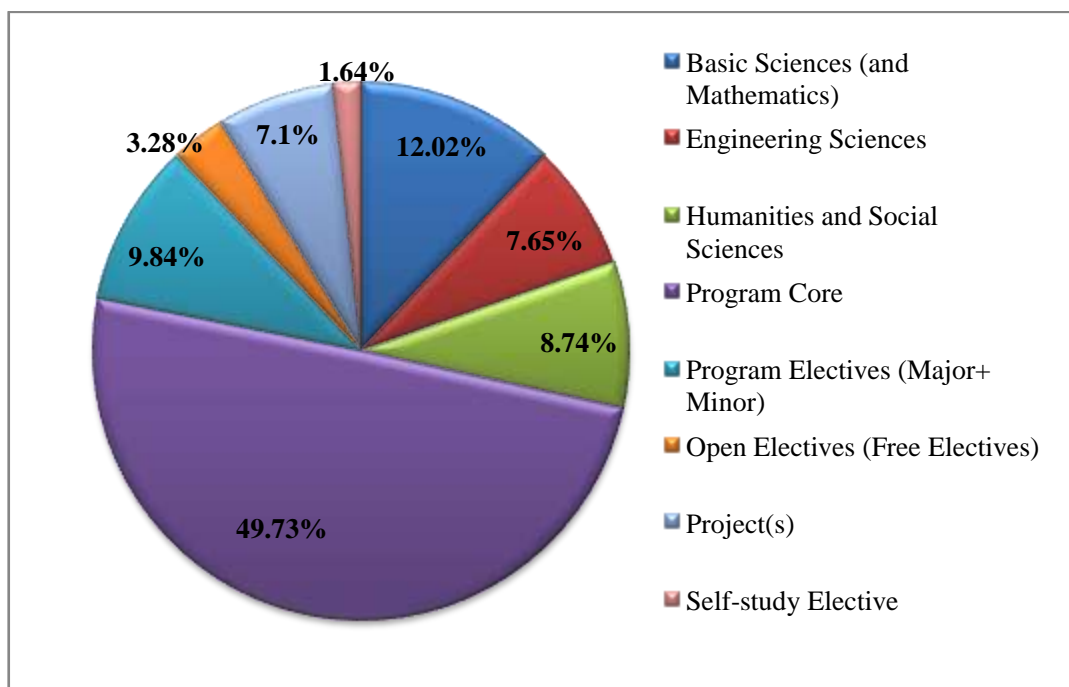


Figure 2.1.3b Credit distribution in B. Tech. Biotechnology Curriculum (2013R)

List of Courses under Basic Sciences Category

Course Code	Course Title	L	T	P	C
MAT101	Mathematics I	3	0	0	3
MAT102	Mathematics II	3	0	0	3
PHY131	Physics I	3	0	0	3
PHY132	Physics II	3	0	0	3
CHY106	Chemistry	3	0	0	3
CHY101	Environmental Sciences	2	0	0	2
CHY181	Chemistry Laboratory	0	0	3	1
PHY181	Physics Laboratory	0	0	3	1
MAT201	Mathematics III	3	0	0	3

List of Course under Engineering Sciences Category

Course Code	Course Title	L	T	P	C
CIV101	Basic Civil and Mechanical Engineering	4	0	0	4
MEC101	Engineering Drawing	1	0	3	2
MEC181	Workshop	0	0	3	1
EEE101	Basic Electrical and	4	0	0	4

	Electronics Engineering				
CSE102	Programming Languages	2	0	0	2
CSE181	Programming Language Laboratory	0	0	3	1

List of Course under Humanities and Social Sciences Category

Course Code	Course Title	L	T	P	C
HSS101	English for Technical Communication I	2	0	0	2
HSS102	English for Technical Communication II	2	0	0	2
HSS036	Soft Skills – I	2	0	0	1
HSSXXX	Humanities Elective I	3	0	0	3
HSS037	Soft Skills – II	2	0	0	1
HSS038	Soft Skills – III	2	0	0	1
HSSXXX	Humanities Elective II	3	0	0	3
HSSXXX	Humanities–Elective III	3	0	0	3

List of Courses under Program Core Category

Course Code	Course Title	L	T	P	C
BIT103	Cell Biology and Genetics	3	0	0	3
CHE253	Bioprocess Calculations	3	1	0	4
BIT204	Microbiology	3	0	0	3
BIT209	Molecular Biology	3	0	0	3
BIT211	Principles of Biochemistry	3	0	0	3
BIT214	Analytical Techniques in Biotechnology	3	0	0	3
BIT281	Biochemistry Laboratory	0	0	3	2
BIT283	Microbiology Laboratory	0	0	3	2
BIT286	Cell and Molecular Biology Laboratory	0	0	3	2
CHE252	Unit Operations	3	1	0	4
BIT203	Bioenergetics and Metabolism	3	1	0	4
BIT205	Industrial Biotechnology	3	0	0	3
BIT215	Bioinformatics and Computational Biology	3	1	0	4
BIT216	Protein Science and Engineering	3	0	0	3
BIT288	Computational Biology Laboratory	0	0	3	2
CHE291	Chemical Engineering	0	0	3	2

	Laboratory				
BIT303	Bioprocess Principles	3	1	0	4
BIT304	Genetic Engineering	3	1	0	4
BIT322	Enzyme Technology	3	1	0	4
CHE357	Reaction Engineering for Biotechnologists	3	0	0	3
BIT387	Bioprocess Laboratory	0	0	4	2
BIT388	Genetic Engineering Laboratory	0	0	4	2
BIT305	Biochemical Engineering	3	1	0	4
BIT306	Immunology	3	1	0	4
BIT389	Immunology Laboratory	0	0	3	2
BIT390	Biochemical Engineering Laboratory	0	0	6	2
BIT401	Animal Biotechnology	4	0	0	4
BIT402	Plant Biotechnology	3	0	0	3
BIT403	Downstream Processing	3	1	0	4
BIT491	Downstream Processing Laboratory	0	0	6	2

In addition of above components, curriculum for B.Tech Biotechnology as 2013 regulation includes One-credit courses, Online courses and Honors courses as discussed above in the 2021 and 2018 regulations.

All students admitted to the B.Tech. Biotechnology programme must earn a minimum of 18 credits out of 39 under the Non-CGPA credit courses by taking at least one course in each of the 4 groups.

Category of Courses with Non-CGPA Credit*

S. No.	Group	Group Course/Activity	Non-CGPACredit
1.	I	Industrial Training	3
2.		Advanced Industrial Training	3
3.		Industrial Lectures	3
4.	II	Value Added Courses* / Soft Skills	3
5.		International Certification	3
6.		Co-Curricular Activities	3
7.	III	Sports	3
8.		National Cadet Corps (NCC)	3
9.		National Service Scheme (NSS)	3
10.		Extra-Curricular Activities	3
11.	IV	English Proficiency Certification	3

12.		Aptitude Proficiency Certification	3
13.		National / International Languages	3

**(Applicable for Batches 2011 – 2016)*

2.1.4 State the process used to identify extent of compliance of the curriculum for attaining the Program Outcomes and Program Specific Outcomes as mentioned in Annexure I (10)

Curriculum and syllabus of B.Tech. Biotechnology programme is designed and refined in accordance with the Program Outcomes and Program Specific Outcomes.

(a) Contribution of Curriculum Structure towards the compliance with POs and PSOs:

The KARE Curriculum structure comprehensively addresses the Knowledge, Skill and Aptitude expected of each engineering graduate covering all the POs and PSOs. It includes various course categories including Basic Science and Mathematics, Basic Engineering, Humanities and Social Sciences, Soft Skills, Program Core, Professional and Open Electives, Community Service Project, Industry Training/ Industry Internship and Capstone Project. The curriculum also mandates complementary skill courses under non-CGPA category primarily aiming at the POs which demand more skills and attitudes. Each of three groups concentrates on NSS/NCC/Sports/Extra-Curricular Activity, Co-curricular Activity and International Language/Aptitude/English Proficiency respectively. Compliance of KARE Curriculum Structure with POs and PSOs is depicted in Fig. 2.1.4.1.

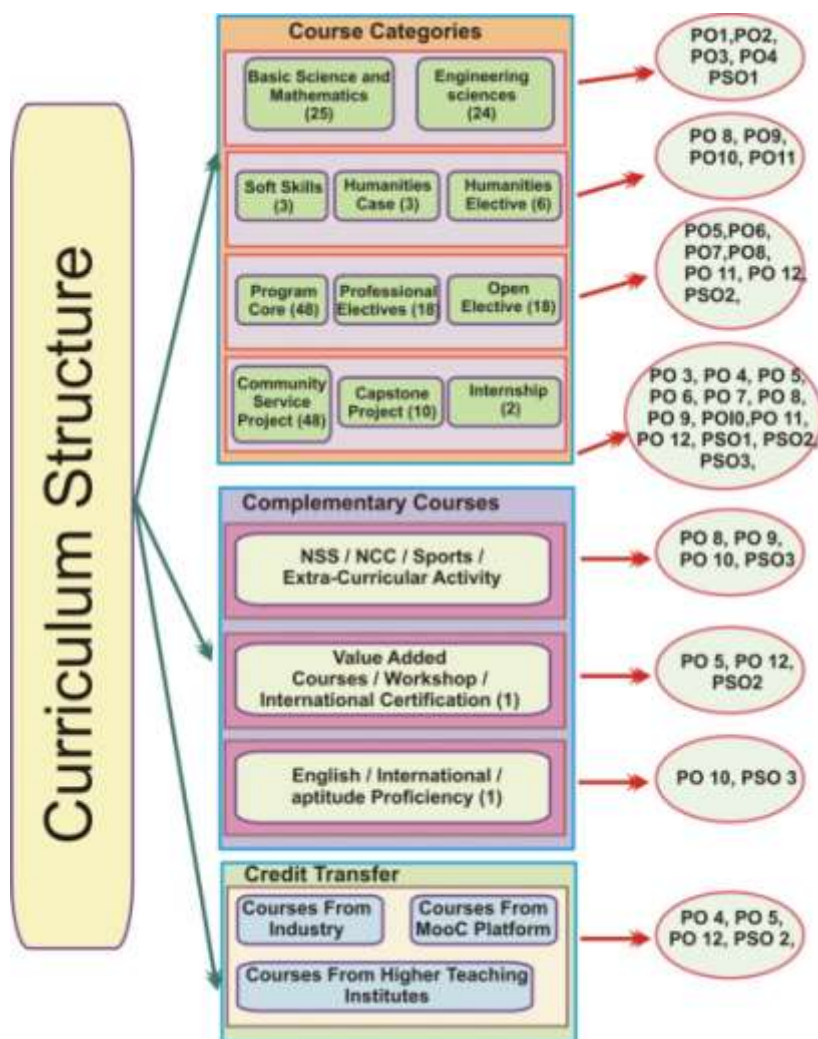


Fig. 2.1.4.1. Compliance of KARE Curriculum Structure with POs and PSOs

- Project courses including Community Service Project, Internship, Capstone Project have high correlation with majority of Program Outcomes including Design/development of solutions (PO3), Conduct investigations of complex problems (PO4), Modern tool usage (PO5), Contextual knowledge to the Engineer and Society (PO6), Environment and Sustainability (PO7), Ethics (PO8), Individual and team work skills (PO9), Communication (PO10), Project management and finance (PO11), Life-long learning (PO12), Problem Solving (PSO1), Professional Skills (PSO2), and Communication and Team Skill (PSO3).
- Complementary courses in Group 1 correlate with Ethics (PO8), Individual and team work skills (PO9), Communication (PO10), Communication and Team Skill (PSO4).

Group 2 courses comply strongly with Modern tool usage (PO5), Life-long learning (PO12), Professional Skills (PSO2). Courses from Group 3 have high correlation with Communication (PO10), Communication and Team Skill (PSO3).

- Courses offered by external experts from Industry, Higher Training Institutes, Online Platforms typically have higher compliance with Conduct investigations of complex problems (PO4), Modern tool usage (PO5), Life-long learning (PO12), Professional Skills (PSO2).

(b) Correlation of Delivery and Assessment methods with POs and PSOs

It is also envisioned that in addition to the courses (course outcomes), the delivery methods and assessment tools adopted based on the nature of the course contribute significantly towards the attainment of POs and PSOs. The courses in the curriculum of KARE are offered as various course types such as Theory courses (T), Integrated courses (IC), Theory with Practice courses (TP) and Project (P). The correlation of the delivery and assessment methods with POs and PSOs are depicted in Fig. 2.1.4.2.

The theory courses inculcate knowledge among the students to comply with outcomes including Engineering knowledge (PO1), Problem Analysis (PO2), Problem Solving (PSO1), Professional Skills (PSO2), Communication and Team Skill (PSO3). Theory courses are usually evaluated through written sessional examinations, assignments, quizzes and end-semester examinations which correspond to the requirements to achieve the mapping outcomes.

IC and TP courses typically offered with active learning pedagogies including Project Based Learning (PBL), Peer-led learning (PL), Collaborative learning (CL), among others, correlate with the outcomes such as Conduct investigations of complex problems (PO4), Modern tool usage (PO5), Ethics (PO8), Individual and team work skills (PO9), Problem Solving (PSO1), Professional Skills (PSO2), Communication and Team Skill (PSO3). IC and TP courses are typically evaluated through written sessional examinations, practical assignments, among others.

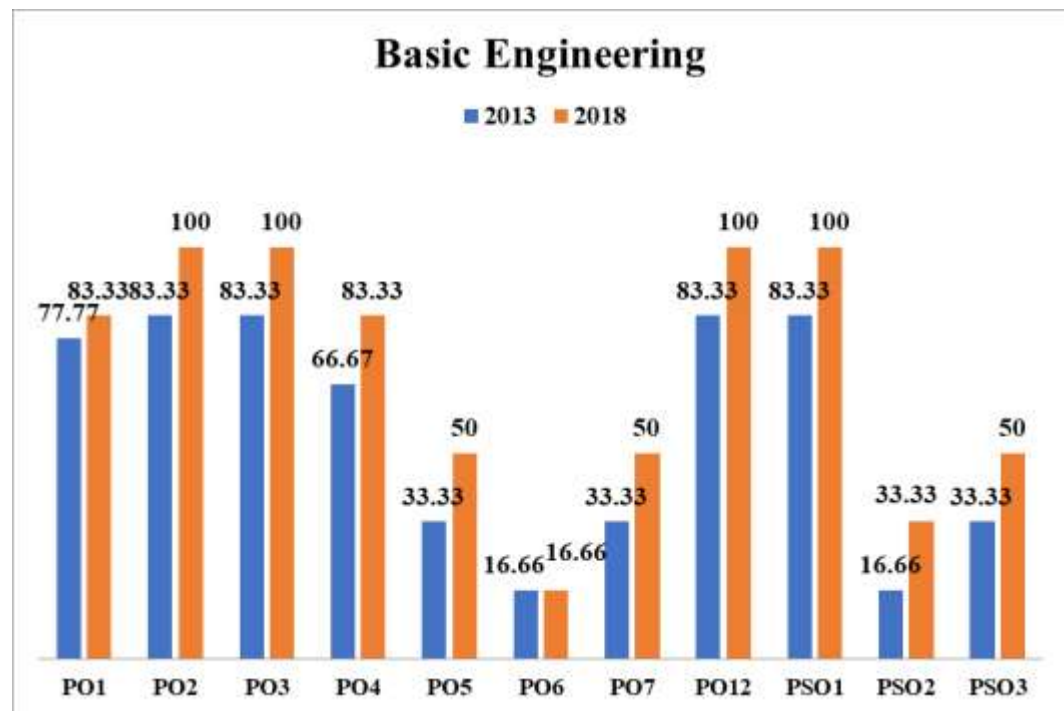
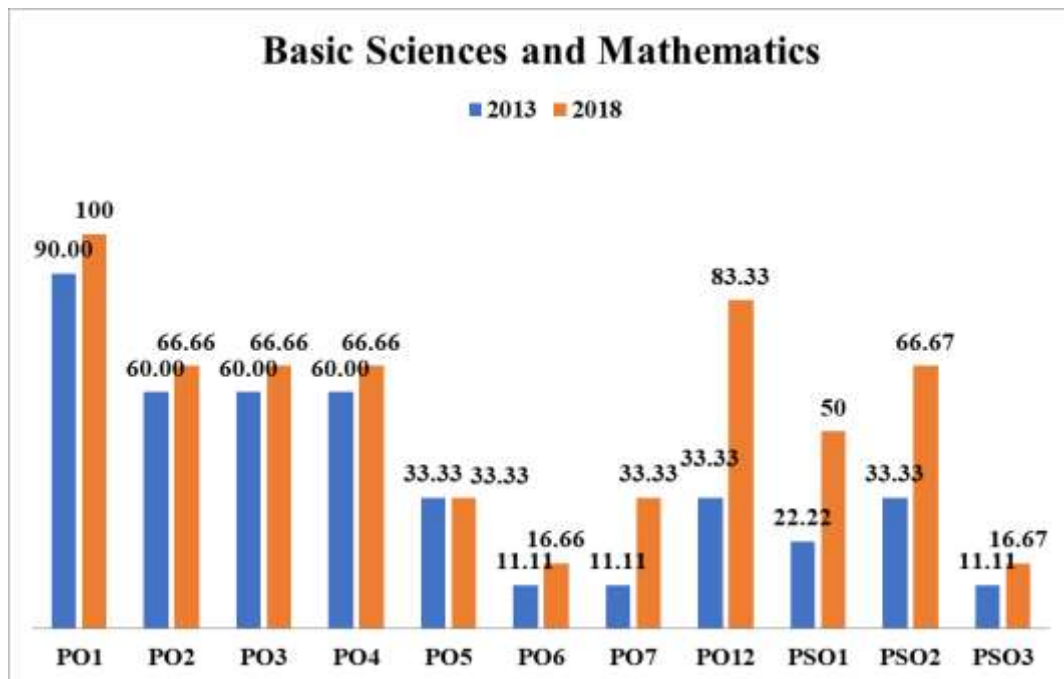


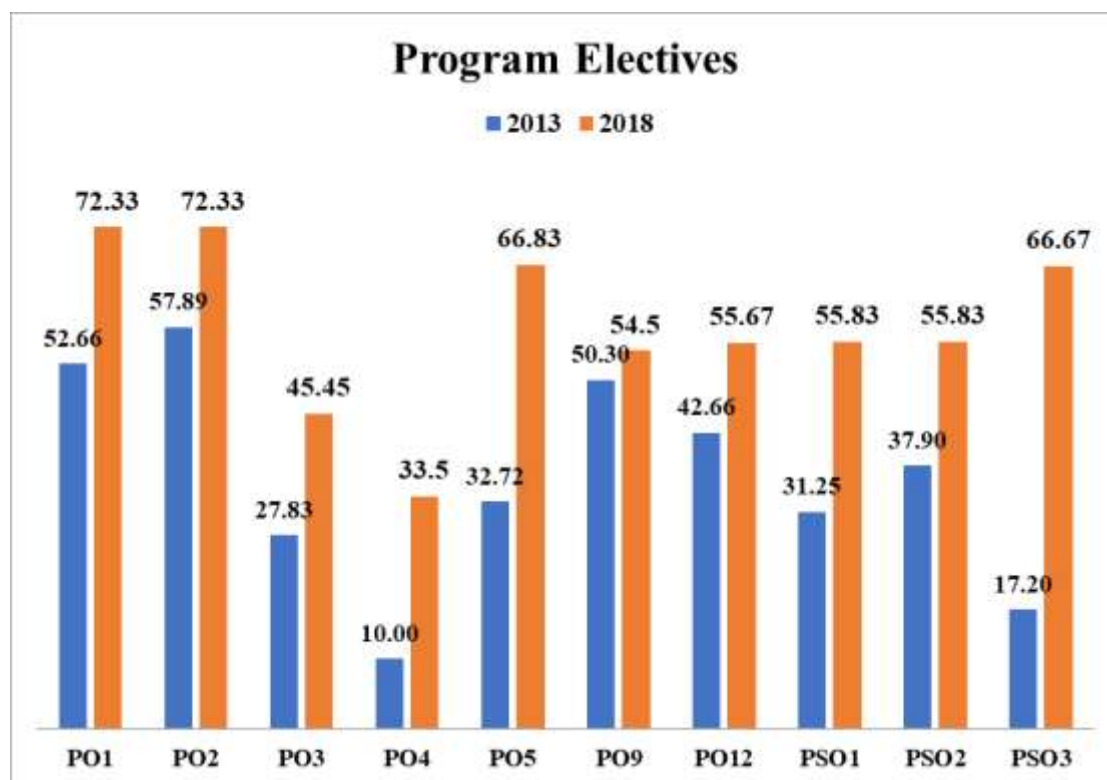
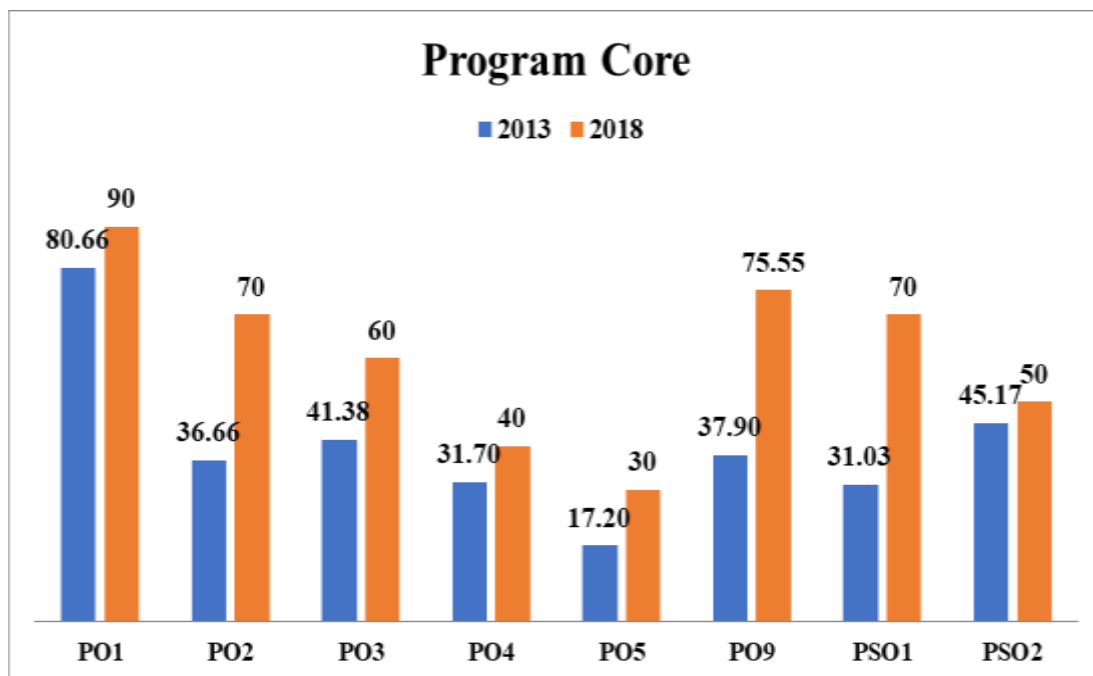
Fig. 2.1.4.2 Correlation of Delivery and Assessment Methods with POs and PSOs

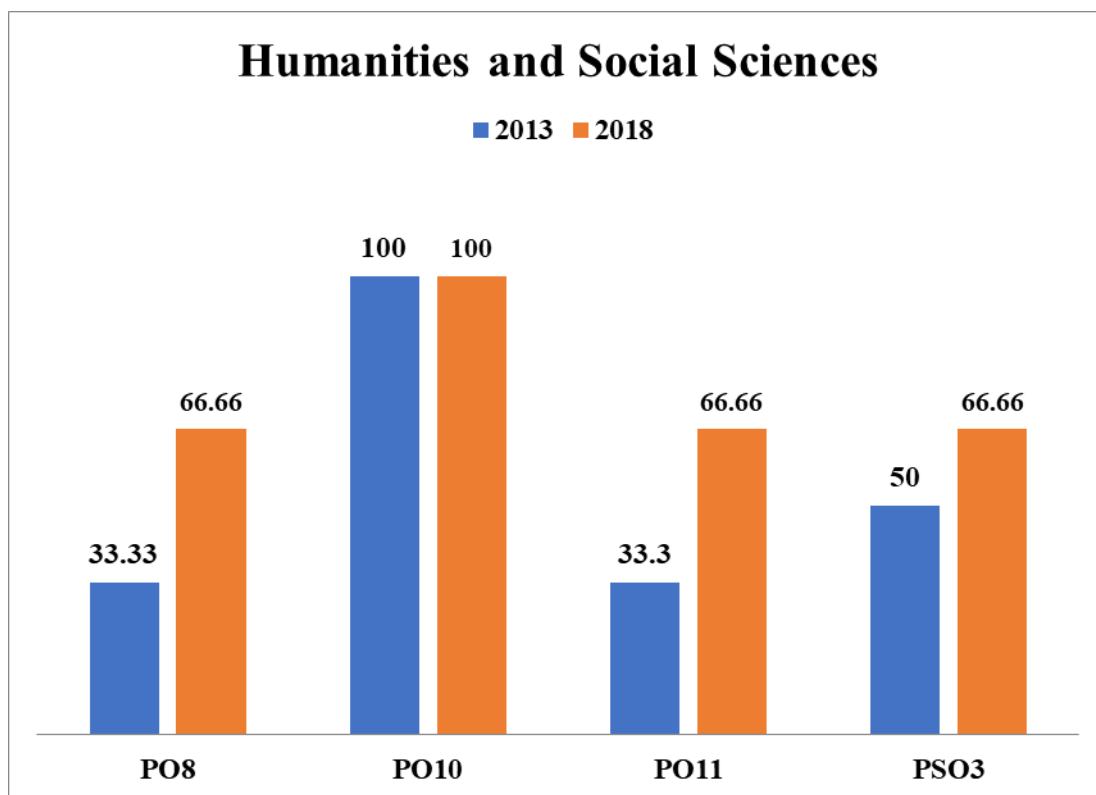
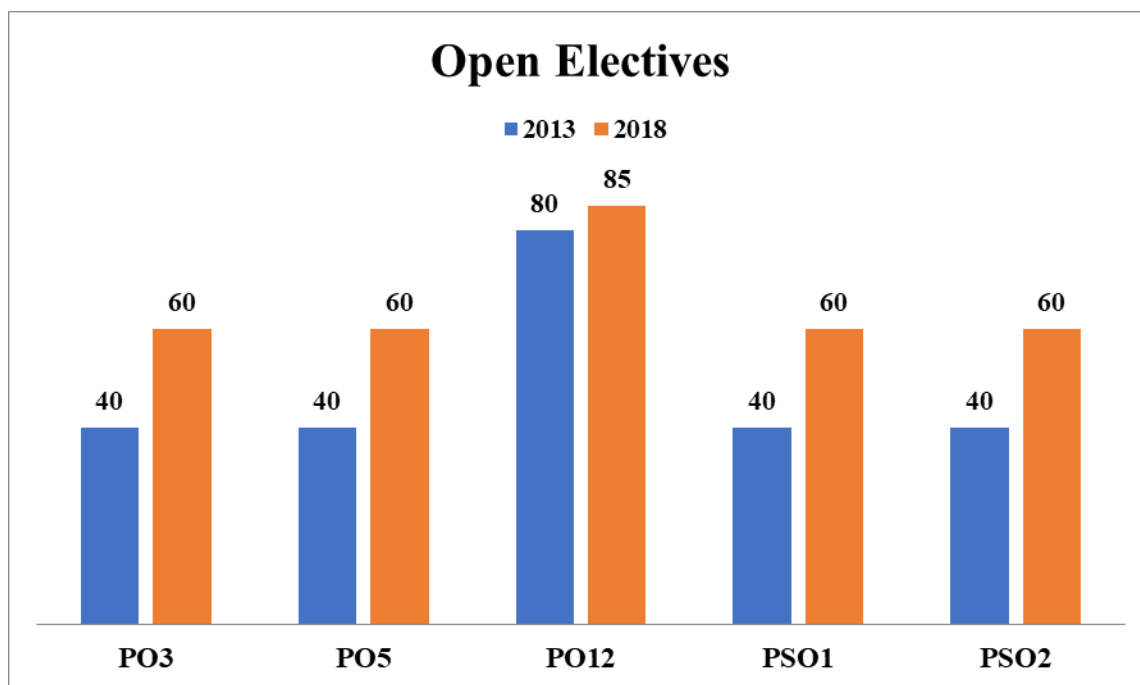
Project courses correlate with higher level pedagogies typically map with the outcomes such as Design/development of solutions (PO3), Conduct investigations of complex problems (PO4), Modern tool usage (PO5), Contextual knowledge to the Engineer and Society (PO6), Environment and Sustainability (PO7), Ethics (PO8), Individual and team work skills (PO9), Communication (PO10), Project management and finance (PO11), Life-long learning (PO12), Problem Solving (PSO1), Professional Skills (PSO2), Communication and Team Skill (PSO3). Project courses are evaluated based on the knowledge and skills acquired by the students through periodic reviews.

Each course has defined course outcomes that are correlated to POs and PSOs leading to the attainment. Table 2.1.4.1 shows the mapping between course components present in the curriculum verses PO and PSO. Further, the extent of compliance of the curriculum was evaluated based on the PO attainment (which is elaborately discussed in criterion-III) for each course component in the curriculum in such a way to ensure the degree of compliance between curriculum and PO, PSO. This strong correlation among the COs and POs-PSOs will help in acquiring skills by the students, and transforms them as competent technocrats. In order to ensure the degree of compliance of the curriculum with the attainment of PO and PSO, the numerical data was considered from the program attainment of 2016-2020 passed

out batch, which was taken as reference to obtain the significance of compliance in accordance with the percentage of contribution for each course component in curriculum.







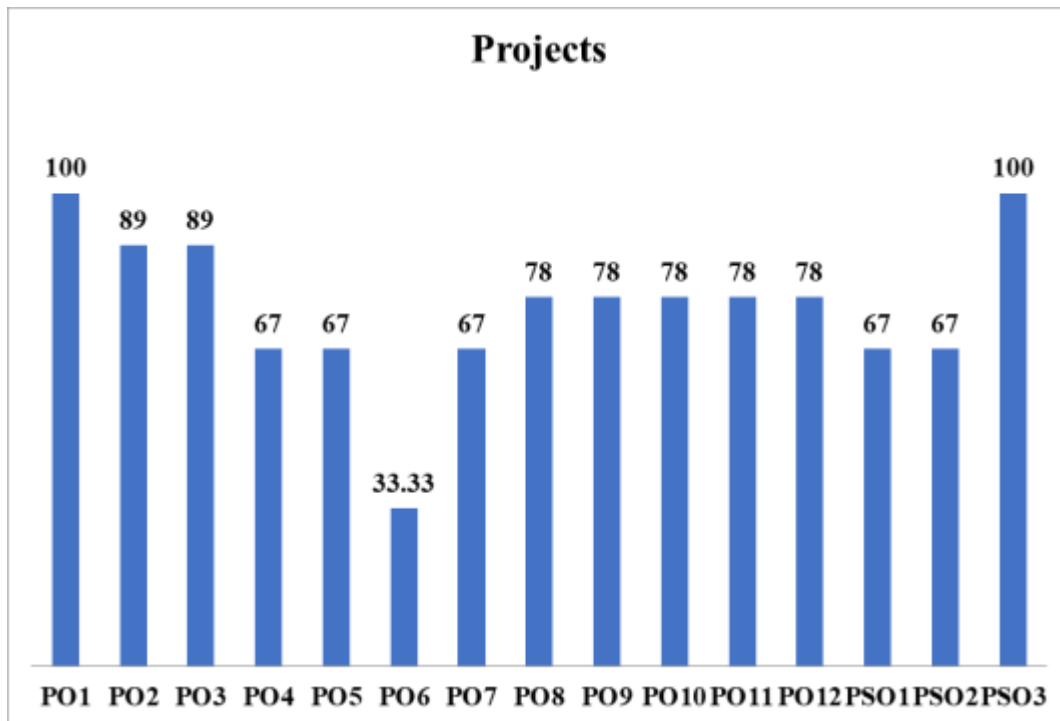


Figure a-g: Mapping between course components of curriculum verses PO and PSO

2.2. Teaching-Learning Process

2.2.1. Describe processes followed to improve quality of teaching & learning (15)

The Department of Biotechnology gives priority to the Teaching and Learning process. The department ensures to provide a quality curriculum that aptly supported by a passionate Teaching-learning process. Quality is ensured through a well-defined system of policies and processes that is planned by the institution.

The following Figure 2.2.1 depicts the teaching and learning process adopted by the institution and the department.



Fig.2.2.1 Teaching and Learning process followed in both Department and University level

The institution and the department have an established process to provide quality teaching to the students who are enrolled in the UG Biotechnology program. This includes various academic activities and monitoring mechanisms to ensure the quality and, corrective mechanisms that can be taken to improve the quality. The process followed to ensure and improve the quality of teaching is depicted in Figure 2.2.2.

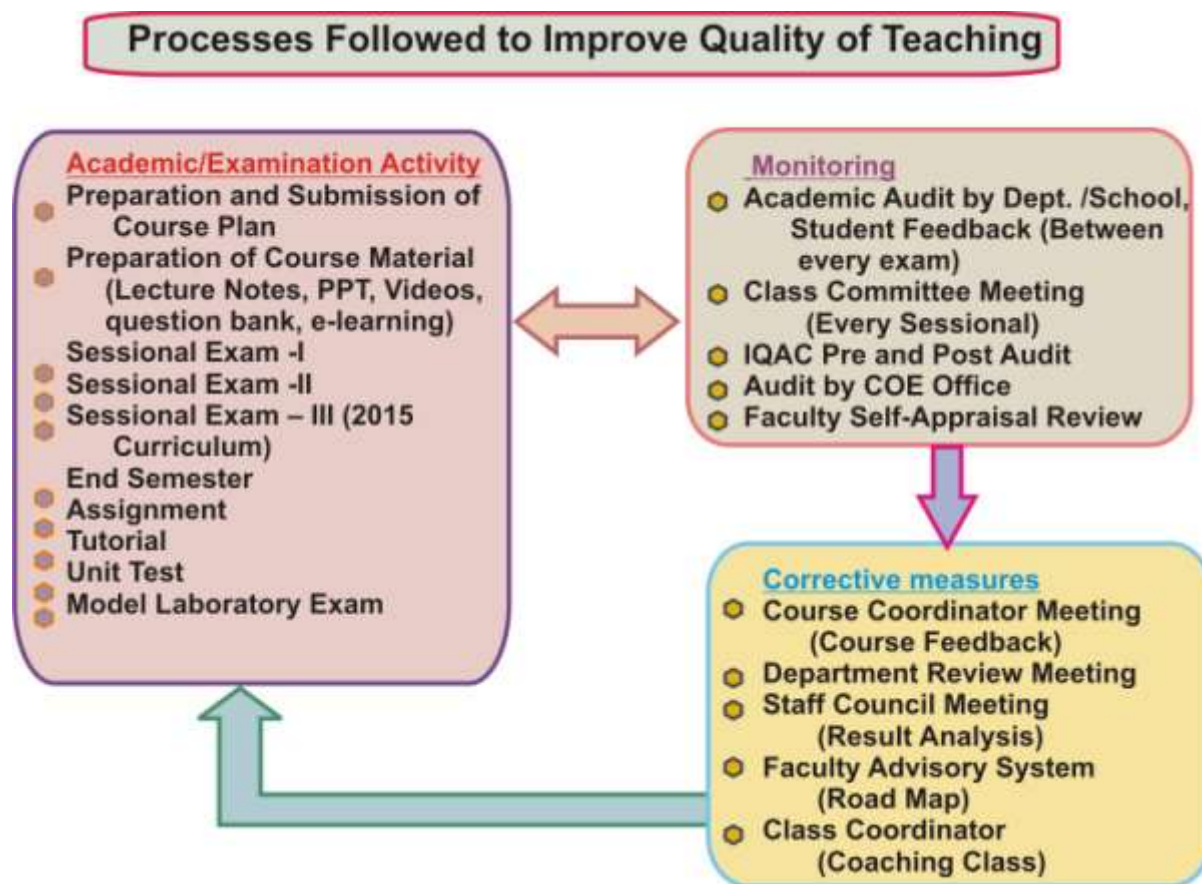


Figure 2.2.2 Processes followed to improve quality of teaching & learning

(A) Adherence to Academic Calendar

Academic calendar is prepared at the institute level well in advance and distributed to all the students and faculty before the commencement of each semester. A sample of academic calendar is shown in Figure 2.2.3.

It also consists of academic activities planned for the semester which includes dates of Internal Assessment, class committee meetings, faculty advisor meetings, declaration of results, etc. All courses are handled as scheduled in the academic calendar. For each course, a course file is prepared by the faculty handling a particular course. The course file consists of syllabus, course plan, course materials, etc. Course plan consisting of course objectives and course outcomes, Mapping of COs and POs, and continuous assessment methods prepared by the faculty before the commencement of the semester and this is reviewed by the Module and Program Coordinators and approved by the Head of the Department. The course is delivered according to

the Course Plan and coverage of syllabus is monitored by the Program Coordinator and Head of the Department.

ACADEMIC CALENDAR FOR EVEN SEMESTER 2020-2021 (Common to all UG and PG)			
Jan 2021	18 th	Reopening Day for UG and PG students (Except First Year UG/PG)	
	27 th	Faculty advisor counseling to the students / Non-CGPA registration (II and III Year students (UG and PG))	
	29 th	I Class Committee /Course Coordinator Meeting (II, III Year UG/PG - Engineering), Review for final year PG projects	
	30 th	I Class Committee/ Course Coordinator Meeting (II, III Year UG/PG Arts and Science)	
Feb 2021	1 st	Reopening Day for First Year UG students	
	3 rd -5 th	I Class Committee / Course Coordinator Meeting for I Year UG – Arts and Engineering	
	6 th	Faculty advisor counseling to the students / Non-CGPA registration (First Year UG)	
	12 th	Reopening Day for First Year PG students	
Mar 2021	3 rd -6 th	Sessional Examination-I (II and III Year Students UG/PG) and Review for final year UG Capstone Design Project and PG projects	
	10 th	Opening Arrear Examination Registration	
	11 th -13 th	II Class Committee / Course Coordinator Meeting (II and III Students UG/PG)	
	17 th -20 th	Sessional Examination-I (First Year and Final Year UG/PG Engineering/Arts)	
	22 nd -26 th	Practical/Laboratory Component Assessment	
	25 th	II Class Committee / Course Coordinator Meeting (I and IV Year UG/PG)	
	26 th	Faculty advisor counseling to the students	
	30 th	Last date for paying the tuition fees.	
April 2021	3 rd	Last date for paying arrear exam fees	
	19 th -22 nd	Sessional Examination-II (II and III Year Students UG/PG) and Review for final year UG Capstone Design Project and PG projects	
May 2021	3 rd -6 th	Sessional Examination-II (I and Final Year UG/PG Engineering/Arts)	
	6 th	Compilation of attendance (II and III Year Students UG/PG)	
	7 th	Submission of Non-CGPA results to COE office	
	7 th -15 th	End Semester Practical Examinations (II and III Year Students UG/PG)	
	17 th -31 st	End Semester Theory/Makeup Examinations (II and III Year Students UG/PG)	
	19 th	Compilation of attendance (I Year and Final Year UG/PG Engineering/Arts)	
	20 th -29 th	End Semester Practical Examinations (I Year and Final Year UG/PG Engineering/Arts)	
	20 th -21 st	Sessional Examinations-III for 2016 Batch -B Arch.	
June 2021	30 th	Viva Voce for UG/PG Projects	
	31 st	End Semester Theory/Makeup Examinations (I and Final Year UG/PG Engineering/Arts)	
	1 st -15 th	Arrear Examinations	
	4 th	Final Class Committee Meeting (II and III Year UG/PG) and Viva Voce for MBA Project	
	8 th	Grade Approval Committee Meeting (II and III Year UG/PG)	
	16 th	Final Class Committee Meeting (I and Final Year UG/PG)	
	18 th	Grade Approval Committee Meeting (I and Final Year UG/PG)	
	22 nd	Result Passing Committee Meeting for CGPA and Non-CGPA Courses	
	23 rd	Paper Distribution Day	
	24 th	Declaration of Results	
	25 th	STC 2021 Registration Starts from 01.00 PM	
	26 th	STC 2021 Registration Closed by 11.30 AM	
July 2021	5 th	STC 2021 Classes Starts	
July 2021	5 th	Last date for payment of STC2021 Fees	
Aug 2021	4 th	Odd semester Begins	

LIST OF HOLIDAYS							
S. No	Date	Day	Occasion	S. No.	Date	Day	Occasion
1.	26.01.2021	TUESDAY	REPUBLIC DAY	4	14.04.2021	WEDNESDAY	TAMIL NEW YEAR
2.	28.01.2021	THURSDAY	THAI POSAM	5.	01.05.2021	SATURDAY	MAY DAY
3.	02.04.2021	FRIDAY	GOOD FRIDAY	6	21.07.2021	WEDNESDAY	BAKRID

Figure 2.2.3: Sample Academic Calendar for Even Semester 2020 – 2021 (common to all UG and PG Programs)

(B) Pedagogical initiatives

The faculty members use various pedagogical initiatives to enhance the knowledge of the students. Initiatives such as cross over learning, context-based learning and learning by doing are used by the faculty to kindle the thinking ability of the students. The faculty advisory system helps in understand the requirement of each student and this is followed by an adaptive learning

approach by the faculty to help the weaker students (slow learners).

Faculty members also prepare handouts containing list of formulae, question bank comprising previous question papers and distribute to the students that helps in slow learners. Use of smart class rooms and LCD projectors helps in displaying animations and videos that in turn enhances the understanding of the basic concepts. This also helps in make them understand how an experiment is performed.

Quality enhancement in teaching and learning process is done on a continuous basis through the department with the help of Academic and IQAC offices who provide quality metrics. The department is keen on introducing new pedagogical initiatives in each semester based on the nature of course. Some of the pedagogical tools which were followed in our department are listed below.

Innovative teaching methods and ICT tools used in teaching

To enhance the learning capability of students, different teaching methods are followed:

1. Learning Management system (LMS)
2. Google classroom (Google meet/Zoom)
3. Impartus video capturing facility
4. E-Content
5. Virtual Laboratory
6. Flipped class room
7. Interactive Boards
8. LCD projector

(i) Learning Management System (LMS)

The course materials are uploaded in the website. Students can retrieve the course material using their username and password provided to them. (<http://kalasalingam.ac.in/elearn>). A snapshot of the LMS is shown in Figure 2.2.4.

User name: Register number

Password: Register number

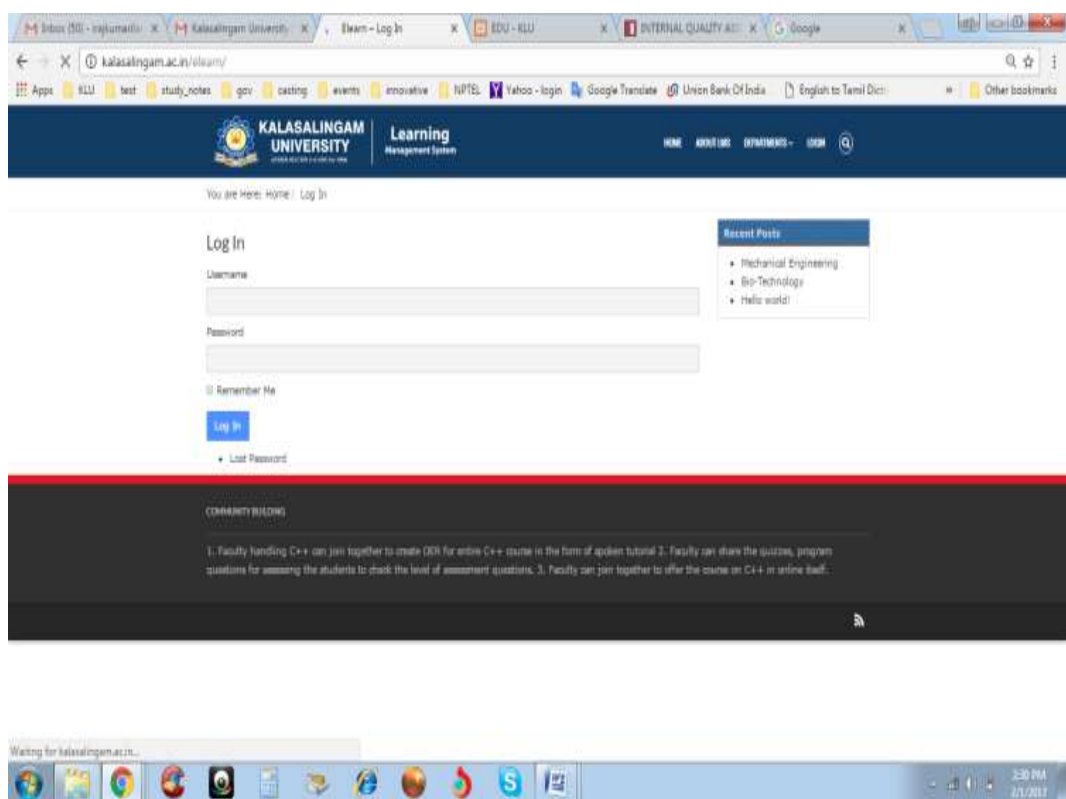


Figure 2.2.4. Learning Management System (LMS) student's login

(ii) Google Classroom

During this pandemic period, technology helped us in overcoming the limitations due to continuous lockdown of the campus. Google classroom, an innovative tool, offered by Google was very effectively used for the delivery of all the courses. Besides content delivery by online mode, it is also possible to upload the course plan, course materials, video lectures, question banks, assignments, etc. (Figure 2.2.5). All the students enrolled in a particular course are able to access the materials. It helps the students to come prepared to the class. The tools in the Google class room facilitate online assessment of students, which can be used to measure the outcomes of each course (Figure 2.2.9).

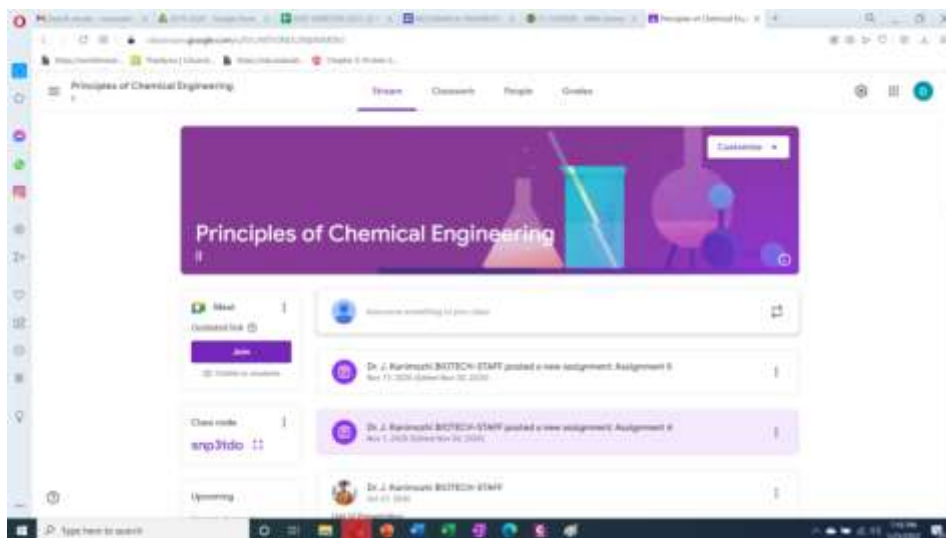


Fig.2.2.5a: Snapshot of Google classroom

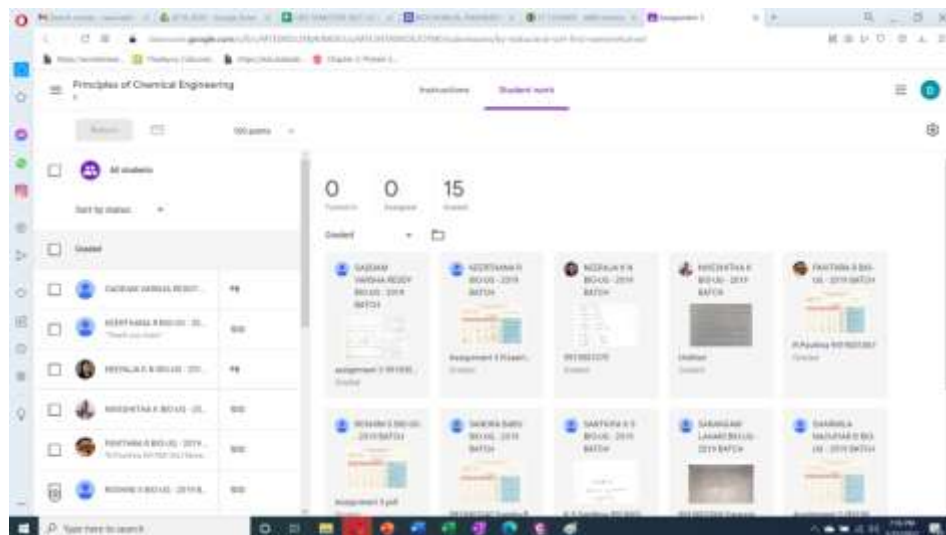


Fig.2.2.5b: Assignments submitted by the students and their grades

(iii) Impartus Video capturing Facility

The institution has established a video capturing facility (Impartus) in many class rooms. Nine class rooms in the department of biotechnology are equipped with this facility. Audio and video recordings of regular lectures delivered by the faculty are captured and are stored in a web-server. The students have access to the class room recordings and can view the lectures anytime. This facility helps the slow-learners in hearing the lectures at their own pace and the fast-learners can use this for any clarifications or doubts. Students can also have discussions, attend test, view question bank, submit assignments, and also can interact with their peers through this facility.

The faculty profile and the snapshot of video lecture is shown in Figure 2.2.6.

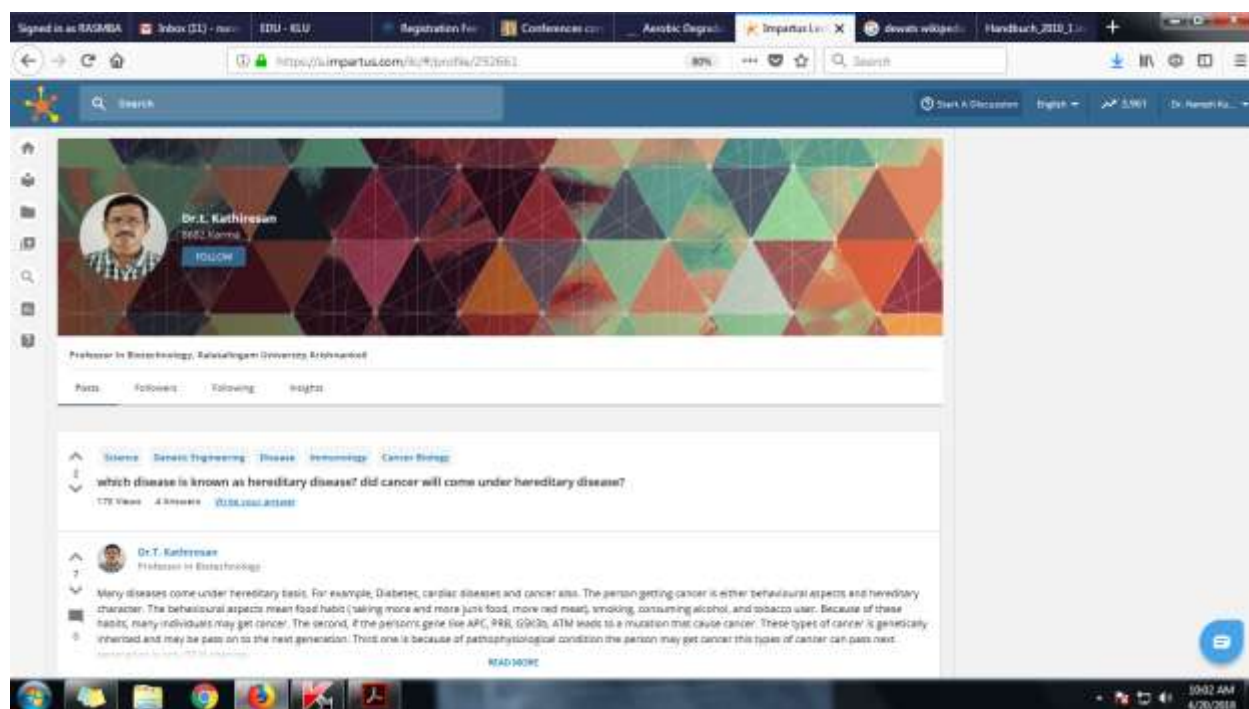


Figure 2.2.6a: Faculty login in Impartus web-server



Figure 2.2.6b: A snap shot from the Impartus video

(iv) E-Content

The faculty members have prepared e-content for all the core and elective courses. The list is provided in Table. 2.2.1. This includes Power point slides, learning text materials and for some courses video lectures. The materials were properly reviewed by senior faculty members of the department. Sample copy is presented in Figure. 2.2.7. The originality of the e-content material was also verified by a plagiarism tool. Short video lectures were prepared for the important topics including the animation tools to enhance better understanding of the content.

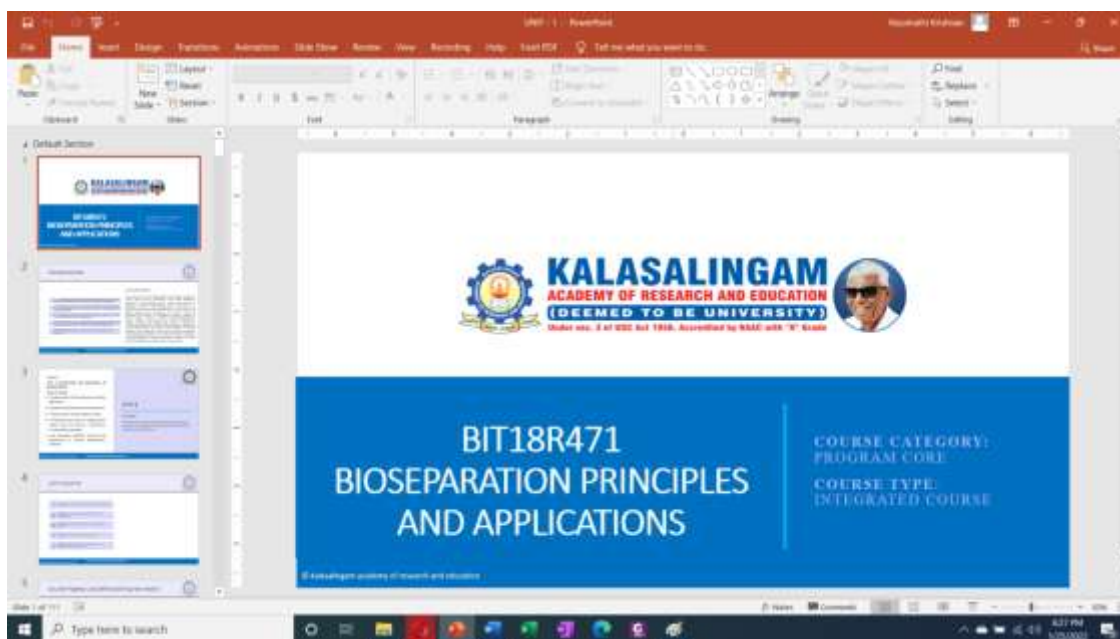


Fig.2.2.7a: E-Content for Bioseparation- Principles and Applications

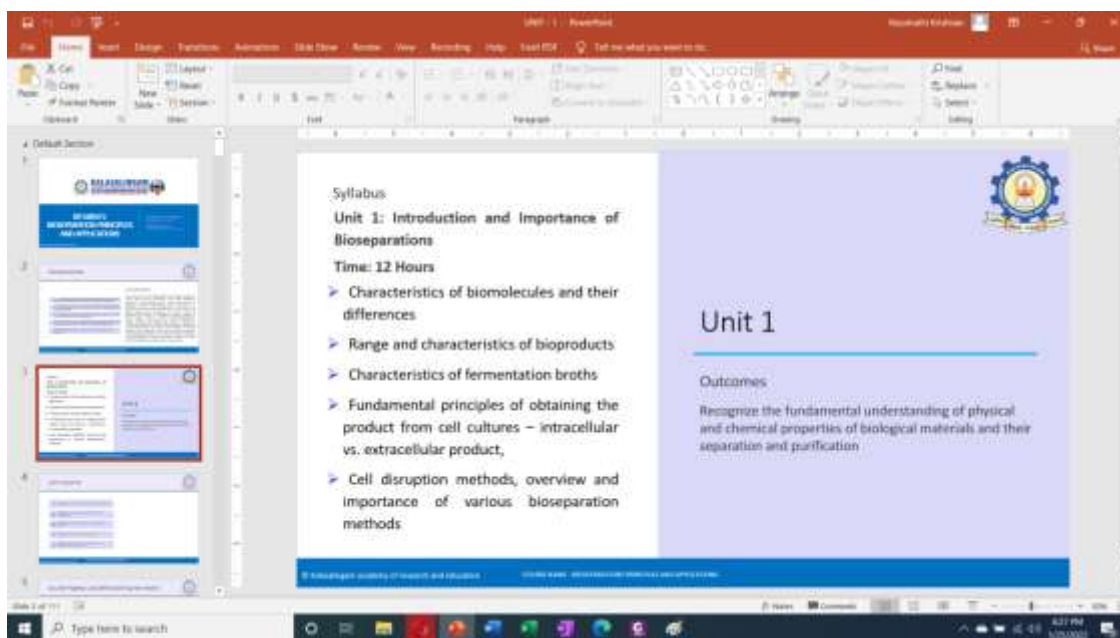


Figure 2.2.7b: E-Content material prepared for Biotechnology courses

Table 2.2.1: List of courses for which E-content is available

Sl. No.	COURSE CODE	NAME OF THE COURSE
1	BIT18R271	Microbiology
2	BIT18R371	Bioprocess Principles
3	BIT18R273	Molecular Biology
4	BIT18R471	Bio-separations: Principles and Applications
5	BIT18R205	Bioenergetics and Metabolism
6	BIT18R274	Bioinformatics
7	BIT18R272	Principles of Biochemistry
8	BIT18R372	Genetic Engineering
9	BIT18R373	Biochemical Engineering
10	BIT18R374	Immunology
11	BIT18R403	Plant Biotechnology
12	BIT18R309	Food Processing and Technology
13	BIT18R322	Nanobiotechnology

(v) Virtual Lab

To enhance learning, particularly during the pandemic, the department has prepared Virtual Labs for all the practical courses using Google sites (Table 2.2.2). The contents include the principle, methodology of each experiment and the analytical methods and tabulation. This also provides assessment forms to evaluate the understanding of the students (Figure 2.2.8). The contents of the labs also include short videos, demos of the experiments and model calculations prepared by our faculty and also by other reputed institutions.



Fig.2.2.8a: Virtual Laboratory - Google site created for Biochemical Engineering laboratory

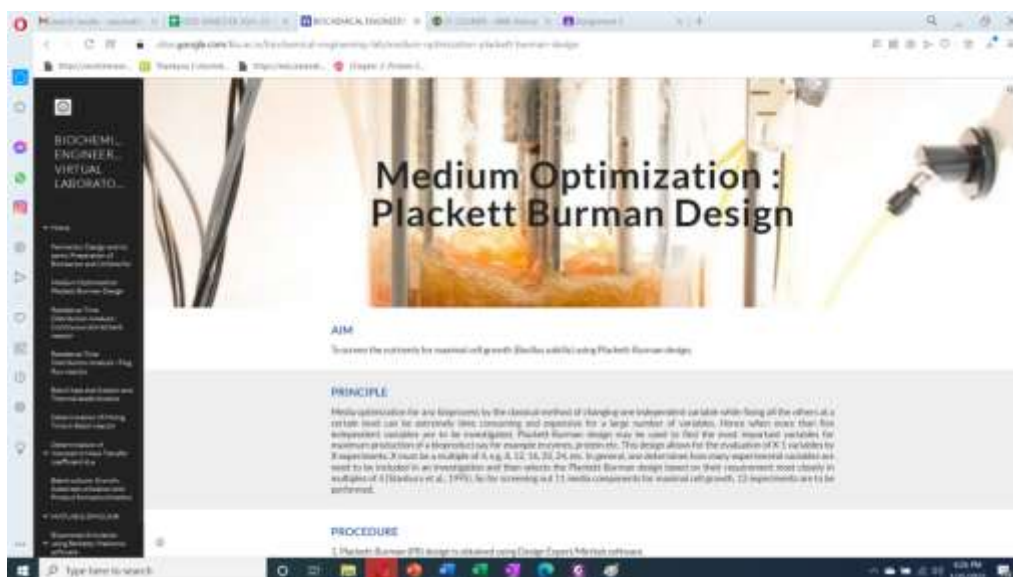


Figure 2.2.8.b: Virtual Laboratory for the Biochemical Engineering-BIT18R373 (III Year B.Tech. Students)

Table.2.2.2: List of Virtual Labs available for UG students

Sl. No	COURSE CODE	COURSE NAME	VIRTUAL LAB LINKS
1	BIT18R271	Microbiology	https://sites.google.com/view/microbiologylaboratory/home
2	BIT18R272	Biochemistry	https://sites.google.com/klu.ac.in/biochemistry-lab/home
3	CHE18R275	Principles of Chemical Engineering	https://sites.google.com/klu.ac.in/bit18r275/home
4	BIT18R273	Molecular Biology	https://sites.google.com/klu.ac.in/molecular-biology/home
5	BIT18R274	Bioinformatics	https://sites.google.com/klu.ac.in/bioinformatics-virtual-lab/experiment-14
6	BIT18R371	Bioprocess Principles	https://sites.google.com/klu.ac.in/bioprocessprinciples/home
7	BIT18R372	Genetic Engineering	https://sites.google.com/klu.ac.in/genetic-engineering/home
8	BIT18R373	Biochemical Engineering	https://sites.google.com/klu.ac.in/biochemical-engineering-lab/home
9	BIT18R374	Immunology	https://sites.google.com/view/immunologylaboratory/home
10	BIT18R471	Bioseparations: Principles and Applications	https://sites.google.com/klu.ac.in/bioseparationslaboratory/home

(vi) Flipped class room

Faculty members are encouraged to adopt Flipped-class room as one the tools in the Teaching-learning process. The faculty members prepare video lectures and the same is provided to the students prior to the class. The students can refer the video lecture before coming to the class and in the class the teacher initiates a discussion on the topic and the students can contribute to the discussion and also get their doubts clarified from their peers or from faculty members. In this process the faculty members play the role of facilitator rather than a teacher. Some of the photographs of flipped class room teaching are shown in Figure 2.2.9.

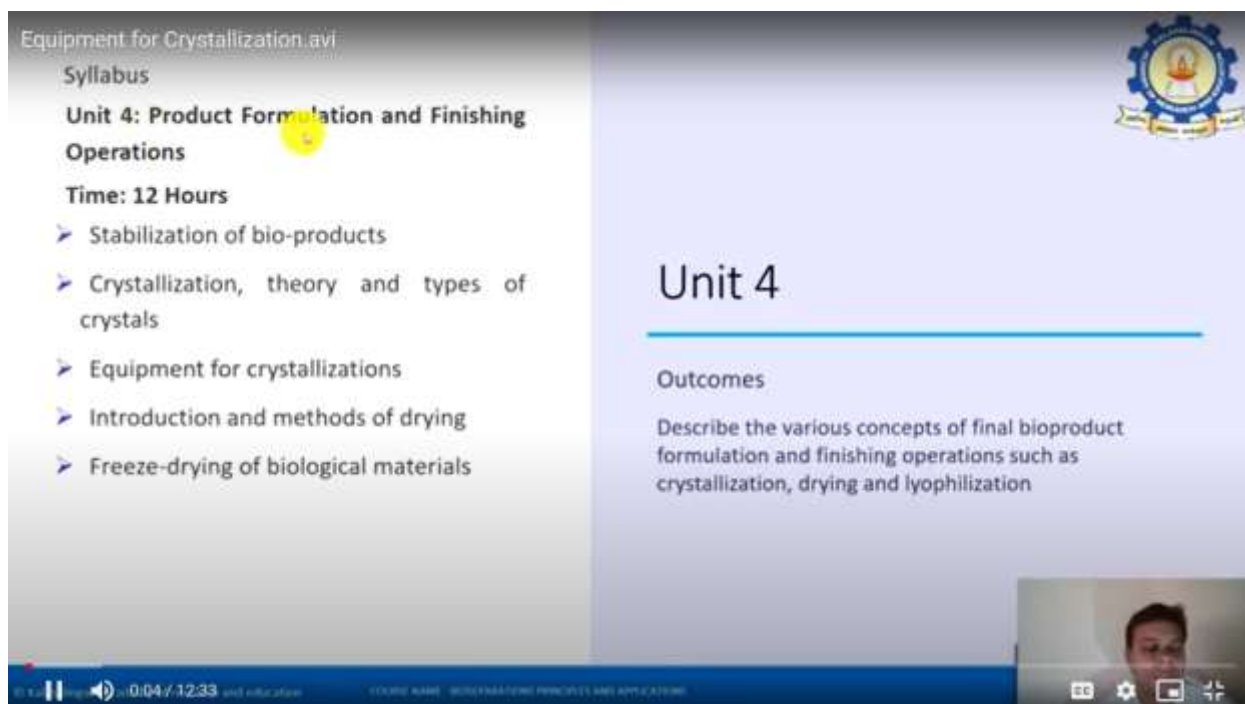


Figure 2.2.9: Short video for flipped classroom

(C) Collaborating learning and quality of laboratory experience

Since the department firmly believes that learning is a natural social act, the department promotes collaborative learning. In the laboratory courses students as a group are involved in completing an experiment or solve a problem. This enhances their learning ability and the slow-learners are supported by the fast-learners. The students not only complete their routine laboratory exercises but also encouraged to complete a mini-project based on whatever skills they have acquired during the particular laboratory course. Besides, regular laboratory courses, Community Service Project (CSP) and the final year cap-stone project also helps the students in adopting collaborative learning as a tool for enhancing their knowledge.

(i) Community service project:

This is a one-year project, spanning two semesters, aimed at exposing the students to societal problems and encouraging them to solve the problems based on their domain knowledge. The students are encouraged to visit the nearby communities, identify a problem, collect data through a questionnaire and analyze them and finally tries to provide solutions to the problem. As per 2013 regulations, the students can enroll for this course in the 5th and 6th semesters. The students

need to submit a report at the end of each semester (Phase I and Phase II). During Phase I, the students need to identify a problem and collect data related to that and during Phase 2 of the project, they can provide a solution to the problem that the community is facing. Successful completion of the project will help the student in getting 3 credits. As per 2018 curriculum, the students have to identify, find solution and implement during the sixth semester and credits will be awarded. Separate team of evaluators including a department representative will evaluate the quality of the projects based on pre-defined criteria. A selected list of community service projects that have been completed by UG Biotechnology students are listed in Table 2.2.3.

Table.2.2.3. List of community Service projects completed by UG Biotechnology Students (2017-21)

Batch No.	Students Reg. No.	Name of the Students	Project Title
1	9917001023	Gayathri M	Preparation of mouthwash using extract of <i>Jatropha gossypifolia</i>
	9917001080	Vasunthara G	
	9917001092	Dhivyadharshini M	
	9917001063	Sathiya Devi P	
2	9917001006	Amalraj A	Biofuel from cooking oil
	9917001017	Deepak Selva Hariharan	
	9917001061	Santhosh Krishnan S	
	9917001062	H Saravana Sundar	
3	9917001012	Athmarishi A	Formulation and evaluation of toothpaste using <i>Prosopis juliflora</i> for the treatment of oral cavity
	9917001035	Kishore Kumar R	
	9917001043	Mirunalinisha B	
	9917001084	Vijaya M	
	9917001088	Abitha Sri	
4	9917001057	Ramar N	Production of biofertilizers for non-leguminous plants
	9917001083	Vignesh Balan M	
	9917001037	Lakshmanan N	
	9916001073	Mohamed Arif M	
5	9917001086	Yaswanth J	Cost effective biofertiliser against plant diseases in cash crops
	9917001094	YenetiYeshwanth Kumar	
	9917001055	Raghul R	
	9917001049	Parthiban A	
6	9917001082	Vidhya Sri AP	Production of biofertilizer using <i>Rhizobium</i> sp.
	9917001018	Deepeeka R	
	9917001071	Souparnika KS	
	9916001004	Abinaya SR	

	9917001051	Pooja S	
7	9916001158	Lalitha AR	Fat loss
	9917001022	Dravid Kannan K	
	9917001050	Ponmani C	
	9917001054	Praveen P	
	9917001072	Subash M	
8	9917001046	Narayanan S	Production of multifunctional natural hair oil
	9917001011	Arul Joseph S	
	9917001028	Jashin P	
	9917001044	Nadar AbelJoseDavidraja	
9	9917001001	Abarna RS	Herbal tea as immune regulator
	9917001008	AntoTheodictaJefrina A	
	9917001013	Bala Varun S	
	9917001029	Karthick M	
10	9917001108	Vignesh Muthu S	Production of biodegradable utensils from husk
	9917001052	Pradeep Kumar K	
	9917001056	Ramanathan ED	
	9917001085	Vishwa A	
11	9917001036	Kowsalya M	Biodegradable bags
	9917001002	Abinaya P	
	9917001077	Uma Maheshwari G	
	9917001060	Sabitha T	
	9917001065	Shruthi Sivaraman	
12	9917001021	Dilaksha Mary V	Formulation and evaluation of antiaging cream using Hibiscus rosa-sinensis
	9917001081	Veerapandi V	
	9917001096	Siva Munieswaran M	
13	9917001042	A. Martina Jemimal	Bead fertilizer and snail bait for crop improvement
	9917001107	S. Jency Emi Carolin	
	9917001112	Sumathi S. Nair	
	9917001113	V.Subharaga	
14	9917001069	M.Sneha	Nutro herbals: Healthy Diet products
	9917001033	N. B Kavyalakshmi	
	9917001020	Derina.J.Pearlin. D	
	9917001048	P. Padma Priya	
15	9917001007	M.Ammu	Eco friendly Organic Mosquito repellent
	9917001016	J.Cathrine	
	9917001111	B.Desiha	
	9917001019	V.Deepikaa	
16	9917001008	Antony Sherina	Identification of crops specific VAM to increase productivity in millets (Minor crops)
	9917001101	SuvethaCinnakondaJanardhanan	
	9917001010	AnushiyaMary.C	
	9917001068	Sivakkani.A	

17	9917001099	Ghurupreya R	Foot care oil
	9917001103	Geetika Devi K	
	9917001106	Venkatesan C	
	9917001109	Mahesh Pandian S	
18	9917001038	R. Lavanya	Anti-bromodosis footpad
	9917001053	R. Pradeepa	
	9917001064	P. Sharmila	
19	9917001026	A.Helina Rose	Eco friendly biodegradable plastic
	9917001073	S.Suja Gayathri	
	9917001074	K.Suriya Lakshmi	
20	9917001058	A.K. Ramkumar	Algal lamp
	9917001070	R. Sneha	
	9917001025	K. Harinivasini	
	9917001093	M.S.Aathikesavan	
21	9917001034	S.Kirthika	Uprooting of <i>Beta vulgaris</i> as a natural lip coat
	9917001066	P.Shyni Jasmin	
	9917001078	M.Vaijayanthi	
22	9917001047	S. Nivedhita	<i>Azolla Microphylla: A Potential Feed for Livestock</i>
	9917001053	B. Renuga Devi	
	9917001024	S. Gowshiki	
	9917001091	S. Shruthi	
23	9917001032	C.M. Karunyasri	Hell pesticides in the heaven of earthworm
	9917001014	M.Balamurugan	
	9917001067	Sivabharathi.V	
	9917001005	Ajitha Murugesan	
24	9917001110	Nino Flaviana R	Growth of plants using biopestimins and reducing the effect of anthracnose disease
	9917001090	Karthika Chandran R	
	9917001027	Janani S	
	9917001030	KarthigaiSelvi J D14	

(ii) Internship program: Students will undergo summer internship in the industry as a part of their Non-CGPAcategory as per 2013 regulations and under CGPA category as per 2018 regulations (3 credits). The internship is mandatory for all the students and the students will attend a two weeks industrial training and complete it satisfactorily. After successful completion of the training, the students need to submit a report and subsequently appear for a review. The performance of the students is evaluated based on the report and their ability to answer questions during the review. In addition, some of the students who got job offer also offered a chance for internship by the recruiters.

Table 2.2.4 List of organizations where students have completed their internship program

S.No	Organization
1.	Biocon. Bengaluru
2.	Algal R Nutra Pharms Pvt.Ltd. Thanjavur.
3.	Biozone. Chennai
4.	Uniq Technologies, Coimbatore
5.	Sunglow Biotech Company
6.	N. Ramavarier Ayurveda Foundation , Madurai
7.	Medall Health Care Pvt.Ltd.
8.	Phycospectrum Algal Research Centre
9.	Life cell International Pvt. Ltd. Chennai
10.	ArmatsBiotek. Chennai
11.	Averin Biotech Pvt Ltd. Hyderabad
12.	Baseman Health Care Inc
13.	Bharath Biologicals
14.	Dharani Sugar & Chemicals. Vasudevanalur
15.	Dinesh Foods. Kannur. Kerala
16.	Greenlife biotech lab. Coimbatore
17.	Janani Biotech, Theni
18.	Jeppiaar milk products. Pvt. Ltd
19.	Life cell International Pvt. Ltd. Chennai
20.	Helix Bio Genesis, Noida
21.	Biosetup Life Science, India
22.	Zygene Biotechnologies. Kochin, Kerala
23.	Centre for Stem Cell & Cancer Genomics, AMI Bioscience, Coimbatore
24.	Veridian Micro lab, Kelambakkam, Tamilnadu
25.	VJ Biotech, Coimbatore, Tamilnadu
26.	Trichy Research Institute of Biotechnology Pvt.Ltd (TRI Biotech)
27.	Clinbiocare Technology, Chennai

(D) Fast Learners

The following are the list of initiatives taken to encourage the fast learners.

(i) NPTEL

Faculty and students are encouraged to enroll in the NPTEL courses offered by faculty members of premier institutions of the country. Online courses can be registered by the students in place of self-study / honors courses offered by the department during the time of project semester. Our faculty members were also encouraged to register for NPTEL courses and they did well by securing good marks through Online exam. A sample copy of NPTEL certificate is shown in Figure 2.2.10.



Figure 2.2.10. Sample copy of NPTEL course certificates obtained by students

(ii) Competitive exams

Department of Biotechnology emphasizes importance towards Competitive Examinations (standardised tests) like GATE, NET, TANCET, GAT-B, DBT-BET, AIEEA, etc., which will facilitate entry into premier institutions of the country for their Masters or Doctoral studies. The university has a Centre for Competitive Examinations (CCE) exclusively to

facilitate more student participation in these examinations. Fast-learners identified by the department were encouraged to attend GATE training that helps them in not only qualifying in GATE exam but also improve their CGPA. This is possible because of the earnest effort put by the department by deputing their faculty members to handle special sessions arranged for GATE. FAST - TRACK coaching is also provided to the students on the verge of examinations. Repeated mock tests are being conducted to the students to get good score in the upcoming examinations. Table 2.2.5 shows the list of students qualified in the competitive examinations. Fig 2.2.11 shows the sample of GATE score card of a student that enabled her to get admission for higher education.

Table 2.2.5 List of students cleared various competitive exams during past three academic years

S. No	Name of the Student	Name of the exam cleared	Academic Year
1	Bhavani R	GATE	2021-2022
2	Gopikrishna G	GATE	2021-2022
3	Nivedhitha K	GATE	2021-2022
4	Deepak R	GATE	2021-2022
5	Ghurupreya R	GATE	2020-2021
6	Geetika Devi K	GATE	2020-2021
7	Nivedhita S	GAT-B	2020-2021
8	Ghurupreya R	TANCET	2020-2021
9	Geetika Devi K	TANCET	2020-2021
10	Suja Gayathri S	TANCET	2020-2021
11	Helina Rose A	TANCET	2020-2021
12	Oviya S	GATE	2019-2020
13	Shalini M	GATE	2019-2020
14	Hemapriya S	TANCET	2019-2020
15	Revathi	TANCET	2019-2020
16	Tvareta T	TANCET	2019-2020
17	Suresh Krishnan S P	GAT-B	2019-2020

18	Praseetha S	TANCET	2019-2020
19	Shalini M	TANCET	2019-2020
20	Arun Karthikeyan	GATE	2018-2019
21	T S Abirami	GATE	2018-2019
22	Arun Karthikeyan	JAM	2018-2019
23	Arun Karthikeyan	DBT - BET	2018-2019
24	Kavitha.A	AIEEA	2018-2019
25	Ramkishore A	TANCET	2018-2019
26	Pavithra U	TANCET	2018-2019
27	Sivaranjani V	TANCET	2018-2019
28	Jayashree B	TANCET	2018-2019
28	Jayashree B	TANCET	2018-2019

GATE 2021 Scorecard
Graduate Aptitude Test in Engineering (GATE)

Candidate's Details

Name: **GHURUPREYA R**
Parent's / Guardian's Name: **C RAMESH**
Registration Number: **BT21S57326017**
Date of Birth: **23-Dec-1999**
Examination Paper: **Biotechnology (BT)**

Performance

GATE Score: **497**
Marks out of 100*: **40**
Qualifying Marks**: **30.0** (General) **27.0** (EWS/OBC (NCL)) **20.0** (SC/ST/PwD)

Number of Candidates Appeared in this paper: 13186
All India Rank in this paper: 634

Valid up to 31st March 2024

* Normalized marks in Civil Engineering (CE), Computer Science and Information Technology (CS) and Mechanical Engineering (ME) Papers.
** A candidate is considered qualified if the marks secured are greater than or equal to the qualifying marks mentioned for the category for which valid category certificate, if applicable, is produced along with this scorecard.

Prof. Deepankar Choudhury
Organising Chairperson, GATE 2021
(on behalf of NCB - GATE, for MoE)

Fig.2.2.10 Snap shot of GATE score card

(iii) One-Credit Courses:

The department also offer one credit courses to under graduate students. These courses are taught

by academic/Industry experts or scientists from abroad (through video conferencing). The list of one credit courses offered by the department is shown in Table 2.2.6.

The students will get a chance to understand the real time projects that are undergoing in the industry and this can help to bridge the gap between practical and theory courses (for reference, few sample photographs are shown in Figure. 2.2.11. These industry-need based courses, also enhance the placement opportunities for our students.

Table 2.2.6 List of one credit courses offered for B.Tech students.

S.No.	Resource person	Name of the course	Date of conducting program	No students attended
1	Dr. S .R. Senthil Kumar, Founder and Chief Operating officer, Padmasini Lifesciences LLP, Chennai	Current Good Manufacturing Practices	24.1.2021 31.1.2021 07.2.2021 14.2.2021	46
2	Dr. H. Nellaiah, Head, Research and Development, BioZeen, Bangalore	Biopharmaceutical production:An Industry Perspective	06.11.2021 07.11.2021 14.11.2021	35
3	Dr. H. Nellaiah, Head, Research and Development, BioZeen, Bangalore	Biopharmaceutical production: An Industry Perspective	07.03.2020-08.03.2020	35
4	Dr. NavaniethaKrishnaraj R, Research Professor, Department of Chemical and Biological Engineering, South Dakota School of Mines and Technology, Rapid City, SD	Bioelectrochemical Engineering	15.11.2020-22.11.2020	30
5	Dr. S.R. Senthil Kumar, Founder and Chief Operating officer, Padmasini Lifesciences LLP, Chennai	Current Good Manufacturing Practices	18.10.2019-19.10.2019	28
6	Dr. H. Nellaiah, Head, Research and Development, BioZeen, Bangalore	Biopharmaceutical production: An Industry Perspective	19.10.2019-20.10.2019	21

7	Dr. S.R. Senthil Kumar, Appasamy Ocular Devices (Biopharma), Chennai	Current Manufacturing Practices	Good	08.09.2018- 09.09.2018	31
8	Dr. Lakshmi Subramanian, Dalmia Research Centre, Coimbatore	Bioseparations Phytochemistry	in	16.3.2019 – 17.3.2019	25



Figure. 2.2.11a: Industrial Expert Dr. Senthil Kumar delivering a lecture on Current Good Manufacturing Practices (BITX001)



Figure. 2.2.11b: Practical sessions – Bioseparations in Phytochemistry (BITX003)

The one-credits are designed to supplement the knowledge in areas that is not covered in the curriculum. For example, though the curriculum covers screening of microbes, bioprocess principles for industrial production of products and downstreaming techniques, that does not include the quality control practices and regulatory processes. The one-credit course “Current Good Manufacturing Practices” includes the quality control practices and describes the processes that is followed in the industry. Similarly, “Bioseparation in Phytochemistry” course content includes case studies on the separation of analytes. “Biopharmaceutical Production” course describes validation of analytical methods, regulatory procedures for drug discovery and drug development. Faculty for one-credit courses are industrial experts and were selected based on their experience in the specific area. The Current good manufacturing Practices syllabus and sample question paper (Figure. 2.2.12) is attached herewith.

Syllabus for BITX001 Current Good Manufacturing Practices (cGMP)

Sl. No.	Topic	Duration (hours)
1.	Introduction to GMP	2
2.	Personnel, Premise and Equipment	2
3.	Pharmaceutical Quality System	2
4.	Quality Management & Quality Control	2
5.	Production, Contract manufacture and analysis	2
6.	Outsourced activities, Documentation	2
7.	Complaints and Product Recall	2
8.	Case Study	1
	Total	15 hours

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END SEMESTER EXAMINATION – ODD SEMESTER [2019-2020]

Course Code/ Name	: BITX001-Current Good Manufacturing Practices	Date & Session	: 20.10.19/FN
Degree/Branch	: B.Tech./Biotechnology	Duration	: 180 Minutes
Section	: ALL	Max. Marks	: 100 Marks

Assessment Pattern as per Bloom's Taxonomy:

Remember	Understand	Apply	Analyze	Evaluate	Create	Total
10	134	0	4	0	0	148

Course Outcomes for Assessment in this Test:

CoS	Course Outcome
CO1	Understand the importance of quality systems in industry
CO2	Explain the role of various sectors in maintaining the quality of system
CO3	Case studies on current manufacturing practices in industry

PART – A (10 x 2 = 20 Marks)

Answer All Questions

	Pattern	Mapping COs
1. What is Pharmaceutical Quality System?	Understand	1
2. Differentiate Quality Control and Quality Assurance?	Analyze	1
3. Write any two key responsibilities of Head of QC?	Remember	1
4. Define Production Area in the context of Biopharmaceuticals	Remember	2
5. Describe the validation process of Autoclave	Understand	2
6. What is BPR?	Remember	2
7. Give any two points to avoid cross contamination?	Understand	2
8. Write any two tests that needs to be done to release the product to the market by QC	Remember	2
9. Define CMO	Remember	3
10. Differentiate Product Recall and Stop Sales activity?	Analyze	3

PART – B (5 x 16 = 80 Marks)

Answer All Questions

	Pattern	Mapping COs
11. Describe the documentation process for the Biopharmaceutical Manufacturing?	Understand	1 (16)
12. Describe in detail the role of Head of Manufacturing in the biopharmaceutical production	Understand	1 (16)
13. Describe the process of product recall	Understand	2 (16)
14. Discuss the activity of self auditing process	Understand	2 (16)
15. Discuss in detail about the Pharmaceutical Quality System?	Understand	2 (16)
16. Describe the person hygiene that needs to be followed in a cGMP facility	Understand	2 (16)
17. Discuss in detail the process of hiring a CMO	Understand	2 (16)
18. Describe the process flow of biopharmaceutical production from E.Coli fermentation to DSP?	Understand	3 (16)

Assessment Summary:

CoS	Remember	Understand	Apply	Analyze	Evaluate	Create	Total
CO1	2	34	0	2	0	0	38
CO2	6	84	0	0	0	0	90
CO3	2	16	0	2	0	0	20

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B.Tech. DEGREE END SEMESTER EXAMINATIONS, APR/MAY 2022

Course Code / Name	: BITX005-Biopharmaceutical Production : An Industry Perspective	Date & session	: 28.04.22/AN
Degree/Branch	: B.Tech/Biotechnology	Duration	: 180 Minutes
Section	: One Credit Courses	Max. Marks	: 100 Marks

Assessment Pattern as per Bloom's Taxonomy :

Remember	Understand	Apply	Analyze	Evaluate	Create	Total
2	86	52	8	0	0	148

Course Outcomes for Assessment in this test :

COs	Course Outcomes
1	Case studies on Biopharmaceutical production
2	Discuss the various areas of biopharma industry
3	Explain the process of regulatory process for Biologics

PART-A(10x2=20 Marks) Answer All Questions		Pattern	Mapping COs
1.	Which forms of viral hepatitis are the most common?	Remember	1
2.	List the three departments that are responsible for quality in an industry.	Remember	2
3.	Distinguish between <i>pharmacokinetics</i> and <i>pharmacodynamics</i>	Understand	2
4.	Distinguish between Greenfield and Brownfield projects with reference to biopharmaceutical facility design.	Analyze	2
5.	State the proper way of correcting an error in a document according to GDP.	Understand	2
6.	Expand the abbreviations CBER, CDER and DCGI	Understand	3
7.	List any three approvals essential for constructing a biopharmaceutical manufacturing facility	Analyze	3
8.	What is the full form of QSAR in connection with drug discovery?	Remember	3
9.	Why do small molecules elute the last in gel filtration chromatography?	Analyze	3
10.	Distinguish between microfiltration and ultra-filtration	Analyze	3

PART-B (5 x 16 = 80 Marks) Answer ANY 5 Questions		Pattern	Mapping COs	
11.	With a flow diagram, describe in detail the purification steps for recombinant hepatitis B virus surface antigen	Understand	1	
12.	Describe in detail how drugs are discovered and developed	Apply	1	
13.	Write a detailed account of the drug (or vaccine) approval process in India	Understand	2	
14.	a. With a diagram, describe the cloning of the Hepatitis B surface antigen gene in <i>Hansenula polymorpha</i> and the isolation of stable transformants (8) b. Distinguish between in vivo, in vitro and ex vivo assays (6)	Understand	2	
15.	Give a detailed description of the design of a pharmaceutical / biopharmaceutical facility and explain the movement of men and materials using labeled diagrams	Understand	2	
16.	Give a detailed account the various quality control measures in biopharmaceutical manufacturing	Understand	2	
17.	a. Describe the various stages of clinical trials and the importance of each (8) b. List the various types of documents involved in the quality control of biopharmaceuticals and describe the specific purpose of each (8)	Apply	2	
18.	Write an elaborate account of Good Documentation Practices and Document Management	Understand	3	

Assessment summary :							
COs	Remember	Understand	Apply	Analyze	Evaluate	Create	Total
CO1	2	16	16	0	0	0	34
CO2	0	54	32	2	0	0	88
CO3	0	16	4	6	0	0	26

2.2.12: Sample question paper of one-credit course

(iv) Lectures by Industry Experts:

In order to enrich the knowledge of the UG students Guest Lectures are frequently organized by inviting senior academicians from leading universities and experts from the industry. This will benefit the students to understand the latest developments in biotechnology and allied fields and also understand the recent developments in the industry. The list of programs organized. (Table.2.2.7).

Table 2.2.7 List of guest lecture/workshop/seminar organized by the department.

S.No.	Name of Programme	Resource Person	Date of Programme
1	Indo- US Workshop on "Extremophiles in Biotechnology"	Prof.Rajesh Shani, South Dakota School of Mines & Technology, USA	27.11.2019
2	Two-day Virtual Workshop on Biotechniques for Extraction of Metabolites from Plant and Algal Sources	Mr. Vivek Murali, Founder, Remura Biologicals, Krishnagiri. Dr. R. Saravanan. CARE	11.05.2020 - 12.05.2020
3	Webinar on "What's New About SARS-CoV-2?"	Prof. S. Sudhakar, MS University, Tirunelveli	03.06.2020
4	Webinar on "Vaccine Development for COVID-19 A Birds eye view.	Prof. Richard Coico, SUNY Downstate Health Sciences University, USA	04.06.2020
5	Webinar on "Missing Links in The Enemy Territory."	Dr. V. Deepak, University of Derby, UK& KARE	06.06.2020
6	Webinar on "Viral Diagnosis: The Covid-19 Scenario"	Dr. K. Sundar,KARE	11.06.2020
7	Online Workshop on "Bread, Butter and Biotechnology"	Dr. N.K. Sasidharan, Kerala Agriculture University Dr.S. Senthil Kumar, Founder and CEO. Padmasri Laboratory, Chennai	13.05.2020- 14.05.2020
8	Virtual Workshop on "Protein and Genome Bioinformatics"	Dr.D. Illakkiya, Mother Terasa University Dr.K.N. Rajnish, SRM Institute of Technology. Chennai	15.05.2020
9	Virtual Workshop on "Caterpillar to Butterfly 2.0 – Personality Development"	Mrs.Swetha Venkatesan, Tfizer Pharmaceuticals Mr. Aravind Babu, Associate consultant, Capgemini	04.06.2020- 06.06.2020

10	Virtual Workshop on "Workshop on Protein Bioinformatics"	Dr.M. Michael Gromiha, IIT, Madras, Dr.P. Kannabiran, Mepco Schlenk Engineering College	08.06.2020-10.06.2020
11	Virtual Workshop on "Plant Bioinformatics"	Dr.S. Hemalatha, Crescent Institute of Science & Technology Dr. Dilip Gore, Founder and Director, Sai Bio System, Nagpur	11.06.2020-12.06.2020
12	Virtual Workshop on "Waste – An offer letter"	Dr.M. Premalatha, NIT, Trichy Mr. TamilmanianNagalingam, Co-Founder, Kuppakaran waste Management Pvt.Ltd.	11.06.2020
13	Virtual Workshop on "Understanding proteins in the post-genomic era"	Dr.S. Ananthi, Head, CLIN Biocare, Chennai Mr. Jaison Raj, Associate Scientist, Biocon Bristol Myers Squibb, Bengaluru	13.06.2020-14.06.2020
14	Virtual Workshop on " From Student to Bio entrepreneur"	Mr. Anand Sivaraj, Manager, Anna University Mr. Dinakaran Paneerselvam, Co-Founder, IEEARC Group of companies.	14.06.2020
15	Virtual Workshop on " The Era of Digital Bioprocessing: Exploitation of MATLAB for Bioprocess Engineers"	Dr. SivamaniSelvaraju, Salalah College of Technology, Oman Dr.K. Haribabu, NIT, Calicut	17.06.2020-18.06.2020
16	Virtual Workshop on " BIOFIRM - Scaling Lab2Market"	Dr. John Thambirajah AMIST University, Malaysia. Dr. Jennet Rani, Prof & Head, Sadakathullah Appa College. Tirunelveli	18.06.2020-20.06.2020
17	Virtual Workshop on " Basic Animal Handling Techniques"	Dr. R. Vadivelan.Professor, JSS College of Pharmacy Ooty Dr.S. Muthukrishnan, Associate Professor, PSG College of Pharmacy, Coimbatore	19.06.2020
18	2 nd National Conference on "Innovations in Bio & Chemical Engineering for Sustainable Life"	Dr. K. Balakrishnan, MK University Dr. K.M. Gothandam Prof, VIT, Vellore Dr.M. Arivazhagan, Prof, NIT, Trichy.	20.05.2021-21.05.2021
19	One day workshop on "Nurturing and Transforming Research"	Dr.K.Sundar, Prof. KARE Dr. Sankarganesh Arunachalam,	09.03.2022

		Associate Prof. KARE Dr.T.Kathiresan, Prof & Head, KARE Dr. K.Selvaraj, Assistant Prof, KARE Dr. S. Achiraman, Prof, Bharathidasan University	
20	One day workshop on “Lab Safety and Management”	Dr. G.Kanthimathi, Associate Prof, Ramco Institute of Technology. Dr.K.Venkadeswaran, Assistant Prof, PSR Engineering College.	20.04.2022

(v) Assignments

Every student is asked to submit assignment / Quiz / tutorial / class test for each unit (1-5), the weightage for assignment is 15%. The weightage for sessional examinations I & II is 35%. The total marks allotted for internal is 50% of the total score. A sample set of assignments is given in Table 2.2.8.

Table 2.2.8: Sample Assignments given to the students

BIT18R312 / Enzyme Technology

S.No.	Assignment /Tutorials	Topics	Date
1	<u>Assignment –I</u> <u>Slow learners</u>	<ul style="list-style-type: none"> Enzyme Classification Catalysis Modeling rate of Equation – Single substrate reaction 	September, 2020
2	<u>Assignment – II</u>	<ul style="list-style-type: none"> Enzyme inhibition and types Allosteric regulation Monad Model 	October, 2020
3	<u>Assignment – III</u> <u>Fast learners</u>	<ul style="list-style-type: none"> Methods of production of enzymes Extraction of enzymes from Microbial sources Seminar and Research Paper discussion Tutorials 	November, 2020
4	<u>Assignment – IV</u>	<ul style="list-style-type: none"> Enzyme Immobilization Applications of immobilized enzyme 	November, 2020
5	<u>Assignment – V</u>	<ul style="list-style-type: none"> Reactor design Biosensors applications 	December, 2020

A sample copy of the assignment submitted by a student is presented in Figure 2.2.14.

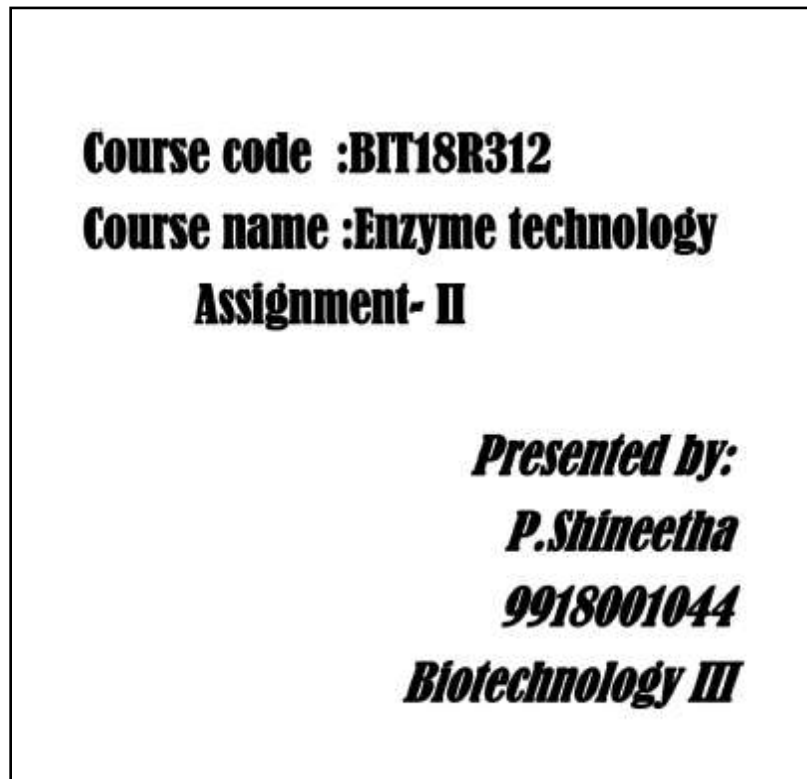


Figure 2.2.14: Sample Assignment copy

1. Enzyme Classification:

S.No	Group of Enzyme	Reaction Catalysed	Examples
1.	Oxidoreductase	Transfer of hydrogen and oxygen atoms or electrons from one substrate to another.	Dehydrogenase Oxidases
2.	Transferases	Transfer of a specific group (a phosphate or methyl etc) from one substrate to another.	Transaminase Kinases.
3.	Hydrolases	Hydrolysis of a substrate.	Estherases digestive enzyme.
4.	Isomerases	Change of the molecular form of the substrate.	Phospho hexo isomerase, fumarase.
5.	Lyases	Nonhydrolytic removal of a group or addition of a group to a substrate.	Decarboxylase Aldolase.
6.	Ligases (Synthetases)	Joining of two molecules by the formation of new bonds.	Citric acid Synthetase.

Scanned with CamScanner

(vi) Research oriented project through funded laboratory

All the faculty members of the department are actively involved in research. This is evident by the number of externally funded projects and the publications the faculty have generated over the years. There are five research laboratories established in the department by the faculty members with the generous support from the management and with the support of external funding agencies. These research laboratories not only support the research scholars but also the PG and

UG students of the department. Many UG students opt for internal projects with one of the faculty mentors as research supervisors either in the 7th or 8th semester. They get a chance to work on one of the projects that is being carried out by the research group of the faculty members.

Besides, the students are also encouraged to opt for external projects in one of the premier laboratories either in India or abroad.

Table 2.2.9 List of organizations where students have completed their project work (external)

❖ National/International	Name of the Universities
❖ Foreign Universities	<ul style="list-style-type: none"> ❖ National University of Singapore, Singapore ❖ Nanyang Technological University, Singapore ❖ Arizona State University, USA ❖ Sedeer Medical, Doha, Qatar ❖ UniversitiTeknologi PETRONAS, Malaysia
❖ Organizations in India	<ul style="list-style-type: none"> ❖ Dabur Research Foundation, New Delhi ❖ CLRI Chennai ❖ NIMHANS, Bangaluru ❖ INSTEM, Bangaluru ❖ IICT, Hyderabad ❖ Osmania University ❖ NIT, Trichy ❖ University of Madras ❖ Madurai Kamaraj University ❖ Bharathiar University ❖ Bhabha Atomic Research Centre, Mumbai ❖ IGCAR, Kalpakkam ❖ Central Island Agriculture Research Institute, Andaman and Nicobar ❖ Indo-American Cancer Research Foundation. Hyderabad ❖ ICAR, Tiruvananthapuram ❖ National Agri-food Biotechnology Institute. Mohali, Punjab ❖ King Institute, Chennai ❖ Aravind Medical Research Foundation, Madurai ❖ AlgalR Nutraceuticals, Thanjavur ❖ Janani Biotech, Theni

(vii) Semester abroad program –

As per our curriculum, during theregular academic sessions, under graduate students of KARE can complete a semester in a university abroad. As part of this program, the students can select any one of the partner universities with whom KARE has an MoU. The credits earned during that period can be transferred to KARE.

Utilizing this opportunity, the students of UG Biotechnology has completed a semester in the following Universities:

- Soongsil University, South Korea
- Hannam University, South Korea

In addition, the final year students are allowed to complete their project in any university abroad with the help of our faculty members. Using this opportunity UG students have completed their project in the following universities:

- Arizona State University, USA
- National University of Singapore, Singapore
- Nanyang Technological University, Singapore
- ❖ UniversitiTeknologi Petronas, Malaysia

The department has also signed an MoU with South Dakota School of Mines & Technology, South Dakota, USA which helps in organizing various advanced level workshops every year.

(E) Slow learners

The department put enormous efforts in helping the slow-learners in acquiring the subject knowledge; following actions are taken for the benefit of slow learners.

(i) Bridge course

It is a midterm course offered at the end of odd and even semesters for the benefit of vernacular medium students and Lateral entry students to improve their skills in basic English and mathematics. A copy of the circular for the bridge course conducted is shown in Figure 2.2.14.

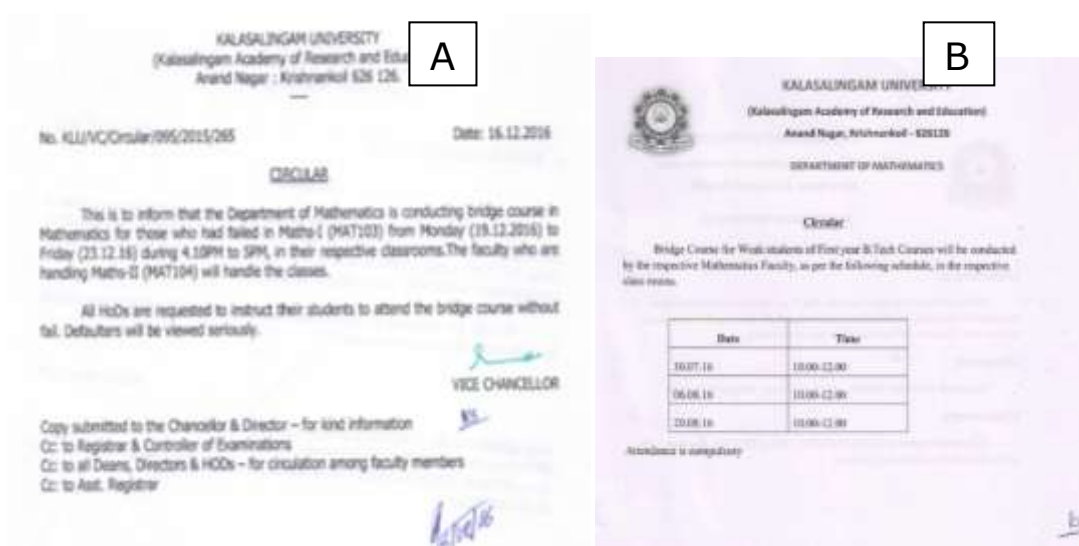


Figure. 2.2.14 Circular for Bridge course (A), Schedule of Mathematics Bridge course (B)

(ii) Laboratory course with project.

As per the curriculum, the student has to carry out a project from in five of the laboratory courses that are offered during their BTech program. The details of course information is presented in Table 2.2.10.

By applying the concept learned in of laboratory courses, the students are encouraged to develop some small projects as outcome. This will enhance the analytical and intellectual ability of the students. Accordingly, the following five laboratory courses (in 2013 syllabus) viz. Microbiology (III), Computational Biology (IV), Bioprocess laboratory (V), Genetic Engineering (V), Immunology Laboratory (VI) Downstream processing (VII) have been approved by the BoS as laboratory courses with project. A group comprising with four/five students will complete the project as part of the laboratory course.

Table 2.2.10. List of Special Academic Courses (LP) offered by the Department

Course code	Name of the course	Theory with Practical (TP) / Lab with Project (LP)/ Integrated course (IC)
BIT283	Microbiology Laboratory	Lab with project
BIT288	Computational Biology	Lab with project
BIT387	Bioprocess Laboratory	Lab with project
BIT388	Genetic Engineering	Lab with project
BIT389	Immunology Laboratory	Lab with project
BIT491	Downstream Processing Laboratory	Lab with project

Sample copy of the mini project report is shown in Figure. 2.2.15.

**PHYSICAL INTERACTION OF ROSIGLITAZONE
WITH Nrf2 and IFN γ**

A report submitted in the part of lab with Mini project

By

RAMAGIRI PAVITHRA (9915001059)

AYYAVARISSETTY SUSHMITHA (9915001060)

BACKIALAKSHMI .R (9915001061)

KARTHIKE .R (9915001063)

HARISH KUMARAN .G (9915001065)

ADHIL KHA .A (9915001066)

AMIRTHA VARSHINI .R (9915001167)

SIVA SANKAR .M (9915001169)



**DEPARTMENT OF BIOTECHNOLOGY
SCHOOL OF BIO AND CHEMICAL ENGINEERING
KALASALINGAM ACADEMY OF RESEARCH AND
EDUCATION**

(Deemed to be University)

KRISHNANKOIL 626 126

2015-2019

Figure 2.2.15.aLab with Project Report

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION

(Deemed to be University)

KRISHNANKOIL 626 126

BONAFIDE CERTIFICATE

This is to certify that the report entitled, "PHYSICAL INTERACTION OF ROSIGLITAZONE WITH Nrf2 and $\text{IFN}\gamma$ " was submitted by RAMAGIRI PAVITHRA, AYYAVARISETTY SUSHMITA, BACKIALAKSHMI .R, KARTHIKE .R, HARISH KUMARAN .G, ADHIL KHAN .A, AMIRTHA VARSHINI .R and SIVA SANKAR .M, III Year Biotechnology, KALASALINGAM UNIVERSITY, Krishnankoil, Srivilliputhur" is a bonafide research work carried out by them under my guidance and in the part of lab with mini project in this institute.


Dr. B. VANAVIL

THE HEAD

DEPARTMENT OF BIOTECHNOLOGY


Dr. SANKARGANESH ARUNACHALAM

ASSISTANT PROFESSOR

DEPARTMENT OF BIOTECHNOLOGY

II

Figure 2.2.15.b Lab with Project Report

(iii) Theory with practical components.

The theory courses without any allied laboratory component can also have the practical component as a part of the syllabus in the curriculum. Accordingly, the following three theory courses viz. Analytical Techniques in Biotechnology (III), Protein science and Engineering (IV), Enzyme Technology (V), Solid Waste Management (VI), Animal Biotechnology (VII) were approved by the Board of Studies (BoS) as theory with practical components.

Table 2.2.11 shows the list of courses (IC, Autonomous, TP) approved by BoS. Through these course of study, one can improve the practical knowledge which could give them the idea to compare the experimental results with the analytical results. At the outset, the group of students should submit the observation based on the results obtained from the practical component. In this regard, our students have utilized the various tools for analysis in protein science engineering (Front page of the Report is shown in Figure 2.2.16). It also helps our students to improve their practical knowledge in terms of understanding the fundamental theoretical concepts.

NAME: R. Mari Selva Sundari
 STD: 11th yr SEC A
 ROLL No. 991600106 SUB Protein Science Lab

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S.No.	Date	Title	Page No.	Teacher's Sign / Comment
(01)	12/01/18	DENATURATION OF PROTEIN	4	✓
(02)	8/02/18	AN INSILICO TOOL FOR PROTEOLYTIC PEPTIDES (IPEP)	4	✓
(03)	8/03/18	PREDICTION OF TRANSMEMBRANE PROTEIN	4	✓
(04)	22/03/18	SECONDARY STRUCTURE PREDICTION	4	✓
(05)	20/4/18	MUTATION BY UV RADIATION	4	✓

Chari

Figure 2.2.16: Sample Observation Note book for Theory with Practice Course

Table 2.2.11. List of Special Academic Courses (TP, IC) offered by the Department

Course code	Name of the course	Theory with Practical (TP) / Lab with Project (LP)/ Integrated course (IC)
BIT216	Protein Science and Engineering	Theory with Practical
BIT214	Analytical Techniques in Biotechnology	Theory with Practical
BIT322	Enzyme Technology	Theory with Practical
BIT401	Animal Biotechnology	Theory with Practical
CIV416	Industrial Wastewater Management	Theory with Practical
CIV463	Solid Waste Management	Theory with Practical
BIT17R142	Bioanalytical Techniques	Integrated Course
BIT17R241	Cell Biology and Genetics	Integrated Course
BIT18R242	Industrial Microbiology	Integrated Course
BIT18R271	Microbiology	Integrated Course
BIT18R272	Bioinformatics	Integrated Course
BIT18R272	Principles of Biochemistry	Integrated Course
BIT18R273	Molecular Biology	Integrated Course
BIT18R374	Immunology	Integrated Course

(iv) Remedial classes

Students who are slow-learners are encouraged to attend Remedial classes that are scheduled in the evening hours. Students who secure low marks in their sessional examinations are motivated to attend these classes. Special attention is given to the individual students by the respective faculty. A sample copy of the Circular, Time Table and attendance sheet is presented in Figure.2.2.17.

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION
(Deemed to be University)
Anand Nagar: Krishnankoil 626 126.

No. KARE/Circular/095/2020/116

Date: 17.10.2020

CIRCULAR

As per the decision taken in the Staff council meeting held on 10.10.2020, all the HoDs are hereby informed to start the remedial class from 19.10.2020.

To monitor and consolidate the attendance daily, the online system for entering the attendance details is enabled in the timetable cell PDs' login in edu.kalasalingam.ac.in.

All the HoDs are hereby informed to instruct the Timetable Cell PDs' to enter the attendance details in EDU-Login before 06.30 PM of each day.

The attendance template course-wise should be uploaded in the EDU-Login, and the same is attached.



VICE CHANCELLOR

Copy submitted to Chancellor and Vice President – for favour of information

Cc: to Registrar

Cc: to CoE

Cc: to all Deans and Directors

Cc: to all Heads of the Department – with a request to inform to the faculty members and all Students through FA/CC

Figure. 2.2.17. a. A sample copy of the Circular



REMEDIAL COACHING CLASS SCHEDULE
2020-2021 (ODD SEMESTER)
SCHOOL OF BIO AND CHEMICAL ENGINEERING
DEPARTMENT NAME: BIOTECHNOLOGY

Program: B.TECH

S.No.	Year	Sem	Section	Course Code	Course Name	Student Strength	Day order	Time	Faculty ID	Faculty Name	Google-Meet Link
1.	II	III	A	BIT18R271	Microbiology	10	Monday	04.00-05.00	KSRBIO	Dr. K. Sundar	https://meet.google.com/lookup/a5wy4fbsly?authuser=1&hs=179
2.	II	III	B	BIT18R271	Microbiology	5	Monday	04.00-05.00	PYABIO	Ms. P. Priya	https://meet.google.com/lookup/gplfnkd4h3?authuser=1&hs=179
3.	II	III	A	BIT18R272	Principles of Biochemistry	5	Tuesday	04.00-05.00	KJIBIO	Dr. K. Jyothi	https://meet.google.com/lookup/fmmutl27ih
4.	II	III	B	BIT18R272	Principles of Biochemistry	2	Tuesday	04.00-05.00	KSJBIO	Dr. K. Selvaraj	http://meet.google.com/znw-vxcr-fmq
5.	II	III	OE	BIT18R320	Human Diseases and Prevention	9	Wednesday	04.00-05.00	SRKBIO	Dr. S. Ramkumar Pandian	https://meet.google.com/rwr-syqo-rikb?authuser=0&hs=179
				BIT18R321	Exploring	7	Wednesday	04.00-05.00	JKNBIO	Mr. S. J. Kabilan	https://meet.google.com/lookup/diav3

					Microbial World						bp3mk
6.	II	III	A	CHE18R275	Principles of Chemical Engineering	14	Thursday	04.00-05.00	KVIBIO	Dr. K.K. Vasumathi	https://meet.google.com/lookup/bwq2ynlds5
7.	II	III	B	CHE18R275	Principles of Chemical Engineering	12	Thursday	04.00-05.00	JKMBIO	Dr. J. Kanimozhi	https://meet.google.com/lookup/dll3tj76nc
8.	II	III	CBCS	BIT18R207	Analytical Techniques in Biotechnology	2	Friday	04.00-05.00	KJIBIO	Dr. K. Jyothi	https://meet.google.com/lookup/gsh4vnl4cz
				BIT18R309	Food Processing and Technology	5	Friday	04.00-05.00	NHMFOO	Dr. N. Hariram	https://meet.google.com/lookup/hmrcx5amxp?authuser=0&hs=179
9.	III	V	A	HSS18R013	Professional Ethics	5	Monday	04.00-05.00	JKNBIO	Mr. S. J. Kabilan	https://meet.google.com/lookup/eusz22hdb?authuser=0&hs=179
10.	III	V	B	HSS18R013	Professional Ethics	2	Monday	04.00-05.00	ASGBIO	Dr. Sankarganesh Arumachalam	https://meet.google.com/lookup/bto2f6nhyn
11.	III	V	CBCS	BIT18R310	Pharmaceutical Biotechnology	1	Tuesday	04.00-05.00	AMKBIO	Dr. A. Muthukumaran	https://meet.google.com/lookup/elgnhbcwzs?authuser=0&hs=179
				BIT18R314	Drug Design and Development	4	Tuesday	04.00-05.00	JCRBIO	Mrs. J. Christina Rosy	https://meet.google.com/lookup/a4xgtqx3w6
				BIT18R312	Enzyme Technology	6	Tuesday	04.00-05.00	LMLBIO	Dr. L. Muthulakshmi	https://meet.google.com/lookup/a4xgtqx3w6

											.com/lookup/d3foysmvkk
12.	III	V	OE	BIT18R316	Introduction to Computational Biology	8	Wednesday	04.00-05.00	JCRBIO	Mrs. J. Christina Rosy	https://meet.google.com/lookup/b2dxzfx7z
13.	III	V	OE	BIT18R319	Environmental Biotechnology	4	Wednesday	04.00-05.00	NHMFOO	Dr.N.Hariram	https://meet.google.com/lookup/dkcnci6x4d
14.	III	V	A	BIT18R371	Bioprocess Principles (IC)	10	Thursday	04.00-05.00	BVLBIO	Dr. B. Vanavil	https://meet.google.com/lookup/d5zvdpyutt
15.	III	V	B	BIT18R371	Bioprocess Principles (IC)	8	Thursday	04.00-05.00	PYABIO	Ms. P. Priya	https://meet.google.com/lookup/amnpkmdu6f?authuser=1&hs=179
16.	III	V	A	BIT18R372	Genetic Engineering (IC)	14	Friday	04.00-05.00	SRKBIO	Dr. S. Ramkumar Pandian	https://meet.google.com/zgk-mfinf-pfr?authuser=0&hs=179
17.	III	V	B	BIT18R372	Genetic Engineering (IC)	7	Friday	04.00-05.00	KRNBIO	Dr. T. Kathiresan	https://meet.google.com/lookup/fz3e2jucst
18.	IV	VII	B	HSS18R015	Total Quality Management	1	Monday	04.00-05.00	NRVBIO	Ms. G. Nadana Raja Vadivu	https://meet.google.com/hji-unxy-jai
19.	IV	VII	B	BIT18R403	Plant Biotechnology	3	Tuesday	04.00-05.00	PCMBIO	Dr. K. Palanichelvam	http://meet.google.com/aop-dpit-kpx
20.	IV	VII	B	BIT18R402	Animal Biotechnology	5	Tuesday	04.00-05.00	KRNBIO	Dr. T. Kathiresan	https://meet.google.com/lookup/gmrzzqtnxi
21.	IV	VII	OE	BIT18R432	Biological Waste	11	Wednesday	04.00-	NKS BIO	Dr.Naresh Kumar	https://meet.google

					Water Treatment			05.00		Sharma	.com/lookup/dgdgg62hpu?authuser=0&hs=179
22.	IV	VII	B	BIT18R313	Metabolic Engineering	3	Thursday	04.00-05.00	NRVBIO	Ms. G. Nadana Raja Vadivu	https://meet.google.com/ady-zupx-itk?hs=122&authuser=0
23.	IV	VII	B	BIT18R471	Bio separations: Principles and Applications (IC)	8	Friday	04.00-05.00	SSABIO	Dr. S. Sheik Asraf	https://meet.google.com/lookup/exdv54oy7n

Signature of the HoD

Figure.2.2.17. b. A sample copy of the Time Table

Remedial Coaching Classes for 2020-21 (ODD SEMESTER)
COURSE WISE DAILY ATTENDANCE SHEET

1. Name of the Department : Biotechnology
 2. Name of the Program : B.Tech
 3. Year/Semester : II/III
 4. Course Name : Principles of Chemical Engineering
 5. Course Code : BIT18R275 Date: 19.11.2020
 6. Name of the Faculty : K.K.VASUMATHI Time: 4.00 – 5.00 PM



S. No.	Register No	Name of the Student	Present / Absent
1.	9919001001	AATHREYAN M	Present
2.	9919001009	ARUNACHALAM A	Present
3.	9919001012	BARKAVI V	Present
4.	9919001014	DEENATHAYALAN M	Present
5.	9919001016	DURGA S	Present
6.	9919001019	HARI KRISHNAN L	Present
7.	9919001020	HARIHARAN B	Present
8.	9919001025	JAYASREE M	Present
9.	9919001027	KANAGA SHANMUGI	Present
10.	9919001028	KARTHIKEYAN R	Absent
11.	9919001031	MEGAPRAKASH S P	Present
12.	9919001034	NAVEENKUMAR V S	Present
13.	9919001035	PRUNTHA G	Present
14.	9919001036	PURUSHOTHAMAN K	Present
Total number of students to be attended			14
Number of absentees			1
Signature of the Faculty			<i>U. U. Uthir</i>



Signature of the Timetable Cell PDs

Signature of the HoD

Figure.2.2.17. c. A sample copy of the attendance sheet submitted by the faculty

2.2.2. Quality of end semester examination, internal semester question papers, assignments and evaluation (15)

The examination pattern is written examinations (Sessional Examinations and End Semester Examinations) and assignments/ seminars. Both the internal and end semester question papers are prepared following Bloom's Taxonomy. The subject experts (either internal or external) set the question paper. The sessional examination questions are prepared by the course coordinator which is reviewed by the module and program coordinators of each course and the question is finally approved by the Head of the department and submitted to the Office of Controller of Examinations. In case of End Semester examinations, the question is either prepared by an Internal Faculty or External Examiner. The questions are reviewed by a committee appointed by the CoE and then finally approved.

End semester Examination: The End Semester examinations are conducted once in a semester. The End semester question paper is prepared for 100 marks and the pattern include all the COs and mapping of COs for each question. The total weight age for the end semester examination is 50% of the total score.

A sample copy of the End Semester question is presented in Figure 2.2.2.1 and the screen shots of Module and Program Coordinators approval is given in Figures 2.2.2.2 and 2.2.2.3 respectively.

Figure 2.2.2.1: Sample copy of End Semester Question

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION (Deemed to be University) Anand Nagar, Krishnankoil – 626 126, END SEMESTER EXAMINATIONS - APR/MAY 2022				
Course Code	: BIT18R205	Duration	: 180 Minutes	
Course Name	: Bioenergetics and Metabolism	Max. Marks	: 100	
Degree	: B.Tech.			
PART – A (20 Marks) Answer All Questions		Pattern	Mapping COs	Marks
1	Mention the components involved in photo system	Understand	CO1	2.0
2	State the various ways in which oxidation & reduction can be defined.	Understand	CO1	2.0
3	Define Cori cycle and write the significance of this pathway.	Remember	CO2	2.0
4	What is the biological significance of Glycogenin?	Understand	CO2	2.0
5	Explain the various levels of regulation in amino acid synthesis	Understand	CO3	2.0
6	What are the forms in which amino groups are transported through the blood prior to the urea cycle?	Understand	CO3	2.0
7	Where does the biosynthesis of fatty acids occur?	Understand	CO4	2.0
8	Distinguish between beta oxidation and omega oxidation	Apply	CO4	2.0
9	What is the major mechanistic difference in purine and pyrimidine biosynthesis?	Apply	CO5	2.0
10	How are pyrimidines synthesized?	Understand	CO5	2.0
PART – B (80 Marks) Answer All Questions		Pattern	Mapping COs	Marks
11.A	Discuss about oxidation and reduction concepts explain with suitable example.	Remember	CO1	16.0
OR				
11.B	Explain the pathway of Calvin cycle with diagrammatic explanation.	Remember	CO1	16.0
12.A	(i). Draw the citric acid cycle and show the various intermediates and enzymes at each step of the cycle (ii). How many ATPs are produced during respiration (Glycolysis+ citric acid cycle) (iii). Relate the number of ATPs to the number of NADH and FADH2	Analyze	CO2	16.0
OR				
12.B	Describe the gluconeogenesis pathway in detail and show the various intermediates of the pathway. Comment on the importance of this pathway under conditions of fasting/ starvation.	Understand	CO2	16.0

PART – B (80 Marks) Answer All Questions		Pattern	Mapping COs	Marks
13.A	(i) Briefly explain the post translational modification in protein synthesis with suitable diagram	Understand	CO3	8.0
	(ii) Explain the reversible covalent regulation in biosynthetic pathway of amino acids	Apply	CO3	8.0
OR				
13.B	Write a detailed account of Protein synthesis in prokaryotes and illustrate suitably	Apply	CO3	16.0
14.A	(i) Describe in detail steps of the cholesterol synthesis	Apply	CO4	8.0
	(ii) Detail the steps involved in activation, transport and beta-oxidation of palmitic acid mitochondria.	Analyze	CO4	8.0
OR				
14.B	Illustrate the major regulatory mechanisms of fatty acid metabolism in humans	Analyze	CO4	16.0
15.A	Discuss the synthesis and degradation of pyrimidines.	Apply	CO5	16.0
OR				
15.B	Write an account of salvage pathway in purine nucleotide synthesis. Add a note on Lesch-Nyhan syndrome	Apply	CO5	16.0

Assessment Pattern as per Bloom's Taxonomy:

COs	Remember	Understand	Apply	Analyze	Evaluate	Create	Total
CO1	32.0	4.0	0	0	0	0	36
CO2	2.0	18.0	0	16.0	0	0	36
CO3	0	12.0	24.0	0	0	0	36
CO4	0	2.0	10.0	24.0	0	0	36
CO5	0	2.0	34.0	0	0	0	36
Total	34	38	68	40	0	0	180

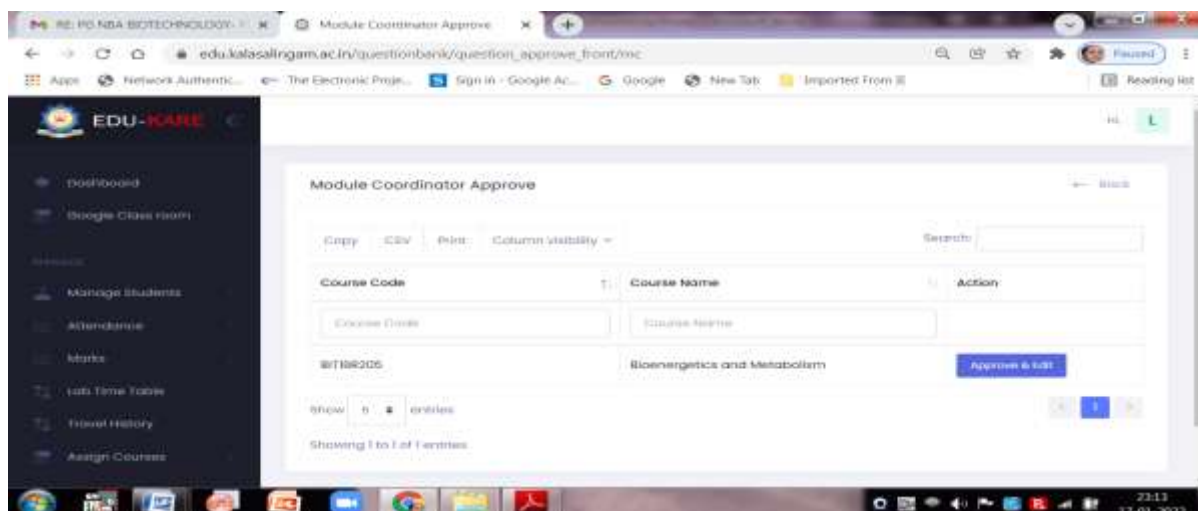


Figure 2.2.2.2: Screen Shot of Module coordinator approval

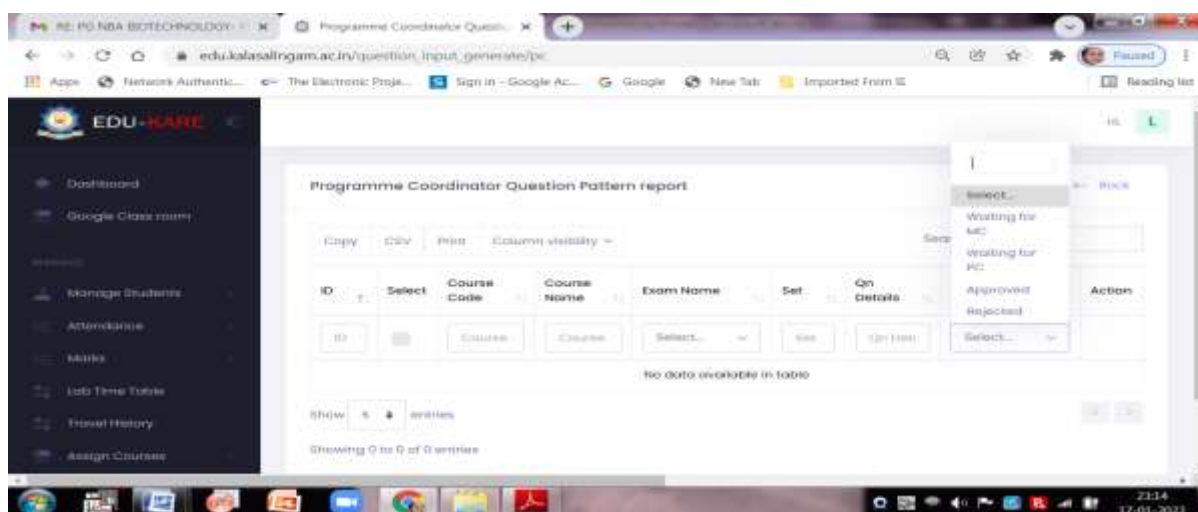
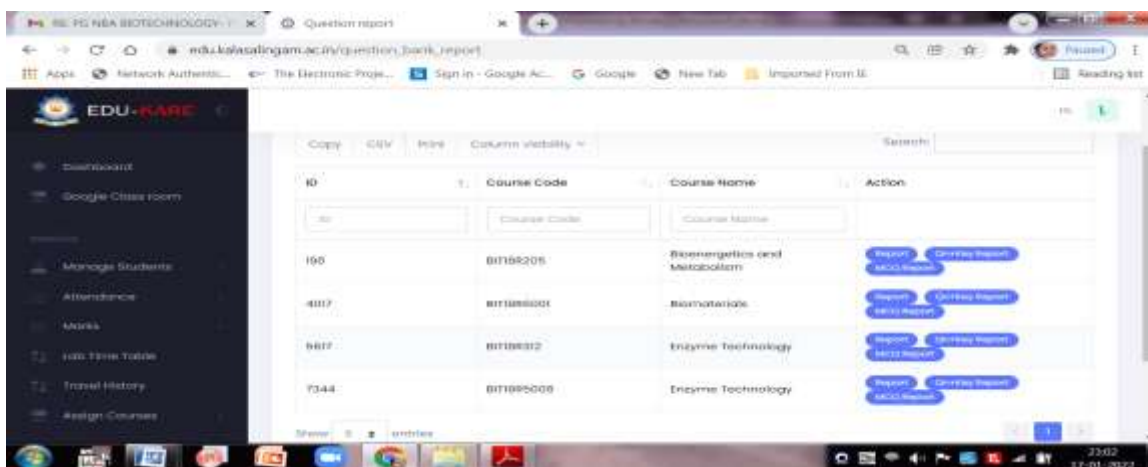


Figure 2.2.2.3: Screen shot of Programme coordinator question pattern report

While the question pattern for End Semester Examination includes all the five units (5 COs) for 100 marks, the internal question papers cover 2 units (2 COs) for 50 marks. The End Semester examinations are of 3h duration whereas the internal examinations are of 1.5h duration. The approved question papers are submitted to Office of Controller of Examinations through either EDU-KARE or ERP-KALVI databases.

During pandemic, to overcome the difficulties encountered, the academic sessions went on-line followed by examinations. For each course an exhaustive Question Bank (consisting of multiple choice questions (MCQ) was prepared by each of the Course Faculty and the questions were

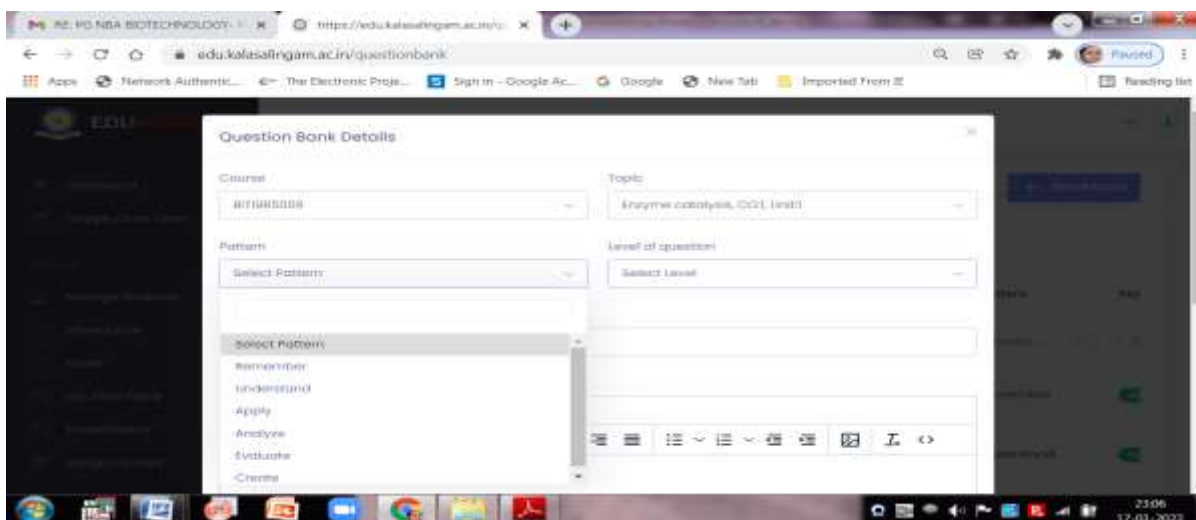
approved through the routine approval process described earlier. During the examinations, the question paper will be randomly generated from the question bank by the Office of Controller of Examinations. A screen shot of the process is presented in Figures 2.2.2.4 to 2.2.2.6.



The screenshot shows a web application interface for 'EDU-KARE'. On the left is a sidebar menu with options: Dashboard, Google Classroom, Manage Students, Attendance, Marks, Add Time Table, Travel History, and Assign Courses. The main area displays a 'Question report' table with columns: ID, Course Code, Course Name, and Action. The table contains four rows of data, each with a 'Report' and 'Generate Report' button in the Action column.

ID	Course Code	Course Name	Action
160	BIT06205	Bioenergetics and Metabolism	Report Generate Report
4017	BIT068001	Biomaterials	Report Generate Report
9817	BIT06312	Enzyme Technology	Report Generate Report
7344	BIT065005	Enzyme Technology	Report Generate Report

Figure 2.2.2.4: Screen Shot of Question Report



The screenshot shows a 'Question Bank Details' dialog box. It contains four main filter sections: Course (with a dropdown menu), Topic (with a dropdown menu), Pattern (with a dropdown menu), and Level of question (with a dropdown menu). Below the Pattern dropdown, a list of patterns is visible: Remember, Understand, Apply, Analyze, Evaluate, and Create. The interface also includes a search bar and a 'Generate Report' button.

Figure 2.2.2.5: Screen shot of Question bank details

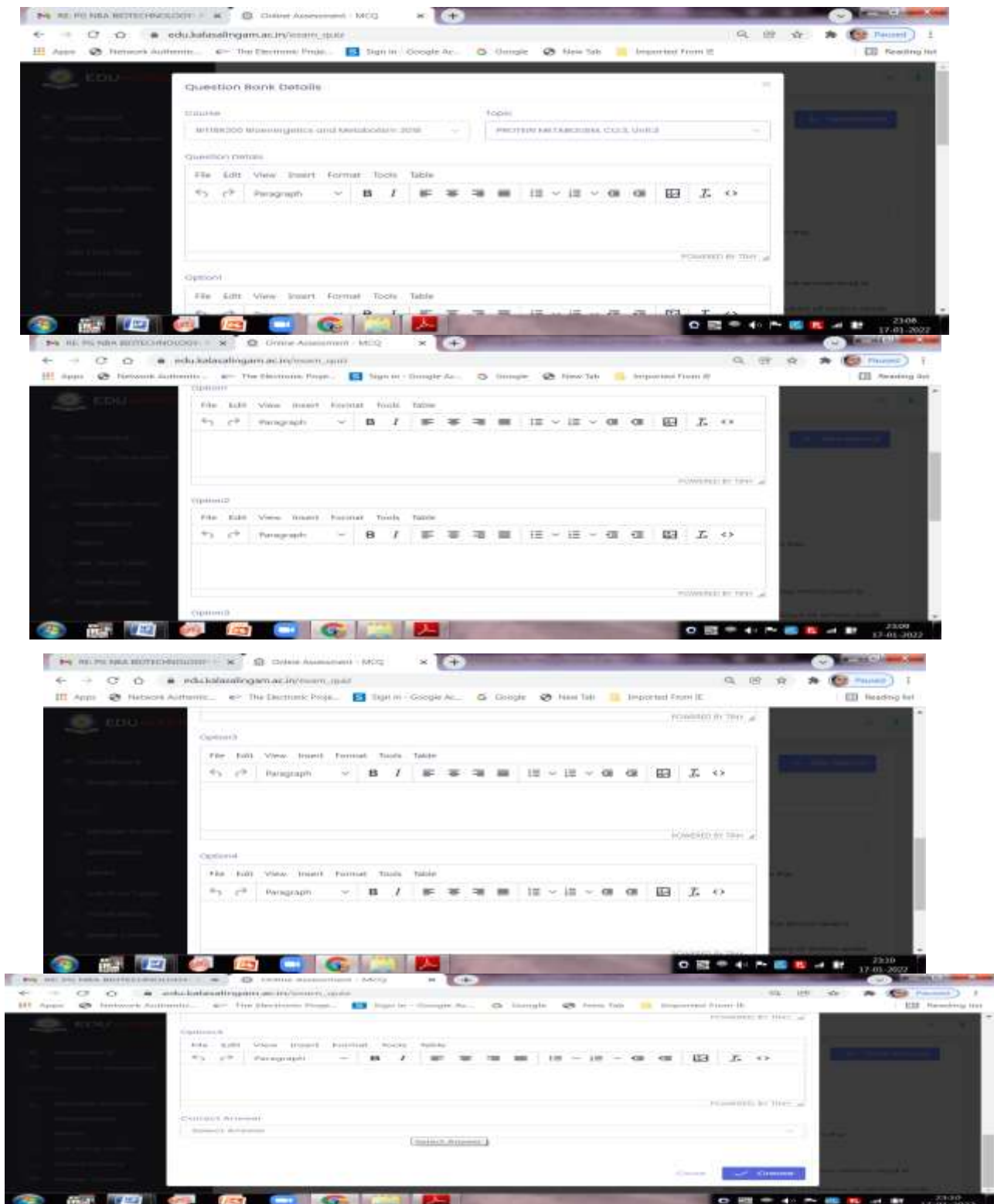


Figure 2.2.2.6: Screen shot of Online Assessment (MCQ)

Assignments:

Every student is asked to submit assignment / Quiz / tutorial / class test for each unit (1-5), the weightage for assignment is 20%. The sessional examinations I & II covered 30 %. The total marks allotted for internal is 50% of the total score. A sample set of assignments is given in Table 2.2.2.1.

Table 2.2.2.1: Sample Assignments given to the students
BIT18R312 / Enzyme Technology

S.No.	Assignment /Tutorials	Topics	Date
1	<u>Assignment –I</u> <u>Slow learners</u>	<ul style="list-style-type: none">● Enzyme Classification● Catalysis● Modeling rate of Equation – Single substrate reaction	September, 2020
2	<u>Assignment – II</u>	<ul style="list-style-type: none">● Enzyme inhibition and types● Allosteric regulation● Monod Model	October, 2020
3	<u>Assignment – III</u> <u>Fast learners</u>	<ul style="list-style-type: none">● Methods of production of enzymes● Extraction of enzymes from Microbial sources● Seminar and Research Paper discussion● Tutorials	November, 2020
4	<u>Assignment – IV</u>	<ul style="list-style-type: none">● Enzyme Immobilization● Applications of immobilized enzyme	November, 2020
5	<u>Assignment – V</u>	<ul style="list-style-type: none">● Reactor design● Biosensors applications	December, 2020

A sample copy of the assignment submitted by a student is presented in Figure 2.2.2.7.

Figure 2.2.2.7: Sample Assignment copy

Course code :BIT18R312
Course name :Enzyme technology
Assignment- II

Presented by:
P.Shineetha
9918001044
Biotechnology III

1. Enzyme Classification:

S.No	Group of Enzyme	Reaction Catalysed	Examples
1.	Oxidoreductase	Transfer of hydrogen and oxygen atoms on electron from one substrate to another.	Dehydrogenase Oxidases
2.	Transferases	Transfer of a specific group (a phosphate on methyl etc) from one substrate to another.	Transaminase Kinases.
3.	Hydrolases	Hydrolysis of a substrate.	Enzymes digestive enzymes.
4.	Isomerases	Change of the molecular form of the substrate.	Phosphohexo isomerase, fumarase.
5.	Lyases	Nonhydrolytic removal of a group or addition of a group to a substrate.	Decarboxylase Aldolase.
6.	Ligases (Synthetases)	Joining of two molecules by the formation of new bonds.	Citric acid Synthetase.

2. Types of Catalysis:

Catalysts are primarily categorized into four types. They are:

- * Homogeneous
- * Heterogeneous
- * Heterogenized homogeneous catalyst
- * Biocatalysts.

a). Homogeneous Catalyst:

In homogeneous catalysts, reaction mixture & catalyst both are present in the same phase. Both catalyst & reactants show high homogeneity which results in high interaction between them that leads to high reactivity & selectivity of the reaction under mild reaction condition. Some examples of homogeneous catalysts are Brønsted & Lewis acids, transition metals, organometallic complexes, organocatalyst. Some notable chemical processes that occur through homogeneous catalysis are carbonylation, oxidation, hydrocyanation, metathesis & hydrogenation.

b). Heterogeneous Catalyst:

In heterogeneous catalysis, catalysts exist in a different phase than the reaction mixture. Some of the processes that

3. Michaelis-Menten equation:

In biochemistry, Menton kinetics is one of the best-known models of enzyme kinetics. It is named after german biochemist Leoner michaelis and Canadian physician Maud menton. The model takes place from equation describing the rate of enzymatic reaction

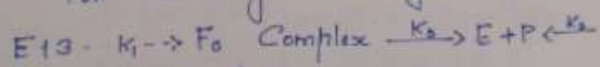
$$v = \frac{d[P]}{dt} = \frac{V_{max} [E]}{K_m + [S]}$$

This equation is called Michealis-Menten equation

V_{max} → maximum rate achieved by the system.

Derivation of the Michealis-Menten Equation.

For the enzyme catalyzed equation



$$V = K_3 [E \cdot S]$$

$$\text{Rate of formation of } E_s = k_1 [E] [S]$$

$$\text{Rate of breakdown of } E_s = (k_2 + k_3) [E_s]$$

At Steady State, the formation & the breakdown are equal. This Steady State would only be temporary.

$$k_1 [E] [S] = (k_2 + k_3) [E_s]$$

Rearranging,

$$[E_s] = [E] [S] / (k_2 + k_3) / (k_1)$$

We can lump these constants to make a new constant called $K_m = (k_2 + k_3) / k_1$

$$[E_s] = [E] [S] / K_m$$

$$[E_T] = [E] + [E_s] \quad (\text{The total amount of enzymes equals the free and that bound to substrate})$$

Substituting in $[E_T] - [E_s]$ for $[E]$

$$[E_s] = ([E_T] - [E_s]) [S] / K_m$$

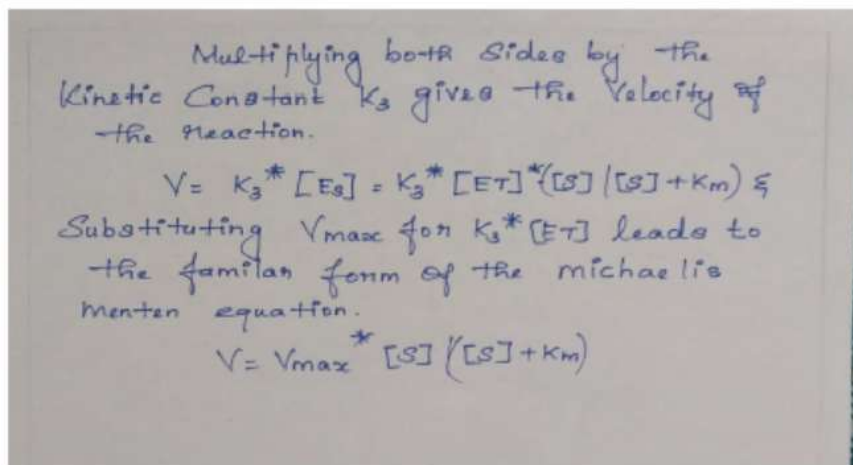
(enzyme equals the free & that bound to substrate).

Solving for $[E_s]$ leads to

$$[E_s] = \frac{([E_T] [S] / K_m)}{(1 + [S] / K_m)}$$

which simplifies to

$$[E_s] = E_T * ([S] / ([S] + K_m))$$



Additional Assignments for Fast Learners

Students who are fast learners are encouraged to work on additional assignments, so as to enhance their knowledge in the particular course. A sample copy of the additional assignments given in Enzyme Technology course is provided here.

Assignment

In a chemostat, evaluate the dilution rate at the cell wash-out condition by applying Monod's model with the given set of data: $\mu_{max} = 1 \text{ h}^{-1}$; $Y_{x/s} = 0.5 \text{ g/g}$
 $K_s = 0.2 \text{ g L}^{-1}$; $S_0 = 10 \text{ g L}^{-1}$

Soln:-

From Monod's equation,

$$\mu = \mu_{max} \left[\frac{S_0}{K_s + S_0} \right]$$

$$\mu = \frac{\mu_{max} [S_0]}{K_s + [S_0]}$$

Given: $\mu_{max} = 1 \text{ h}^{-1}$; $Y_{x/s} = 0.5 \text{ g dcw/g mol of substrate}$;
 $K_s = 0.2 \text{ g L}^{-1}$; $S_0 = 10 \text{ g L}^{-1}$

$$\mu = \frac{1 \text{ h}^{-1} \times 10 \text{ g L}^{-1}}{0.2 \text{ g L}^{-1} + 10 \text{ g L}^{-1}}$$

$$= \frac{1 \text{ h}^{-1} \times 10 \text{ g L}^{-1}}{10.2 \text{ g L}^{-1}}$$

$$= \frac{10}{10.2} \text{ h}^{-1} = 0.98 \text{ h}^{-1}$$

At wash out, dilution rate, $D = \mu$. Therefore the required diluted rate, $D = 0.98 \text{ h}^{-1}$.

Assignment

In a chemostat, evaluate the dilution rate at the cell wash-out condition by applying Monod's model with the given set of data: $\mu_{max} = 1 \text{ h}^{-1}$; $Y_{x/s} = 0.5 \text{ g/g}$
 $K_s = 0.2 \text{ g L}^{-1}$; $S_0 = 10 \text{ g L}^{-1}$

Soln.

From Monod's equation,

$$\mu = \mu_{max} \left[\frac{S_0}{K_s + S_0} \right]$$

$$\mu = \frac{\mu_{max} [S_0]}{K_s + [S_0]}$$

gn:- $\mu_{max} = 1 \text{ h}^{-1}$; $Y_{x/s} = 0.5 \text{ g dcw/g mol of substrate}$;
 $K_s = 0.2 \text{ g L}^{-1}$; $S_0 = 10 \text{ g L}^{-1}$

$$\mu = \frac{1 \text{ h}^{-1} \times 10 \text{ g L}^{-1}}{0.2 \text{ g L}^{-1} + 10 \text{ g L}^{-1}}$$

$$= \frac{1 \text{ h}^{-1} \times 10 \text{ g L}^{-1}}{10.2 \text{ g L}^{-1}}$$

$$= \frac{10}{10.2} \text{ h}^{-1} = 0.98 \text{ h}^{-1}$$

At wash out, dilution rate, $D = \mu$. Therefore the required diluted rate, $D = 0.98 \text{ h}^{-1}$

Assignment -3

In a Fed Batch culture glucose solution is added with a flow rate of 2 m^3 per day. The Initial volume of the culture is 6 m^3 .

The volume of culture at the end of second day (neglect loss due to vaporization) is

Final volume = Initial volume + Flow rate \times no. of days.

$$= 6\text{ m}^3 + 2\text{ m}^3 \times 2\text{ days}$$

$$= 6 + 4$$

$$= 10\text{ m}^3$$

The enzyme-catalyzed conversion of a substrate at 25°C has a K_m of 0.035 M . The rate of reaction is $1.15 \times 10^{-3}\text{ M s}^{-1}$ when substrate concentration is 0.110 M . Find maximum velocity of reaction?

Solution:

$$-r_s = \frac{V_{\max} C_s}{K_m + C_s}$$

$$\Rightarrow V_{\max} = \frac{-r_s (K_m + C_s)}{C_s}$$

$$= \frac{1.15 \times 10^{-3} (0.035 + 0.110)}{0.110}$$

$$\therefore V_{\max} = 1.52 \times 10^{-3}\text{ M s}^{-1}$$

Mapping of CO to Assignments:- BIT 18 R 312 / Enzyme Technology

Table 2.2.2.2: Assessment Plan for the Course:

S.No.	Course Outcomes	Measurement Tools	Time of Measurement
1	CO1	Assignment I Sessional Examination - I	September, 2020
2	CO2	Assignment II Sessional Examination - I	October, 2020
3	CO3	Assignment III Sessional Examination - II	November, 2020
4	CO4	Assignment IV Sessional Examination - II	November, 2020
5	CO5	Assignment V End Semester Examination	December, 2020

Evaluation:

The answer scripts of Sessional Examinations are evaluated by the Course Faculty whereas the End Semester answer scripts are evaluated by either a Course Faculty or an External Examiner appointed by the Controller of Examinations.

At the end of each semester, based on the results, the CO-PO attainment will be calculated for each course.

Make-up examination:

If any student is not able to attend the Sessional or End Semester examinations due to ill health or any other valid reasons, they are eligible to apply for Makeup Examination with a valid medical certificate or any other proof. This will be verified by the Office of Controller of Examinations and the CoE will give the final approval for the student.

Table 2.2.2.3: Marks allotment for sessional and End semester Examinations

S. No.	Test No	Test Portion	Marks
1	Sessional Exam I	UNIT -I, UNIT - II	50
2.	Sessional Exam II	UNIT-III, UNIT-IV	50
3	End Semester Exam	All Units. (I-V)	100

Internal and external auditing of end semester question paper

Question papers prepared for each course in a semester are audited (pre-exam) by the respective Module Coordinators and finally the Program Coordinator. Post-exam audit of question papers and answer scripts are done by Senior Academicians from other institutions appointed by the CoE.

Figure 2.2.2.8: Sample Question Paper with Answer Key

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION (Deemed to be University) Anand Nagar, Krishnankoil – 626 126, END SEMESTER EXAMINATIONS - APR/MAY 2022				
Course Code	: BIT18R205	Duration	: 180 Minutes	
Course Name	: Bioenergetics and Metabolism	Max. Marks	: 100	
Degree	: B.Tech.			
PART – A (20 Marks) Answer All Questions		Pattern	Mapping COs	Marks
1	Mention the components involved in photo system	Understand	CO1	2.0
2	State the various ways in which oxidation & reduction can be defined.	Understand	CO1	2.0
3	Define Cori cycle and write the significance of this pathway.	Remember	CO2	2.0
4	What is the biological significance of Glycogenin?	Understand	CO2	2.0
5	Explain the various levels of regulation in amino acid synthesis	Understand	CO3	2.0
6	What are the forms in which amino groups are transported through the blood prior to the urea cycle?	Understand	CO3	2.0
7	Where does the biosynthesis of fatty acids occur?	Understand	CO4	2.0
8	Distinguish between beta oxidation and omega oxidation	Apply	CO4	2.0
9	What is the major mechanistic difference in purine and pyrimidine biosynthesis?	Apply	CO5	2.0
10	How are pyrimidines synthesized?	Understand	CO5	2.0
PART – B (80 Marks) Answer All Questions		Pattern	Mapping COs	Marks
11.A	Discuss about oxidation and reduction concepts explain with suitable example.	Remember	CO1	16.0
OR				
11.B	Explain the pathway of Calvin cycle with diagrammatic explanation.	Remember	CO1	16.0
12.A	(i). Draw the citric acid cycle and show the various intermediates and enzymes at each step of the cycle (ii). How many ATPs are produced during respiration (Glycolysis+ citric acid cycle) (iii). Relate the number of ATPs to the number of NADH and FADH ₂	Analyze	CO2	16.0
OR				
12.B	Describe the gluconeogenesis pathway in detail and show the various intermediates of the pathway. Comment on the importance of this pathway under conditions of fasting/ starvation.	Understand	CO2	16.0

PART – B (80 Marks) Answer All Questions		Pattern	Mapping COs	Marks
13.A	(i) Briefly explain the post translational modification in protein synthesis with suitable diagram	Understand	CO3	8.0
	(ii) Explain the reversible covalent regulation in biosynthetic pathway of amino acids	Apply	CO3	8.0
OR				
13.B	Write a detailed account of Protein synthesis in prokaryotes and illustrate suitably	Apply	CO3	16.0
14.A	(i) Describe in detail steps of the cholesterol synthesis	Apply	CO4	8.0
	(ii) Detail the steps involved in activation, transport and beta-oxidation of palmitic acid mitochondria.	Analyze	CO4	8.0
OR				
14.B	Illustrate the major regulatory mechanisms of fatty acid metabolism in humans	Analyze	CO4	16.0
15.A	Discuss the synthesis and degradation of pyrimidines.	Apply	CO5	16.0
OR				
15.B	Write an account of salvage pathway in purine nucleotide synthesis. Add a note on Lesch-Nyhan syndrome	Apply	CO5	16.0

Assessment Pattern as per Bloom's Taxonomy:

COs	Remember	Understand	Apply	Analyze	Evaluate	Create	Total
CO1	32.0	4.0	0	0	0	0	36
CO2	2.0	18.0	0	16.0	0	0	36
CO3	0	12.0	24.0	0	0	0	36
CO4	0	2.0	10.0	24.0	0	0	36
CO5	0	2.0	34.0	0	0	0	36
Total	34	38	68	40	0	0	180

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION

(Deemed to be University)

Amud Nagar, Krishnankoil – 626 126

END SEMESTER EXAMINATIONS - APR/MAY 2022

Course Code	: HET18R205	Duration	: 180 Minutes
Course Name	: Bioenergetics and Metabolism	Max. Marks	: 100
Degree	: B.Tech.		

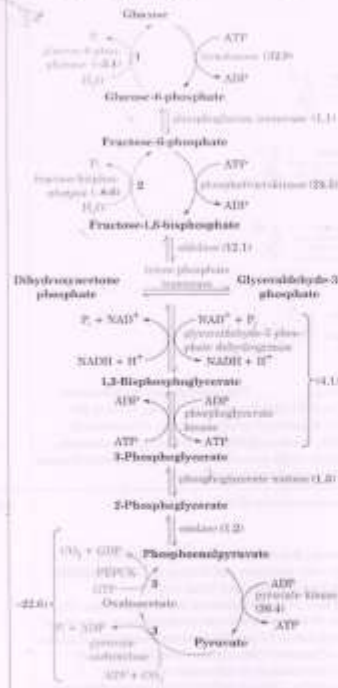
PART – A (20 Marks) Answer All Questions		Marks
1	Mention the components involved in photo system Key: The Photosystem captures light with antennae pigments such as carotene, xanthophyll, Phaeophytin a, Phaeophytin b, chlorophyll a and chlorophyll b, which funnels it light and gradually concentrates it down to a "reaction center"	2.0
2	State the various ways in which oxidation & reduction can be defined. Key: The terms oxidation and reduction can be defined in terms of the adding or removing oxygen to a compound, while this is not the most robust definition, as discussed below, it is the easiest to remember. • Oxidation is the gain of oxygen. • Reduction is the loss of oxygen.	2.0
3	Define Cori cycle and write the significance of this pathway. Key: The glucose can enter the blood and be carried to muscles and immediately used. If by this time the muscles have ceased activity, the glucose can be used to rebuild supplies of glycogen through glycogenesis. This recycling of lactic acid is referred to as the Cori Cycle.	2.0
4	What is the biological significance of Glycogen? Key: Glycogen is a polysaccharide of glucose that serves as a form of energy storage in fungi and animals. The polysaccharide structure of glucose shows the primary storage form of glucose in the body. Glycogen is made and stored in the cells of liver and muscles that are hydrated with the four parts of water.	2.0
5	Explain the various levels of regulation in amino acid synthesis Key: Amino Acid Biosynthesis Is Regulated by Feedback Inhibition. The rate of synthesis of amino acids depends mainly on the amounts of the biosynthetic enzymes and on their activities. In a biosynthetic pathway, the first irreversible reaction, called the committed step, is usually an important regulatory site. The final product of the pathway (Z) often inhibits the enzyme that catalyzes the committed step (A → B). This kind of control is essential for the conservation of building blocks and metabolic energy. The committed step in this pathway is the oxidation of 3-phosphoglycerate, catalyzed by the enzyme 3-phosphoglycerate dehydrogenase.	2.0
6	What are the forms in which amino groups are transported through the blood prior to the urea cycle? Key: The Urea Cycle. About 80% of the excreted waste nitrogen is in the form of urea which is produced exclusively in the liver, in a series of reactions that are distributed between the mitochondrial matrix and the cytosol. The series of reactions that form urea is known as the Urea Cycle or the Krebs-Henseleit Cycle.	2.0

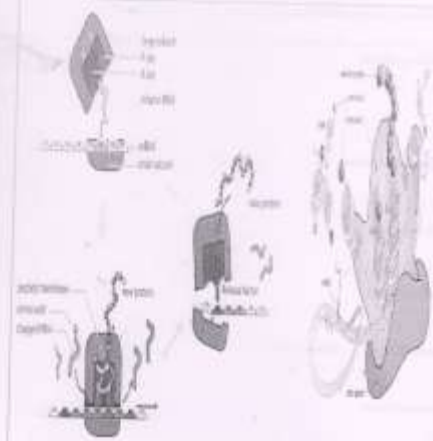
PART – A (20 Marks) Answer All Questions		Marks
7	Where does the biosynthesis of fatty acids occur? Key: Fatty acid synthesis is the creation of fatty acids from acetyl-CoA and NADPH through the action of enzymes called fatty acid synthases. This process takes place in the cytoplasm of the cell. Most of the acetyl-CoA which is converted into fatty acids is derived from carbohydrates via the glycolysis pathway.	2.0
8	Distinguish between beta oxidation and omega oxidation Key: In beta oxidation, the beta position will be oxidized. In omega oxidation, the omega position will be oxidized.	2.0
9	What is the major mechanistic difference in purine and pyrimidine biosynthesis? Key: Purines Are Much Simpler Than Pyrimidines B. Pyrimidines Utilize Amino Acids During Synthesis C. Purines Are Synthesized On The Ring Of Ribose D. IMP Is Formed In Both Pathways E.	2.0
10	How are pyrimidines synthesized? Key: Pyrimidine synthesis takes place in cytoplasm. Pyrimidine is synthesized as a free ring and then a ribose-5-phosphate is added to yield direct nucleotides, whereas, in purine synthesis, the ring is made by attaching atoms on ribose-5-phosphate. ... Pyrimidine atoms come from two sources—carbamoyl phosphate and aspartate.	2.0
PART – B (30 Marks) Answer All Questions		Marks
11.A	Discuss about oxidation and reduction concepts explain with suitable example. Key: Chemical reactions involving oxidation and reduction processes are central to metabolism. These are also called redox reactions which involve the transfer of electrons from a donor molecule to an acceptor molecule. In the process of electron transfer, the molecule that donates the electrons is oxidized and the molecule that accepts them is reduced. The flow of electrons in oxidation-reduction reactions is responsible, directly or indirectly, for all work done by living organisms. In non-photosynthetic organisms, the sources of electrons are reduced compounds (foods); in photosynthetic organisms, the initial electron donor is a chemical species excited by the absorption of light. The energy derived from the oxidation of carbohydrates is coupled to the synthesis of ATP via a series of redox reactions, namely, the electron-transport chain present in the mitochondria. Most life on earth is dependent on a series of redox reactions, namely photosynthesis, in which solar energy is trapped by plants to produce ATP and O ₂ , and to synthesize carbohydrates from CO ₂ . Definitions of Oxidation and Reduction a) Oxidation Reaction - reaction in which a substance loses electrons - reaction in which a substance combines with oxygen - reaction in which a substance loses hydrogen b) Reduction Reaction - reaction in which a substance gains electrons - reaction in which a substance combines with hydrogen - reaction in which a substance loses oxygen c) Half-cell Reaction - The individual oxidation or reduction step in a redox reaction is termed a half-cell reaction Example of a Redox Reaction $\text{Fe}^{2+} + \text{Cu}^{2+} \rightarrow \text{Fe}^{3+} + \text{Cu}^{+}$ In the above reaction, a divalent cation of iron (ferrous ion) combines with a divalent cation of copper (cupric ion). In the process, the ferrous ion is oxidized to a trivalent ion (ferric ion) and the divalent ion of copper (cupric ion) is reduced to a monovalent ion (cuprous ion). The above redox reaction can be split into two individual half-cell reactions as shown below. Oxidation of ferrous cation: $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + e^{-}$ Reduction of cupric cation: $\text{Cu}^{2+} + e^{-} \rightarrow \text{Cu}^{+}$ In this example, Fe^{2+} is the reducing agent (or reductant) and Cu^{2+} is the oxidizing agent (or oxidant). The Fe^{2+} and Fe^{3+} ionic forms of iron constitute a conjugate redox pair. Similarly, the Cu^{+} and Cu^{2+} forms of copper constitute another conjugate redox pair. In the conjugate redox pair of iron, the Fe^{2+} form is the electron donor (reducing agent) and the Fe^{3+} form is the electron acceptor (oxidizing agent). Likewise, in the second conjugate pair, the Cu^{+} form is the electron donor and the Cu^{2+} form is the electron acceptor.	16.0
OR		

PART – B (80 Marks) Answer All Questions		Marks
11. B	Explain the pathway of Calvin cycle with diagrammatic explanation.	16.0
<p>Key:-</p> <p>All photosynthetic eukaryotes reduce CO_2 to carbohydrate via the same basic mechanism: the photosynthetic carbon reduction cycle originally described for C_3 species (the Calvin cycle; or reductive pentose phosphate [RPP] cycle). The Calvin Cycle Has Three Stages: Carboxylation, Reduction, and Regeneration. In the Calvin cycle, CO_2 and water from the environment are enzymatically combined with a five-carbon acceptor molecule to generate two molecules of a three-carbon intermediate. This intermediate (3-phosphoglycerate) is reduced to carbohydrate by use of the ATP and NADPH generated photochemically. The cycle is completed by regeneration of the five-carbon acceptor (ribulose-1,5-bisphosphate, abbreviated RuBP). 1. Carboxylation of the CO_2 acceptor ribulose-1,5-bisphosphate, forming two molecules of 3-phosphoglycerate, the first stable intermediate of the Calvin cycle. 2. Reduction of 3-phosphoglycerate, forming glyceraldehyde-3-phosphate, a carbohydrate. 3. Regeneration of the CO_2 acceptor ribulose-1,5-bisphosphate from glyceraldehyde-3-phosphate. The carbon in CO_2 is the most oxidized form found in nature (+4). The early reactions of the Calvin cycle complete the reduction of atmospheric carbon and incorporate it into organic compounds. Carboxylation of Ribulose Bisphosphate by the Enzyme Rubisco CO_2 enters the Calvin cycle by reacting with ribulose-1,5-bisphosphate to yield two molecules of 3-phosphoglycerate (See Figure and Table), a reaction catalyzed by the chloroplast enzyme ribulose bisphosphate carboxylase/oxygenase, referred to as rubisco. As indicated by the full name, the enzyme also has an oxygenase activity in which O_2 competes with CO_2 for the common substrate ribulose-1,5-bisphosphate. Two properties of the carboxylase reaction are especially important: 1. The negative change in free energy for the carboxylation of ribulose-1,5-bisphosphate is large; hence, the forward reaction is strongly favored. 2. The affinity of rubisco for CO_2 is sufficiently high, so that rapid carboxylation of the substrate occurs even at the low concentrations of CO_2 found in photosynthetic cells. Rubisco is very abundant, representing up to 40% of the total soluble protein of most leaves. The concentration of rubisco active sites within the chloroplast stroma is about 4 mM, or about 500-times greater than the concentration of its CO_2 substrate. Triose Phosphates Are Formed in the Reduction Step of the Calvin Cycle Next in the Calvin cycle (See Figure and Table), the 3-phosphoglycerate formed in the carboxylation stage undergoes two modifications: 1. It is first phosphorylated via 3-phosphoglycerate kinase to 1,3-bisphosphoglycerate through use of the ATP generated in the light reactions (See Table, reaction 2). 2. Then it is reduced to glyceraldehyde-3-phosphate through use of the NADPH generated by the light reactions (See Table, reaction 3). The chloroplast enzyme NADP+ glyceraldehyde-3-phosphate dehydrogenase catalyzes this step. Operation of the Calvin Cycle and Regeneration of Ribulose-1,5-Bisphosphate The continued uptake of CO_2 requires that the CO_2 acceptor, ribulose-1,5-bisphosphate, be constantly regenerated. To prevent depletion of Calvin cycle intermediates, three molecules of ribulose-1,5-bisphosphate (15 carbons total) are formed by reactions that re-arrange the carbons from the five molecules of triose phosphate ($5 \times 3 = 15$ carbons). This reshuffling consists of reactions 4 - 12 (See Table and Figure): 1. One molecule of glyceraldehyde-3-phosphate is converted via triose phosphate isomerase to dihydroxyacetone-3-phosphate in an isomerization reaction (reaction 4). 2. Dihydroxyacetone-3-phosphate then undergoes aldol condensation with a second molecule of glyceraldehyde-3-phosphate (a reaction catalyzed by aldolase) to give fructose-1,6-bisphosphate (reaction 5). 3. Fructose-1,6-bisphosphate occupies a key position in the cycle and is hydrolyzed to fructose-6-phosphate (reaction 6), which then reacts with the enzyme transketolase. 4. A two-carbon unit (C-1 and C-2 of fructose-6-phosphate) is transferred via transketolase to a third molecule of glyceraldehyde-3-phosphate to give erythrose-4-phosphate and xylulose-5-phosphate (reaction 7). 5. Erythrose-4-phosphate then combines via aldolase with a fourth molecule of triose phosphate (dihydroxyacetone-3-phosphate) to yield the seven-carbon sugar sedoheptulose-1,7-bisphosphate (reaction 8). 6. This seven-carbon bisphosphate is then hydrolyzed by a specific phosphatase to give sedoheptulose-7-phosphate (reaction 9). 7. Sedoheptulose-7-phosphate donates a two-carbon unit to the fifth (and last) molecule of glyceraldehyde-3-phosphate via transketolase and produces ribose-5-phosphate and xylulose-5-phosphate (reaction 10). 8. The two molecules of xylulose-5-phosphate are converted to two molecules of ribulose-5-phosphate sugars by a ribulose-5-phosphate epimerase (reaction 11). The third molecule of ribulose-5-phosphate is formed from ribose-5-phosphate by ribose-5-phosphate isomerase (reaction 12). 9. Finally, ribulose-5-phosphate kinase catalyzes the phosphorylation of ribulose-5-phosphate with ATP, thus regenerating the three-needed molecules of the initial CO_2 acceptor, ribulose-1,5-bisphosphate (reaction 13).</p>		

PART – B (80 Marks) Answer All Questions		Marks
12.A	<p>(i). Draw the citric acid cycle and show the various intermediates and enzymes at each step of the cycle.</p> <p>(ii). How many ATPs are produced during respiration (Glycolysis+ citric acid cycle) (iii). Relate the number of ATPs to the number of NADH and FADH₂.</p> <p>Key:</p> <p>Reactions of the Citric Acid Cycle. The oxidation of acetyl-CoA takes place in a series of reactions called as the citric acid cycle (Krebs cycle or tricarboxylic acid cycle) (Figure 16-7, page 621). The reactions of the cycle are as follows: 1) Acetyl-CoA donates its acetyl group to the four-carbon compound oxaloacetate (OAA) to form the six-carbon compound citrate. This is a condensation reaction catalyzed by the enzyme citrate synthase; during this reaction, a molecule of water is consumed and CoA (or CoA-SH) is released. 2) a. Citrate formed in the previous reaction is dehydrated to form cis-aconitate by the enzyme aconitase; b. cis-aconitate is hydrated by aconitase to give isocitrate. 3) Isocitrate undergoes oxidative decarboxylation to yield α-ketoglutarate; one molecule of CO₂ is released and one molecule of NAD⁺ is reduced to NADH. The enzyme for this reaction is isocitrate dehydrogenase. 4) α-ketoglutarate is oxidatively decarboxylated and the four-carbon succinyl group is attached to CoA-SH, forming succinyl-CoA; the reaction is catalyzed by a complex of enzymes (α-ketoglutarate dehydrogenase complex). This step releases the second molecule of CO₂ of the cycle. NAD⁺ is also reduced to NADH. 5) Succinyl-CoA is converted to succinate by the enzyme succinyl-CoA synthetase; CoA-SH is released, and a substrate-level phosphorylation of GDP to GTP takes place. GTP later transfers its phosphate group to ADP to produce ATP and GDP. 6) Succinate is dehydrogenated to fumarate by the enzyme succinate dehydrogenase; FAD is the hydrogen acceptor which is reduced to FADH₂. 7) Fumarate is hydrated by the enzyme fumarase to produce malate. A molecule of water is consumed in the reaction. 8) Finally, malate is dehydrogenated by the enzyme malate dehydrogenase to produce OAA. • The two-carbon acetyl group is oxidized to two molecules of CO₂ in the cycle. • There is no net removal of OAA, since it is regenerated at the last step. • The cycle consists of eight steps, out of which four are oxidations. • The energy of oxidation is conserved in the form of NADH and FADH₂. • The 1st, 3rd and 4th steps are highly exergonic and irreversible. • The citric acid cycle takes place in the mitochondria in eukaryotes and in the cytosol in prokaryotes. • The cycle is not only catabolic in nature, but also supplies intermediates for biosynthetic reactions. • One turn of the cycle releases two molecules of CO₂, three molecules of NADH, one molecule of FADH₂, and one molecule of ATP (as GTP).</p>	16.0
OR		
12.B	<p>Describe the gluconeogenesis pathway in detail and show the various intermediates of the pathway. Comment on the importance of this pathway under conditions of fasting/ starvation.</p> <p>Key:</p>	16.0

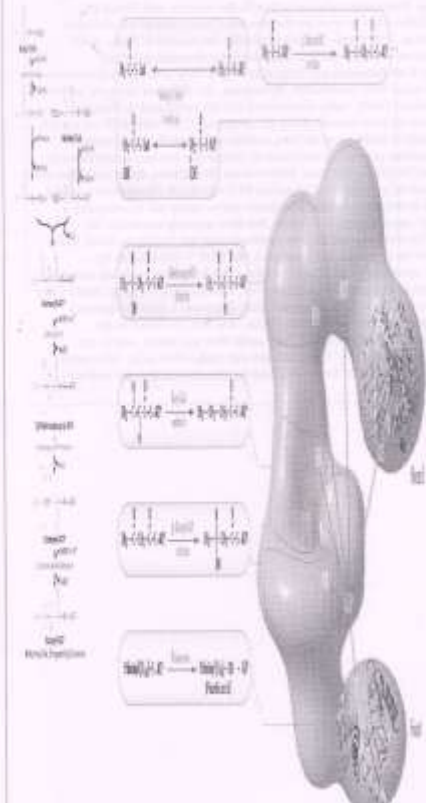
Glycolysis/gluconeogenesis





Protein synthesis is accomplished through a process called translation. After DNA is transcribed into a messenger RNA (mRNA) molecule during transcription, the mRNA must be translated to produce a protein. In translation, mRNA along with transfer RNA (tRNA) and ribosomes work together to produce proteins. Stages of Translation in Protein Synthesis 1. Initiation: Ribosomal subunits bind to mRNA. 2. Elongation: The ribosome moves along the mRNA molecule linking amino acids and forming a polypeptide chain. 3. Termination: The ribosome reaches a stop codon, which terminates protein synthesis and releases the ribosome. Transfer RNA plays a huge role in protein synthesis and translation. Its job is to translate the message within the nucleotide sequence of mRNA in a specific amino acid sequence. These sequences are joined together to form a protein. Transfer RNA is shaped like a clover leaf with three loops. It contains an amino acid attachment site on one end and a special section in the middle loop called the anticodon site. The anticodon recognizes a specific area on a mRNA called a codon. Messenger RNA Modifications Translation occurs in the cytoplasm. After leaving the nucleus, mRNA must undergo several modifications before being translated. Sections of the mRNA that do not code for amino acids, called introns, are removed. A poly-A tail, consisting of several adenosine bases, is added to one end of the mRNA, while a guanosine triphosphate cap is added to the other end. These modifications remove unwanted sections and protect the ends of the mRNA molecule. Once all modifications are complete, mRNA is ready for translation. Translation Once messenger RNA has been modified and is ready for translation, it binds to a specific site on a ribosome. Ribosomes consist of two parts, a large subunit and a small subunit. They contain a binding site for mRNA and two binding sites for transfer RNA (tRNA) located in the large ribosomal subunit. Initiation During translation, a small ribosomal subunit attaches to a mRNA molecule. At the same time as initiator tRNA molecule recognizes and binds to a specific codon sequence on the same mRNA molecule. A large ribosomal subunit then joins the newly formed complex. The initiator tRNA resides in one binding site of the ribosome called the P site, leaving the second binding site, the A site, open. When a new tRNA molecule recognizes the next codon sequence on the mRNA, it attaches to the open A site. A peptide bond forms connecting the amino acid of the tRNA in the P site to the amino acid of the tRNA in the A binding site. Elongation As the ribosome moves along the mRNA molecule, the tRNA in the P site is released and the tRNA in the A site is translocated to the P site. The A binding site becomes vacant again until another tRNA that recognizes the new mRNA codon takes the open position. This pattern continues as molecules of tRNA are released from the complex, new tRNA molecules attach, and the amino acid chain grows. Termination The ribosome will translate the mRNA molecule until it reaches a termination codon on the mRNA. When this happens, the growing protein called a polypeptide chain is released from the tRNA molecule and the ribosome splits back into large and small subunits. The newly formed polypeptide chain undergoes several modifications before becoming a fully functioning protein. Proteins have a variety of functions. Some will be used in the cell membrane, while others will remain in the cytoplasm or be transported out of the cell. Many copies of a protein can be made from one mRNA molecule. This is because several ribosomes can translate the same mRNA molecule at the same

PART – B (80 Marks) Answer All Questions	Marks
time. These clusters of ribosomes that translate a single mRNA sequence are called polyribosomes or polysomes.	
14.A (a) Describe in detail steps of the cholesterol synthesis	8.0
<p>Key:</p>	

PART - B (80 Marks)		Marks
Answer All Questions		
(ii) Detail the steps involved in activation, transport and beta-oxidation of palmitic acid mitochondria.	8.0	
<p>Key:</p> <p>Oxidation of of palmitic acid yields 7 NADH + 7 FADH₂ + 8 acetyl-CoA in 7 cycles of mitochondrial beta oxidation. Every acetyl-CoA yields 3 NADH + 1 FADH₂ + 1 GTP (~ATP) during Krebs cycle. Considering an average production of 3 ATP/NADH and 2 ATP/FADH₂ using the respiratory chain, you have 131 ATP molecules. However, you have to used 2 ATP molecules for the initial activation of every fatty acid that is going to be oxidized in the mitochondria.</p>		
OR		
14.0 Illustrate the major regulatory mechanisms of fatty acid metabolism in humans	16.0	
<p>Key:</p>  <p>The diagram illustrates the major regulatory mechanisms of fatty acid metabolism in humans. It shows the synthesis of fatty acids in the cytoplasm and endoplasmic reticulum, and their oxidation in the mitochondria. The diagram includes chemical structures of fatty acids and the enzymes involved in the process.</p> <p>Synthesis of fatty acids occurs in the cytoplasm and endoplasmic reticulum of the cell and is chemically similar to the beta-oxidation process, but with a couple of key differences. The first of these occur in preparing substrates for the</p>		

PART - B (80 Marks) Answer All Questions	Marks
<p>reactions that grow the fatty acid. Transport of acetyl-CoA from the mitochondria occurs when it begins to build up. Two molecules can play roles in moving it to the cytoplasm – citrate and acetylcarbamate. Joining of oxaloacetate with acetyl-CoA in the mitochondrion creates citrate which moves across the membrane, followed by action of citrate lyase in the cytoplasm of the cell to release acetyl-CoA and oxaloacetate. Additionally, when free acetyl-CoA accumulates in the mitochondrion, it may combine with carnitine and be transported out to the cytoplasm. Starting with two acetyl-CoA, one is converted to malonyl-CoA by carboxylation catalyzed by the enzyme acetyl-CoA carboxylase (ACC), the only regulatory enzyme of fatty acid synthesis (Figure 6.12.1). Next, both molecules have their CoA portions replaced by a carrier protein known as ACP (acyl-carrier protein) to form acetyl-ACP and malonyl-ACP. Joining of a fatty acyl-ACP (in this case, acetyl-ACP) with malonyl-ACP splits out the carboxyl that was added and creates the intermediate at the upper right in the figure at left. Enzymes of Fatty Acid Synthesis Acetyl-CoA carboxylase, which catalyzes synthesis of malonyl-CoA, is the only regulated enzyme in fatty acid synthesis. Its regulation involves both allosteric control and covalent modification. The enzyme is known to be phosphorylated by both AMP Kinase and Protein Kinase A. Dephosphorylation is stimulated by phosphatases activated by insulin binding. Dephosphorylation activates the enzyme and favors its assembly into a long polymer, while phosphorylation reverses the process. Citrate acts as an allosteric activator and may also favor polymerization. Palmitoyl-CoA allosterically inactivates it. Fatty Acid Synthase (FAS) revised model with positions of polypeptides, three catalytic domains and their corresponding reactions, visualization by Koni Grzesnikoff. Note that FAS is only active as a homodimer rather than the monomer pictured. Image used with permission. In animals, six different catalytic activities necessary for the remaining catalytic actions to fully make palmitoyl-CoA are contained in a single complex called Fatty Acid Synthase. These include transacylases for swapping CoA with ACP on acetyl-CoA and malonyl-CoA; a synthase to catalyze addition of the two carbon unit from the three carbon malonyl-ACP in the first step of the elongation process; a reductase to reduce the ketone; a dehydratase to catalyze removal of water, and a reductase to reduce the trans double bond. In bacteria, these activities are found on separate enzymes and are not part of a complex. Elongation of Fatty Acids Elongation to make fatty acids longer than 16 carbons occurs in the endoplasmic reticulum and is catalyzed by enzymes described as elongases. Mitochondria also can elongate fatty acids, but their starting materials are generally shorter than 16 carbons long. The mechanisms in both environments are similar to those in the cytoplasm (a malonyl group is used to add two carbons, for example), but CoA is attached to the intermediates, not ACP. Further, whereas cytoplasmic synthesis employs the fatty acid synthase complex, the enzymes in these organelles are separable and not part of a complex. Desaturation of Fatty Acids Fatty acids are synthesized in the saturated form and desaturation occurs later. Enzymes called desaturases catalyze the formation of cis double bonds in mature fatty acids. These enzymes are found in the endoplasmic reticulum. Animals are limited in the desaturated fatty acids they can make, due to an inability to catalyze reactions beyond carbons 9 and 10. Thus, humans can make oleic acid, but cannot synthesize linoleic acid or linolenic acid. Consequently, these two must be provided in the diet and are referred to as essential fatty acids.</p>	

PART – B (80 Marks) Answer All Questions		Marks
15.A	Discuss the synthesis and degradation of pyrimidines.	16.0
<p>Key:</p> <p>Conversion of UDP to CTP and dTTP</p> <p>The diagram illustrates the metabolic pathways for pyrimidine synthesis and degradation. Key steps include the formation of carbamoyl aspartate from carbamoyl phosphate and glutamine, followed by the synthesis of dihydrouracil, dihydrothymine, and thymine. The pathway also shows the conversion of UDP to CTP and dTTP. A note indicates that the conversion of UDP to dTTP is inhibited by the presence of dUMP.</p> <p>Synthesis:</p> <ul style="list-style-type: none"> Carbamoyl phosphate + Glutamine → Carbamoyl aspartate Carbamoyl aspartate → Dihydrouracil Dihydrouracil → Dihydrothymine Dihydrothymine → Thymine Thymine → dTTP <p>Degradation:</p> <ul style="list-style-type: none"> Thymine → Dihydrothymine Dihydrothymine → Dihydrouracil Dihydrouracil → Carbamoyl aspartate Carbamoyl aspartate → Carbamoyl phosphate + Glutamine <p>Note: The conversion of UDP to dTTP is inhibited by the presence of dUMP.</p>		
OR		

PART – II (80 Marks) Answer All Questions		Marks
(5.B)	<p>Write an account of salvage pathway in purine nucleotide synthesis. Add a note on Lesch-Nyhan syndrome.</p> <p>Key:</p> <p>Salvage of Bases Salvaging of purine and pyrimidine bases is an exceedingly important process for most tissues. There are two distinct pathways possible for salvaging the bases. Salvaging Purines: The more important of the pathways for salvaging purines uses enzymes called phosphoribosyltransferases (PRT). PRTs catalyze the addition of ribose 5-phosphate to the base from PRPP to yield a nucleotide: Base + PRPP → Base-ribose-phosphate (BMP) + PP_i. We have already seen one example of this type of enzyme as a normal part of de novo synthesis of the pyrimidine nucleotides, → O-PRT. As a salvage process though, we are dealing with purines. There are two enzymes, A-PRT and HGPRT. A-PRT is not very important because we generate very little adenine. (Remember that the catabolism of adenine nucleotides and nucleosides is through inosine). HGPRT, though, is exceptionally important and it is inhibited by both IMP and GMP. This enzyme salvages guanine directly and adenine indirectly. Remember that AMP is generated primarily from IMP, not from free adenine. Lesch-Nyhan Syndrome HGPRT is deficient in the disease called Lesch-Nyhan Syndrome, a severe neurological disorder whose most blatant clinical manifestation is an uncontrollable self-mutilation. Lesch-Nyhan patients have very high blood uric acid levels because of an essentially uncontrolled de novo synthesis. (It can be as much as 20 times the normal rate). There is a significant increase in PRPP levels in various cells and an inability to maintain levels of IMP and GMP via salvage pathways. Both of these factors could lead to an increase in the activity of the amidotransferase. Salvaging Pyrimidines A second type of salvage pathway involves two steps and is the major pathway for the pyrimidines, uracil and thymine. Base + Ribose 1-phosphate → Nucleoside + P_i (nucleoside phosphorylase) Nucleoside + ATP → Nucleotide + ADP (nucleoside kinase - irreversible) There is a uridine phosphorylase and kinase and a deoxythymidine phosphorylase and a thymidine kinase which can salvage some thymine in the presence of dR 1-P. Formation of Deoxyribonucleotides De novo synthesis and most of the salvage pathways involve the ribonucleotides. (Exception is the small amount of salvage of thymine indicated above.) Deoxyribonucleotides for DNA synthesis are formed from the ribonucleotide diphosphates (in mammals and E. coli). A base diphosphate (BDP) is reduced at the 2' position of the ribose portion using the protein, thioredoxin and the enzyme nucleoside diphosphate reductase. Thioredoxin has two sulfhydryl groups which are oxidized to a disulfide bond during the process. In order to restore the thioredoxin to its reduced form so that it can be reused, thioredoxin reductase and NADPH are required. This system is very tightly controlled by a variety of allosteric effectors. dATP is a general inhibitor for all substrates and ATP an activator. Each substrate then has a specific positive effector (a dTTP or dCTP). The result is a maintenance of an appropriate balance of the deoxynucleotides for DNA synthesis. Synthesis of dTMP DNA synthesis also requires dTMP (dTTP). This is not synthesized in the de novo pathway and salvage is not adequate to maintain the necessary amount. dTMP is generated from dUMP using the folate-dependent one-carbon pool. Since the nucleoside diphosphate reductase is not very active toward UDP, CDP is reduced to dCDP which is converted to dUMP. This is then converted to form dUMP. In the presence of 5,10-Methylene tetrahydrofolate and the enzyme thymidylate synthase, the carbon group is both transferred to the pyrimidine ring and further reduced to a methyl group. The other product is dihydrofolate which is subsequently reduced to the tetrahydrofolate by dihydrofolate reductase. Chemotherapeutic Agents Thymidylate synthase is particularly sensitive to availability of the folate one-carbon pool. Some of the cancer chemotherapeutic agents interfere with this process as well as with the steps in purine nucleotide synthesis involving the pool. Cancer chemotherapeutic agents like methotrexate (4-amino, 10-methyl folic acid) and aminopterin (4-amino, folic acid) are structural analogs of folic acid and inhibit dihydrofolate reductase. This interferes with maintenance of the folate pool and thus of de novo synthesis of purine nucleotides and of dTMP synthesis. Such agents are highly toxic and administered under careful control.</p>	16.0

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION

(Deemed to be University)
Anand Nagar, Krishnankoil – 626 126.

SESSIONAL EXAMINATION - I - OCTOBER 2021

Course Code	: BIT18R402	Duration	: 90 Minutes
Course Name	: Animal Biotechnology	Max. Marks	: 50
Degree	: B.Tech.	Date & Session	: 22-10-2021 / AN

PART – A (10 Marks) Answer All Questions		Pattern	Mapping COs	Marks
1	What is adherent culture?	Remember	CO1	2.0
2	Differentiate between bacterial culture and animal cell culture	Analyze	CO1	2.0
3	List any 4 human cell lines	Remember	CO1	2.0
4	Explain Adenoviral vector	Understand	CO2	2.0
5	Explain SV 40 viral vector	Understand	CO2	2.0

PART – B (40 Marks) Answer All Questions		Pattern	Mapping COs	Marks
6	Examine different methods of gene transfection in animal cell culture.	Analyze	CO2	16.0
7	Demonstrate the overall view of the establishment of animal cell culture	Apply	CO1	16.0
8	Explain the protocol involved in the preparation of stem cell culture	Understand	CO1	8.0

Assessment Pattern as per Bloom's Taxonomy:

COs	Remember	Understand	Apply	Analyze	Evaluate	Create	Total
CO1	4.0	8.0	16.0	2.0	0	0	30
CO2	0	4.0	0	16.0	0	0	20
Total	4	12	16	18	0	0	50

2.2.3 Quality of student projects (20)

A. Identification of Projects and allocation methodology to faculty

The final year students are advised to identify projects based upon their field of interest and also encouraged them to do interdisciplinary projects. The students are also encouraged to do projects either in the industries or in research laboratories. The guides are allocated based on their specialization by the Project Coordinator and Head of the Department.

The project work has two phases; during Phase I, the students identify the problem in consultation with the respective guides, collect literature and consolidate the work plan by continuous evaluation through the reviews. Similarly, the industrial projects also planned and scheduled.

In the Phase II, students complete their project work and submit the project report as per the Phase I plan. The projects are evaluated by project reviews that are conducted at proper intervals. Each student must attend at least three reviews. The reviews are conducted by the faculty members. The students are encouraged to present/publish good quality project in National and International conferences and journals.

B. Types and relevance of the projects and their contribution towards attainment of POs

Based upon the functional area of the projects, they are categorized into three categories:

- Life Science
- Computational Biology
- Bioprocess Technology

After categorizing the projects, they are mapped with POs and PSOs and the attainments are assessed based on the following:

- Research area
- Gap Identification and Hypothesis Derivation
- Relevance of experiments
- Preparative effect
- Outcome and quality of experiment
- Team work and organization
- Presentation and documentation

Students Project related to Life Sciences (2019-2020)

S. No	Register no.	Name of the student	Title of the Project
1	9916001019	Bhairavi	Characterization of p-cresol stress associated proteins in <i>Enterococcus faecalis</i>
2	9916001120 9916001118	S. Lakshmi Priya S. Shwetha	Genomic characterization and identification of organophosphate degrading bacteria from soil
3	9916001117 9916001029	Shekar Priyadarshini Ch. Mohanrao	Bio control agents using <i>Bacillus</i> species against bacterial disease in plants
4	9916001012 9916001017 9916001058	M. Anusuya B. Balakiruthika K. Keerthika	Comparative studies between bacterial consortium and microalgae species <i>Chlorella vulgaris</i> for methyl orange biodegradation
5	9916001030	B. Darszhan	Optimization and purification of L-asparaginase using marine isolate <i>Enterobacter cloacae</i>
6	9916001008 9916001041 9916001153	S. Akila A. Hemalatha S. Shreen Taj	A simple method for identification of hydrocarbon degrading bacteria from petrol bunk spilling soil
7	9916001054	M. Karthik	Influence of iron restriction on biofilm formation in uropathogenic <i>Pseudomonas aeruginosa</i> .
8	9916001003 9916001006	K. Abinaya G. Abisha	Synthesis and characterization of Nanoparticle from extremophilic bacterium.
9	9916001046 9916001051 9916001057	S. Jeyashree B. Kalanandhini M. Kayalvizhi	Systemic exploration of <i>Asparagus racemosus</i> for its bioactive compounds
10	9916001128	T. Sreeshma Revathi	Effects of selenium nanoparticles and finasteride conjugate on treating alopecia
11	9916001031	S. Deepika	Development and optimization of biosurfactant based pesticide wash for fruits and vegetables.
12	9916001077	K. Rajaram	Effect of adriamycin of apoptosis in yeast cell
13	9916001040	K. Harsitha	Optimization of invitro culture techniques of sea buckthorn (<i>Hippophae ramnoides</i>)
14	9916001068 9916001069	R. Mari Selva Sundari S. Maria Agnes Roganzia	Green and biocompatible carbon quantum dots (CQDs) from marine red seaweed (<i>Hypnea valentiae</i>) for <i>in vitro</i> anticancer properties and UV assisted enhanced photocatalytic activity on various dyes.
15	9916001029 9916001117	Chebrolu Mohanrao Shekar Priyadarshini	Screening of rhizospheric and non- rhizospheric bacillus isolates and their antagonistic effects on plant pathogen
16	9916001043	S. Keeran Sethupathi	Theragnostic application of calcium carbonate (CaCO ₃) nanoparticles delivering arsenic trioxide (As ₂ O ₃) against breast cancer
17	9916001021 9916001047 9916001067	D. Bhoobalan N. Jayasuriyan A. Manojkumar	Effect of various extracts of <i>Terminalia arjuna</i> in treatment of pre-eclampsia
18	9916001001	E. Abarna	Propagation of medicinal plant

	9916001063	V. Loges	<i>Hybanthus enneaspermus</i>
19	9916001039	S. Harishmitha	Extraction and characterization of pterin deaminase from zebra fish embryos
20	9916001011 9916001016 9916001053	F. AngelinJenit M. Athimeera R. Kamalraj	Optimization of medium composition and inoculum volume for alginate lyase production from a marine isolate
21	9916001094 9916001149 9916001144	Prem Kumar K Murugananth K Vignesh S	Plant like bioactive compound isolated from Endophytic fungi and their biological application
22	9916001080 9916001083 9916001119	Nithish Ram RK Pavithran R Silamparasan P	Phytochemical extraction, evaluation and application of some medicinal plant leaves
23	9916001089 9916001095	Prasanna Devi S Priyadharshini S	Influence of indole acetic acid on antibiotic production in marine bacteria
24	9916001071 9916001077 9916001122	Miruthula R Muthukumar K Sophie P	Effect of coelomic fluid in induction of callus and root development in <i>Nicotiana tabacum</i>
25	9916001093 9916001098 9916001085	Prem Kumar K Raj Babu P Ponraj R	Screening <i>Pseudomonas</i> species as a biocontrol agent and it's antagonist effect on plant pathogen
26	9916001050 9916001105 9916001145	Kalaiyaran A Roobamathi S Vijayaraghavan B	Effect of sugarcane bagasse as a source of carbon for α -amylaseenzyme production from different types of filamentous fungi
27	9916001079 9916001148	Naveen Kumar. R Souravkhanra	Expression, purification and crystallization of SH3 domain of endolysin
28	9916001076 9916001155	Mulla Sariyanaz N.S. Supraja	Screening of lipase producing organism for polymer degradation
29	9916001133	S.P. Suresh Krishnan	Analysis of <i>cardamom mosaic virus</i> nia protease cleavage sites in cardamom proteins
30	9916001025	Boya Tharuni	Extraction and <i>in silico</i> approach of docosaheanoic acid production from green microalgae
31	9916001096 9916001138 9916001139	Rajaganapathy K Vaishnavi Sruthi R Vandhana K	Isolation and characterization of fructophilic bacteria for probiotic applications
32	9916001159 9916001126 9916001024	Sahana Parveen Sowndariya A Bincy Benny	Micro-algaebased treatment of cotton processing wastewater
33	9916001142 9916001100 9916001147	Vennila V Ramalakshmi G Yuvasri	Decolonization and degradation of textile effluent and methylene blue dye using ZnO, Nps, Rc1 and Rc3
34	9916001112 9916001052 9916001152	Selvakeerthana M Kaliraj C Mallikarjuna Reddy	Chemoprevention of arsenic trioxide loaded calcium carbonate nanoparticles Induced cell death in breast cancer cell
35	9916001007	AdhvithaPremanand	Novel Pre-Synaptic Orphan neurotoxin from

			<i>Micrurus fulvis</i> (Eastern Coral Snake) venom
36	9916001143 9916001038 9916001084	R.Vigneshperumal E.Ganeshprabu C.Periyavellai	Polyherbal aprodisiac formulation for enhanced sexual performance on diabetic male rats
37	9916001015 9916001032 9916001044	R.Atchaya V.Dhanapradeeba D.Inbajothi	Systemic exploration of <i>Semecarpus anacardium linn</i> for its bioactive compounds
38	9916001101 9916001111 9916001163	Ramya krishnaveni.M Sathiyakumar. E Prakash.M.	Partial Purification, Characterization and insilico analysis of asparaginase enzyme from the marine isolate <i>Enterobacter cloacae</i>
39	9916001013 9916001055 9916001150	T. Arunlakshmi S. Karthikadevi R. Abinaya	Biochemical characterization of rhizobacteria in <i>Hybanthus enneaspermus</i> and callus induction
40	9916001113	Shaik Muhammad Sohail	Silver nanoparticles in plant synthesis of white velvet beans, <i>Mucuna pruriens</i> (Lin), DC. Cyclodextrin and it's applications
41	9916001010	S.V. Akshaya	Optimization of expression and crystallization of BRCT domain containing proteins:
42	9916001018 9916001087 9916001129	BazeeraFerdhous P Poorinima Devi B Srigan Shan	Characterization of curdlan gum produced by bacteria isolated from marine environment
43	9916001100 9916001142 9916001047	G. Ramalakshmi V.Vennila R. Yuvasri	Decolorization and degradation of textile effluent water and dye by using ZnO NPS, RC1 (<i>Kocuriakristinae</i>) and RC3 (<i>Bacillus cereus</i>)
44	9916001154 9916001137 9916001033	S. Janani T. Tvareta Dhanush Damodharan	Folic acid conjugated BCD-albumin carrier for folate receptor targeted delivery of gallic acid for effective anti-Cancer treatment
45	9916001156 9916001157 9916001162	V. Ilakiyasuruthi S. Harshi D. Uma maheswari	Isolation and enrichment of phage from various samples and its application in wastewater treatment
46	9916001102 9916001097	S.A. Ramya R. Raja Rajeswari	Biosynthesis of silver nanoparticle from <i>Lactobacillus</i> species against MDR pathogens
47	9916001042 9916001130	S. Hema priya M.Subikshaa	A comparative study on the role of selected medicinal herbs in the treatment of kidney disorder
48	9916001072 9916001082	MoghalAlmazz S.Oviya	Identification of gender specific changes in Mt DNA of oral cancer patients
49	9916001027 9916001062 9916001132	B. Chandra murali M.Lingeshwari T. Suguna	Antioxidant potential of medicinal plant against chemical induced oxidative stress in <i>Saccharomyces cerevisiae</i>
50	9916001043	S. Immanuel David	Study of various effects of adriamycin in eukaryotic organisms using yeast

Students Project related to Computational Biology (2019-2020)

S.No	Register No.	Name of the student	Title of the project
1	9916001005 9916001036 9916001070	M.S. Abirami S. ElakkiyaRuba S. Marimuthu	Design and development of camptothecin loaded solid lipid nanoparticles for targeting in brain tumour
2	9916001028 9916001146	A. Charumathi Y. Ramakrishna	Optimization and mathematical modeling of ultrasound assisted extraction of biomolecules from <i>Swietenia macrophylla</i> on antidiabetic activity
3	9916001048 9916001065	M. Jhanani B.S. Makimaa	Medium optimization for urease production by using one factor at a time
4	9916001141 9916001125 9916001091	VennilaSankari B Sowmya SR Preethika M	Examination of commercially available cookies by culture dependent and metagenomic method
5	9916001115 9916001134 9916001110	Shamini AS Swathi V Sathish T	<i>In silico</i> screening of potential of various drug against novel coronavirus
6	9916001108 9916001086 9916001081	N. Sankaragomathi M. Pooja Vaisnavi U. Nivas	Study of commercially available potato chips by metogenomic and culture dependent strategy
7	9916001090	S. Praseetha	<i>In silico</i> validation of computationally predicted murine specific dengue CTL epitopes
8	9916001045 996001104 9916001114	Jayaprabhakaran.M Revathi.G Shalini.M	Studies on the influence of iron on biofilm formation and screening for inhibitors of iron acquisition in <i>Pseudomonas aeruginosa</i>
9	9916001023 9916001161	A.Bhuvaneshwari M.Santhiyakayathri	Genome mining of <i>Escherichia coli nissle 1917</i> for cyclic-di-GMP metabolic genes

Students Project related to Bioprocess Technology (2019-2020)

S.No	Register No.	Name of the student	Title of the project
1	9916001037	EugithPalcy	Fermentative demineralization of crab shell through effective lactic acid bacteria
2	9916001106	Rounack	Anaerobic digestion of petroleum sludge to digestate and formation of methane gas
3	9916001131	Suganthi J	Petroleum sludge treatment by using isolated bacterial cultures in composting

Students Project related to Computational Biology (2020-2021)

S.No	Register No.	Name of the student	Title of the project
1	9917001005 9917001001	Ajitha Murugesan Abarna Radhakrishnan	<i>In silico</i> evaluation of the binding potential of compounds from medicinal plants with Spike Proteins of SARS-CoV and SARS-CoV-2
2	9917001002 9917001038 9917001053	Abinaya. P Lavanya. R Pradeepa. R	<i>In silico</i> and <i>In vitro</i> analysis of codelivery efficacy of Lycopene and Gallic acid loaded hollow mesoporous silica nanoparticles in breast cancer
3	9917001022 9917001050 9917001054	Dravid Kannan.K Ponmani.C Praveen.P	Effect of Selenium (ionic) and selenium nanoparticles (SENPS) on seed germination, growth and yield of green gram <i>Vigna radiata</i>
4	9917001030 9917001021 9917001010	J. Karthigaiselvi V. Dilaksha Mary C. Anushiya Mary	<i>In silico</i> characterization of seaweed polysaccharides degrading enzymes
5	9917001013 9917001029 9917001052	Bala Varun S. M. Karthick K. Pradeep Kumar	Evaluating the effects of adriamycin on wnt signaling pathway and correlating it with cardiac dysfunction in silico
6	9917001007 9917001016 9917001025	M.Ammu J. Cathrine K. Hari Nivashini	Phylogenetic analysis for typing <i>Lactobacillus</i> strains using molecular gene marker
7	9917001011 9917001035 9917001006	S. Arul Joseph R. Kishore Kumar A. Amalraj	<i>In silico</i> antileishmanial properties of new flavonoid kaemperol against <i>Leishmania</i> sp
8	9917001048 9917001033 9917001014	P. Padhma Priya N.B. Kavyalakshmi M.BalaMurugan	Multiple substrate biodegradation model using artificial neural networks and genetic algorithm
9	9917001043 9917001034 9917001044	B. Mirunalinisha S. Kirthika D.NadarAbeljose	Evaluation of the distribution of L-Ornithine N5 Monooxygenases among microorganisms
10	9917001017 9917001026 9916001004	R. Deepak SelvaHariharan A. Helina Rose Abinaya S R	Screening of potential therapeutic inhibitor for NUDT5 from halophiles through molecular docking
11	9917001018 9917001051 9917001083	Deepeeka.R S. Pooja Vignesh Balan. M	Identification and biological studies of potential bioactive constituents from important medicinal plant treating rheumatoid arthritis disorder and their geographical variations in chemical markers
12	9916001073 9917001037 9917001096	M.MohamedArif N. Lakshmanan M.Sivamunieswaran	Bioactive compounds from <i>Tribulus terrestris</i> linn.: An <i>in silico</i> approach and molecular dynamics investigation against diabetes mellitus

13	9917001028 9917001042 9917001027	Jashin.P Martina Jemimal. A Janani.S	<i>In silico</i> analysis of beta lactam antibiotic resistant determinants in the genome of <i>Enterobacter hormaechei</i> subsp. <i>hoffmannii</i> OIPH-N069
14	9916001158 9917001020 9917001036	Lalitha.A. R Derina. J. Pearlin. Kowsalya.M	<i>In silico</i> study of the Bromelain-Phytochemical complex inhibition of phospholipase A2 (PLA2)
15	9917001032 9917001008 9917001009	C.M. Karunya Sri AntoTheodictaJefrina Antony Sherina. J	Molecular docking and <i>in silico</i> ADMET studies of potential phytotherapeutics from <i>Zingiber officinale</i> for treating chronic kidney disease
16	9917001012 9917001060 9917001084	Athma Rishi T. Sabitha M.Vijaya	Comparative <i>in silico</i> analysis of L-asparaginase of <i>Enterobacter cloacae</i> and FDA approved therapeutic L-asparaginase and their molecular docking studies
17	9917001061 9917001098 9917001072	S.Santhosh Krishnan A.Balamurugan M.Subash	Elucidating the role of phytochemicals screened from <i>Semecarpus anacardium</i> on macrophage activation and polarization: <i>An insilico and in vitro</i> approach.
18	9917001101 9917001065 9917001077	SuvethaCinnakondaJanardhanan Shruti Sivaraman G. Uma Maheswari	Graph theoretical network analysis, molecular docking and density functionality theory of 3,4-dihydroxypyrimidine derivative for enhanced anticancer activity
19	9917001055 9917001086 9917001094	Raghul R Yaswanth J Yeswanth Kumar Y	Designing and targeting of RGA2, a Rho2 GTPase – activating protein into the phytoconstituents of Indian medicinal herb of <i>Tinospora cordifolia</i> .
20	9917001064	P.Sharmila	Pharmacoinformatics-based screening of phytochemicals for reduction of doxorubicin induced toxicity
21	9917001049 9917001109	A.Parthiban S.Mahesh Pandian	Molecular docking, Admetprediction and Molecular dynamics studies of bioactive compounds from <i>Cissus quadrangularis</i> against peptic ulcer
22	9917001069 9917001068 9917001057	M. Sneha A. Sivakkani Ramar.N	<i>In silico</i> and functional analysis of antibiotic resistant determinants in the genome of <i>Streptomyces clavuligerus</i> ATCC 27064
23	9917001088 9917001046 9917001078	K.Abitha Sri S. Narayanan M.Vaijayanthi	<i>In silico</i> analysis of different L-Asparaginase enzyme and its substrate specificity for validation of anti-tumor activity

Students Project related to Life Sciences (2020-2021)

S.No	Register No.	Name of the student	Title of the project
1	9917001111 9917001067	B.Desiha V.Siva Bharathi	Effect of selenium nanoparticles (SeNPs) on cucurbit(7) uril induced developmental and organ -specific toxicity on the zebrafish model
2	9917001059 9917001073 9917001091	B.Renugadevi S.Suja Gayathri S.Shruthi	Codelivery effect of Eugenol and Thymol loaded mesoporous silica nanoparticles in <i>In silico</i> model of breast cancer
3	9917001063 9917001092 9917001093	Sathiyadevi.P M.Dhivyadharshini M.S.Aathikesavan	Analysing the effect of adriamycin on cell cycle in <i>Saccharomyces cerevisia</i>
4	9917001062 9917001071 9917001082	Saravana Sundar H Souparnika.K.S A.P.Vidhya Sri	Encapsulation of microbial polymer (EPS) - modified sodium alginate microcapsule by co-polymerization for the treatment of malachite green dye
5	9917001107 9917001110	Jency Emi Carolin. Nino Flaviana. R	Assessing the efficiency of municipality solid waste degradation using bacteria and fungi
6	9917001058 9917001108	A.K.Ramkumar S.Vignesh Muthu	Microalgae as a plant growth enhancer
7	9917001080 9917001070 9917001023	G. Vasunthara R. Snekhya M. Gayathri	Neem tree gum exudate as a novel edible coating material to prevent the post - harvest loss of fruits
8	9917001085 9917001056	Vishwa A Ramanathan E.D	Effect of coelomic fluid by <i>Eudriluseugeniae</i> on the growth of <i>Arachis hypogaea</i> .
9	9917001099 9917001103 9917001106	R.Ghurupreya K.Geetika Devi C.Venkatesan	Bioactive compounds from <i>Mimosa pudica</i> - An <i>in silico</i> investigation against neurological diseases.
10	9917001024	S. Gowshiki	A comparative study on the role of selected herbs in treatment of diabetic nephropathy
11	9917001019	Deepikaa V	Effect of SARC-CoV-2- Spike mutation and ACE 2on transmissibility and pathogenecity.
12	9917001090	Karthika Chandran. R	Use of ethano medicines against fish bacterial pathogens.
13	9917001112	Sumathi S Nair	Variability studies on <i>Trichoderma spp</i> and its mass multiplication on tuber crops-based media

Students Project related to Bioprocess Technology (2020-2021)

S.No	Register No.	Name of the student	Title of the project
1	9917001113 9917001074	V Subharaga K Suriya Lakshmi	Bioprocessing of brown seaweed for alginate lyase production

2	9917001066	P. Shyni Jasmin	Bioreactor performance in presence of oxytetracycline and its effect on aerobic granulation.
3	9917001047	S. Nivedhita	Bioreactor performance in presence of oxytetracycline and its effect on aerobic granulation.

Students Project related to Life Sciences (2021-2022)

S.No	Register No.	Name of the student	Title of the project
1	9918001032 9918001011 9918001033	Nithish. P Barath. V Nivethidha. K	Unraveling the role of different substrates on nutritional value of the cultivated mushroom, <i>Pleurotus florida</i>
2	9918001026 9918001031 9918001005	Mariya Sneha Rani Neelaveni Akkarshana P	Assessing the therapeutic potential of folklore plants for their anti-viral and wound healing activity
3	9918001008 9918001025 9918001010	Asmitha Sherin Lakshmi Praba P Bala Bharathy K	Effects of cisplatin/cisplatin silver nanoparticles on enzymes involved in glycolysis in <i>Saccharomyces cerevisiae</i> .
4	9918001017 9918001027 9918001017	R. Harish S. Mohamed Asif M. Gokul	Screening and characterization of marine bacteria for L-Asparaginase enzyme production
5	9918001073 9918001069	Suvega M.P Precilla. K	Extraction of anti-mycobacterial metabolites from <i>Withania somnifera</i> and its <i>in silico</i> and <i>in vitro</i> identification.
6	9916001136	Thayaagharan S	Synthesis characterization and <i>in vitro</i> studies of resveratrol loaded zinc oxide nanoparticles grafted to smart copolymer (PMMA-Peg) on gastric (C16) cancer cell line
7	9918001061	Anjali Pandey	Identification of miRNA that can bind and regulate influenza virus infection
8	9918001057	Dever Divya. S	Screening of phytochemicals from <i>Rhizopus oryzae</i> against potential target for mucormycosis
9	9918001046 9918001050 9918001053	R Sneha S Sudhiksha A Vedha Shree	Effect of selenium nanoparticles and zinc oxide nanoparticles on seed germination, growth and yield of tomato plant (<i>Solanum lycopersicum</i>)
10	9918001049 9918001039 9918001040	N. Subiksha J. Rithika Kalyani P. Rooba	Phyto-fabrication of copper nanoparticles from <i>Macrotyloma uniflorum</i> : Characterization and its antibacterial activity
11	9918001041 9918001054 9918001055	S. Saran Babu G. Venugopal R. K. R. Vineeth	Comparative studies on alternate nutrients for the growth of <i>Raphanus sativus</i> and <i>Zea mays</i> .

Students Project related to Computational Biology (2021-2022)

S.No	Register No.	Name of the student	Title of the project
1	9918001068 9918001043 9918001044 9918001045	G. VashidaMousami Z A ShainiDeshaw P Shineetha N M Shreya Bratha	Combinatorial drug delivery of Brucine and Amygdalin against breast cancer proteins through <i>in silico</i> approach
2	9918001013 9918001014	T.U. Dharshana M.Dhayal	Combination of allylsulfide and noscapine hydrochloride loaded hollow mesoporous silica nanoparticles and their <i>in silico</i> screening against breast cancer
3	9918001024 9918001003 9918001029	M.Kopperundevi Abishak.G AR.MohammedSulthanilFazith	CAMs as potential target for inflammatory disease: An <i>in silico</i> approach
4	9918001004 9918001028 9918001007	Agila Eswari.J M.MohamedInshamamulHuk S. Anitha	<i>In silico</i> analysis of anti-inflammatory and neurodegenerative disorders of <i>Cardiospermumhalicacabum</i> L.
5	9918001001 9918001006 9918001022	Abinaya AR AmalinAbarna V Kanmani Geetha P	Graph theoretical network analysis and molecular modeling of bioactive compounds from <i>Aervalanata</i>
6	9918001009 9918001030 9918001035	AthiraRajan R. Muneeswari P. Pavithra	<i>In silico</i> analysis of putative beta-galactosidases of <i>Cellulomonas gilvus</i> ATCC 13127
7	9918001018 9918001034	V.Haritha S.Nivethitha	Pharmacoinformatics based screening of <i>Vitex negundo</i> against lymphatic filariasis by targeting asparaginyltRNA synthetase
8	9918001062 9918001064 9918001051	A.Aarthi K.G. Naganandhini S.Sweatha	Identification of potential drug targets against SARS -COV2 using in-silico and machine learning approach
9	9918001066 9918001065 9918001071	R. Sherwin Camillas G.B. Rajakumaran D. Harisumanth	Ingenious approach to municipal solid waste management & modeling using lab view & RSM
10	9918001042 9918001052 9918001056	Sethu R Varsha .K Yaswanth Kumar P V	Identification and molecular modeling of anti dengue compounds against NS5 protein from the selected medicinal plants
11	9918001036 9918001072	Ramya.S Jaya Surya.V	Metagenome of biogranules used in treatment of cotton processing effluent
12	9918001070 9918001067 9918001047	Bhavani. R DroseIgnatious Shane. M Gopi Krishna. G	Screening of phytochemicals from <i>Aegle marmelos</i> against potential targets of irritable bowel syndrome using pharmacoinformatics and optimization methods

Students Project related to Bioprocess Technology (2021-2022)

S.No	Register No.	Name of the student	Title of the project
1	9918001015 9918001002 9918001021	Dhivyaasree.J Abirami.M Kamini.M	Algal oil recovery from micro-algal treated cotton processing effluent and RSM modeling

C. Process for monitoring and evaluation

To monitor the progress and evaluate the project, the reviews are conducted as given below:

ProjectWorkPhaseI		
PhaseI	Zeroth review	Based on the presentation and the discussion made during the review, the title of the project is tentatively fixed. Subsequently the guides of the projects are allocated.
	First review	Identification of Problem based on the literature, well defined project scope and objective, students understanding of project deliverables.
	Second review	Methodologies were identified to solve the problem and The responsibility of each individual team member to accomplish the project is fixed.
	Phase I final	The detailed plan and methodology of the project is finalized. The duration of the project is presented and to be finalized.

ProjectWorkPhaseII		
PhaseII	First review	Ensure the initialization of project as per the plan in the first Phase and status of the projects were reviewed.
	Second review	Evaluate the adaptation of the proposed methodology to solve the problem and the responsibility of each individual team member was reviewed.

	Third review	Output of the work is presented by consolidating the work done by the team members individually as well as in groups. Fulfillment of the objectives was reviewed.
	Final review	Students should submit their project report and Demonstrate of the outcome of the project. Evaluation of overall student performance.

Marks for internal assessment are awarded based on the scores awarded by the evaluators, based on the rubrics during the reviews. University assessment mark is based on the evaluation by both internal and external examiners.

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION

ANAND NAGAR, KRISHNAN KOIL -626 126

DEPARTMENT OF BIOTECHNOLOGY

Project Review Score sheet

| Course Code: BIT18R499

Date:

S.No	Batch	Reg Number	Name of the student	Research Area and Guide selection (0)	Literature Collection, Gap Identification and Hypothesis Derivation (10 marks)	Framing the Aim and Objectives (10 marks)	Relevance of Experiments with Objectives (20 marks)	Preparative Efforts (20 marks)	Outcome and Quality of Experiments (20 marks)	Team Work and Organization of Experiments (20 marks)	Total (100 marks)
1	1	9918001043	Z A Shaini Deshaw								
		9918001044	P Shineetha								
		9918001045	N M Shreva Bratha								
		9918001068	G. Vashida Mousami								
2	2	9918001061	Anjali Pandey								
3	3	9918001046	R Sneha								

Project Evaluation Form

D. Process to assess individual and team performance

The department has framed rubrics to evaluate the student projects. The project is evaluated based on some selected factors. The factors are collection of literature reviews, Problem definition, methodology proposed, and etc. A complete rubrics description also the mark split is given in the following Table. Based on this Table, the projects are evaluated. The performance of the individual team member of the project is assessed at the time of presentation in reviews by considering the

following criteria:

- Communication
- Confidence in the project work
- Attainment of individual scope of work
- Overall contribution for the project accomplishment

Rubrics						
Review I and Review II						
Description	Score					
	5	4	3	2	1	0
Literature Review(5) (For review-I)	<ul style="list-style-type: none"> • Strong collection of more number of quality journal papers (≥ 25 nos) and gathering information • Information gathered from field survey. • Gathered information from multiple sources. • Well explained the current development and innovation work. • Able to explain the important of study. 	<ul style="list-style-type: none"> • Collection of quality journal papers (≤ 20 nos) and gathering information • Gathered information from multiple sources. • The information is related to innovation idea. 	<ul style="list-style-type: none"> • Collection of quality journal papers (≤ 15 nos) alone. • Collected information from limited number of source. • Summarization of literature with relevant project work. 	<ul style="list-style-type: none"> • Collection of quality journal papers (≤ 10 nos) alone. • Gathered information from single source. • Summary of the literature is not relevant to the project title. 	<ul style="list-style-type: none"> • Collection of journal papers is not relevant 	<ul style="list-style-type: none"> • There is no collection of journal paper

Problem Definition (5)	<ul style="list-style-type: none"> • The problem definition and scope of work is well defined and explained. • Able to clearly present the objective and important of the study. 	<ul style="list-style-type: none"> • The problem definition and scope of work is well explained clearly • But the objective is cleared. 	<ul style="list-style-type: none"> • The problem is defined with existing one. • Not properly explained the problem definition. 	<ul style="list-style-type: none"> • Problem is identified but no scope on work. 	<ul style="list-style-type: none"> • Problem is not clearly identified. 	<ul style="list-style-type: none"> • Unable to present the problem statement
Methodology Proposed (5)	<ul style="list-style-type: none"> • Work is related to community service. • Work is related to research oriented. • Adopted any new techniques in existing one. • Novelty of work. 	<ul style="list-style-type: none"> • The methodology and objective of the current development work is explained clearly. • Suitable methodology is selected for current work. 	<ul style="list-style-type: none"> • Selected methodology is suitable with current work. • Not properly explained the proposed work. 	<ul style="list-style-type: none"> • The selected methods are not relevant to current work. 	<ul style="list-style-type: none"> • No scope for community service. • Old techniques usage • There is no technical content. 	<ul style="list-style-type: none"> • Failed to explain and identify the methods.
Presentation (5)	<ul style="list-style-type: none"> • The slides are presented with team able to clearly explain. • Clearly explained with research oriented. 	<ul style="list-style-type: none"> • Present the current Work with computer aided design and assembly modelling. • Present the current 	<ul style="list-style-type: none"> • The presented slides are not in logical order with un uniform format. • Present the work with 	<ul style="list-style-type: none"> • Slides are presented with lack of communication • Present the work without modeling, animation and experiments results. 	<ul style="list-style-type: none"> • Presentation is not clear • Present the slides with technical error. • Some mistakes happen in 	<ul style="list-style-type: none"> • Failed to present the current development work

	<ul style="list-style-type: none"> Clearly explained with community service oriented. The presented slides are designed in logical order with uniform format. 	<p>Work with animation.</p> <ul style="list-style-type: none"> Present the current Work with experiment s results. 	Auto CAD drawing modelling.	<ul style="list-style-type: none"> Failed to demonstration of work. 	slides	
<p>Solution / findings (5)</p> <p>(Review-II only)</p>	<ul style="list-style-type: none"> The obtained solution is highly satisfied. Obtained expected results. Obtained accrued results. Findings excellent work. 	<ul style="list-style-type: none"> The obtained solution is satisfied. The solution is done with existing one. 	<ul style="list-style-type: none"> The product outcome with some technical error. Obtained solutions are not relevant. The obtained solutions are not satisfied. 	<ul style="list-style-type: none"> The obtained solution is not clear. Failed to run the product. 	<ul style="list-style-type: none"> There is no possible product outcome There is no fabrication and analysis of work. 	<ul style="list-style-type: none"> Unable to obtain the solutions .
Report(5)	<ul style="list-style-type: none"> The report is strictly followed the table, figure, spacing, reference and typesetting as per the format. The most the references are cited in appropriate place. Report printing is high quality. Submit the report in proper time 	<ul style="list-style-type: none"> The report is strictly followed the table, figure, spacing, reference and typesetting as per the format. Submit the report in proper time The few references not cited in appropriate place. 	<ul style="list-style-type: none"> The report is partially followed the table, figure, spacing, reference and typesetting format. Printing quality is poor. The most the references are not cited in appropriate place. 	<ul style="list-style-type: none"> The report is not followed as per the format. Delay in report submissions. The technical content of work is not satisfied. 	<ul style="list-style-type: none"> English language is very poor. There is no technical content. The report is not followed as per the format. 	<ul style="list-style-type: none"> Failed to submit the report.

The performance of the project team is assessed by considering the following criteria:

- How well the team works together as a group
- The team's problem solving techniques
- Coordination in consolidating work & Report writing
- Time management
- Result of the project

E. Quality of Completed Project

Quality projects are disseminated and published to the science and technology domains in the following aspects:

- Publishing papers in reputed National / International Conference proceedings.
- Filling patterns for novel technical idea.
- Forwarding the best project to the science competition
- Sending the students projects proposal to the IEDC, TNSTC etc.

F. Evidences of papers published/awards received by projects

The students are encouraged to publish their innovative works in the national and international conferences, Journals etc

- The best projects are identified and awarded by IQAC.

Industry Project

Students are also encouraged to carry out their project outside the campus (i.e.) preferably in industries and premier institutions. If the students do their project in industries, they could get exposure to real time problems faced by the industries. Further, this could improve the relationship between the companies and the university and enhance the placement opportunities for the students. The lists of companies in which our students completed their projects are given in the following Table.

List of companies/ Institutes where students carried out their projects

1	Dabur Research Foundation. Ghaziabad
2	BARC, Mumbai
3	Biocon. Bengaluru
4	King Institute, Guindy
5	Alagal R Nutra Pharms Pvt.Ltd. Thanjavur.
6	Aravind Medical Research Foundation. Madurai
7	Biozone. Chennai
8	Nanyang Technological University. Singapore
9	Universiti Teknologi Petronas. Malaysia
10	Madurai Kamaraj University
11	Bharathiyar University, Coimbatore
12	Osmania University, Hyderabad
13	CSIR-CLRI, Adyar, Chennai
14	National Institute of Technology. Trichirapalli.
15	National Institute of Mental Health and Neurosciences, Bengaluru.
16	Manonmaniam Sundarnar University. Tirunelveli.
17	Indian Institute of Science Education and Research, Bhopal, Madhya Pradesh

Consolidated report of external projects in the last four academic years

Academic Year	2021-2022	2020-2021	2019-2020
No. of Students Attended	02	05	27

Details of students opted for External Project (2021-2022)

S. No	Register no.	Name of the student	Title of the Project	Institution
1	9918001061	Anjali Pandey	Identification of miRNA that can bind and regulate Influenza virus infection	Indian Institute of Science Education and Research, Bhopal, Madhya

				Pradesh
2	9916001136	Thayaagharan S	Synthesis, characterization <i>and in vitro</i> studies of resveratrol loaded zinc oxide nanoparticles grafted to smart copolymer (PMMA-Peg) on gastric (C16) cancer cell line	Madurai Kamarajar University

Details of students opted for External Project (2020-2021)

S. No	Register no.	Name of the student	Title of the Project	Institution
1	9917001019	Deepikaa V	Effect of SARS-CoV-2-Spike mutation and ACE 2 on transmissibility and pathogenicity.	Sedeer Medical, Doha, Qatar.
2	9917001066	P. Shyni Jasmin	Bioreactor performance in presence of oxytetracycline and its effect on aerobic granulation.	Indira Gandhi Center for Atomic Research (IGCAR) Kalpakkam. Tamilnadu
3	9917001090	Karthika Chandran. R	Use of ethano medicines against fish bacterial pathogens.	Central Island Agriculture Research Institute. Andaman & Nicobar
4	9917001112	Sumathi S Nair	Variability studies on <i>Trichoderma spp</i> and its mass multiplication on tuber crops-based media	ICAR- Central Tuber Crops Research Institute, Tiruvananthapuram
5	9917001047	S. Nivedhita	Bioreactor performance in presence of oxytetracycline and its effect on aerobic granulation.	Indira Gandhi Center for Atomic Research (IGCAR) Kalpakkam. Tamilnadu

Details of students opted for External Project (2019-2020)

S. No	Register no.	Name of the student	Title of the Project	Institution
1	9916001037	Eugith Palcy	Fermentative demineralization of crab shell through effective lactic acid bacteria	Bharathiyar University, Coimbatore

2	9916001019	Bhairavi	Characterization of p-cresol stress associated proteins in <i>Enterococcus faecalis</i>	Bharathiyar University, Coimbatore
3	9916001120	S. Lakshmi Priya	Genomic characterization and identification of organo phosphate degrading bacteria from soil	Madurai Kamaraj University
4	9916001118	S. Shwetha	Genomic characterization and identification of organo phosphate degrading bacteria from soil	Madurai Kamaraj University
5	9916001003	K. Abinaya	Synthesis and characterization of Nanoparticle from extremophilic bacterium.	University of Madras
6	9916001006	G. Abisha	Synthesis and characterization of Nanoparticle from extremophilic bacterium.	University of Madras
7	9916001031	S. Deepika	Development and optimization of biosurfactant based pesticide wash for fruits and vegetables.	CSIR-National Institute for Interdisciplinary Science & Technology, Thiruvananthapuram
8	9916001040	K. Harsitha	Optimization of invitro culture techniques of seabuckthorn (<i>Hippophae rhamnoides</i>)	Bharathiyar University, Coimbatore
9	9916001068	R. Mari Selva Sundari	Green and biocompatible carbon quantum dots (CQDs) from marine red seaweed (<i>Hypnea valentiae</i>) for <i>in vitro</i> anticancer properties and UV assisted enhanced photocatalytic activity on various dyes.	Bharathidasan University, Coimbatore
10	9916001069	S. Maria Agnes Roganzia	Green and biocompatible carbon quantum dots (CQDs) from marine red seaweed (<i>Hypnea valentiae</i>) for <i>in vitro</i> anticancer properties and UV assisted enhanced photocatalytic activity on various dyes.	Bharathidasan University, Tiruchirapalli.

11	9916001048	M. Jhanani	Medium optimization for urease production by using one factor at a time	CSIR-Central Leather Research Institute, Chennai
12	9916001065	B.S. Makimaa	Medium optimization for urease production by using one factor at a time	CSIR-Central Leather Research Institute, Chennai
13	9916001039	S. Harishmitha	Extraction and characterization of pterin deaminase from zebra fish embryos	Bharathiyar University, Coimbatore
14	9916001007	AdhvithaPremanand	Novel Pre-Synaptic Orphan neurotoxin from <i>Micrurus Fulvis</i> (Eastern Coral Snake) venom	National University of Singapore, Singapore
15	9916001076	Mulla Sariyanaz	Screening of lipase producing organism for the polymer degradation	CSIR-Central Leather Research Institute, Chennai
16	9916001079	Naveen Kumar R	Expression check, purification and crystallization of SH3 domain of endolysin	National Institute of Mental Health and Neuro-Sciences(NIMHANS), Bangalore
17	9916001106	Rounack	Anaerobic digestion of Petroleum sludge to methane and digestate.	UniversitiTeknologi PETRONAS, Malaysia
18	9916001131	Suganthi J	Petroleum sludge treatment by using isolated bacterial cultures in composting	UniversitiTeknologi PETRONAS, Malaysia
19	9916001133	Suresh Krishnan	Analysis of Cardamom Mosaic Virus NLA cleavage sites in cardamom proteins.	Madurai Kamaraj University
20	9916001148	Sourav Khanra	Expression check, purification and crystallization of SH3 domain of endolysin	National Institute of Mental Health and Neuro-Sciences(NIMHANS), Bangalore
21	9916001155	Supraja N S	Screening of lipase producing organism for the polymer degradation	CSIR-Central Leather Research Institute, Chennai
22	9916001010	Akshaya S V	Optimization of expression and crystallization of BRCT	Institute for Stem Cell Science and

			domain containing proteins	Regenerative Medicine (inStem), Bangalore
23	9916001023	Bhuvaneshwari A	Genome mining of <i>Escherichia coli</i> Nissle 1917 for cyclic-di-GMP metabolic genes	Madurai Kamaraj University
24	9916001072	MoghalAlmaaz	Identification of gender specific changes in Mt DNA of oral cancer patients	Indo –American Cancer Research Foundation. Hyderabad
25	9916001082	Oviya S	Identification of gender specific changes in Mt DNA of oral cancer patients	Indo –American Cancer Research Foundation Hyderabad
26	9916001151	Sarah Afreen B	Identification and cloning of seed specific bzis of wheat	National Agri-food Biotechnology Institute. Mohali, Punjab
27	9916001161	SanthiyakayathriM	Genome mining of <i>Escherichia coli</i> Nissle 1917 for cyclic-di-GMP metabolic genes	Madurai Kamaraj University

2.2.4 Initiatives related to industry interaction (10)

A. Industry Expert lectures

- During the regular working days, the frequent guest lectures will be conducted by inviting the expertise from the industry with respect to the course-oriented title for all the year of Biotechnology engineering students. It gives them latest technology and motivates them to excellent in industrial trends.
- Seminars and Workshops are also organized by experts from academia/industry on various aspects has also been organized for the students. In this aspect, many industrial lectures had been conducted for the benefit of students.
- The industrial institutional interaction develops the student's skill to work on live projects related to the industrial issues; it exposes them to different opportunities to the students.

Guest Lecture/Seminar Organized by the Department

S. No	Name of Programme	Resource Person	Date of Programme
1	Indo- US Workshop on “Extremophiles in Biotechnology”	Prof. Rajesh Shani, South Dakota School of Mines & Technology, USA	27.11.2019
2	Two-day Virtual Workshop on Biotechniques for Extraction of Metabolites from Plant and Algal Sources	Mr. Vivek Murali, Founder, Remura Biologicals, Krishnagiri. Dr. R. Saravanan. CARE	11.05.2020 - 12.05.2020
3	Webinar on "What's New About SARS-CoV-2?"	Prof. S. Sudhakar, MS University, Tirunelveli	03.06.2020
4	Webinar on "Vaccine Development for COVID-19 A Birds eye view.	Prof. Richard Coico, USA	04.06.2020
5	Webinar on "Missing Links in The Enemy Territory."	Dr. V. Deepak, University of Derby, UK	06.06.2020
6	Webinar on "Viral Diagnosis: The Covid-19 Scenario"	Dr. K. Sundar, Prof & Dean KARE	11.06.2020
7	Online Workshop on "Bread, Butter and Biotechnology"	Dr. N.K. Sasidharan, Kerala Agriculture University Dr.S. Senthil Kumar, Founder and CEO. Padmasri Laboratory, Chennai	13.05.2020- 14.05.2020
8	Virtual Workshop on "Protein and Genome Bioinformatics"	Dr.D. Illakkiya, Assistant Professor, Mother Terasa University Dr.K.N. Rajnish, SRM Institute of Technology. Chennai	15.05.2020
9	Virtual Workshop on "Caterpillar to Butterfly 2.0 – Personality Development"	Mrs.Swetha Venkatesan, Tfizer Pharmaceuticals Mr. Aravind Babu, Associate consultant, CAPGEMINI	04.06.2020- 06.06.2020
10	Virtual Workshop on "Workshop on Protein Bioinformatics"	Dr.M. Michael Gromiha, Professor, IIT, Madras, Dr.P.Kannabiran, MEPCO SCHLENK	08.06.2020- 10.06.2020
11	Virtual Workshop on "Plant Bioinformatics"	Dr.S. Hemalatha, Dean, Crescent Institute of Science & Technology Dr. Dilip Gore, Founder and Director, Sai Bio System, Nagpur	11.06.2020- 12.06.2020
12	Virtual Workshop on "Waste – An offer letter"	Dr.M. Premalatha, NIT, Trichy Mr. Tamilmanian Nagalingam, CoFounder, Kuppakaran waste management Pvt.Ltd.	11.06.2020
13	Virtual Workshop on	Dr.S. Ananthi, Head,	13.06.2020-

	"Understanding proteins in the Post-genomic era" Organized by Department of Biotechnology, KARE	CLIN Biocare, Chennai Mr. Jaison Raj, Associate Scientist, BioconePristol Myers Squiv, Bengaluru	14.06.2020
14	Virtual Workshop on " From Student to Bio entrepreneur"	Mr. Anand Sivaraj, Manager, Anna University Mr. Dinakaran Paneerselvam, Co-Founder, IEEARC Group of companies.	14.06.2020
15	Virtual Workshop on " The Era of Digital Bioprocessing: Exploitation of MATLAB for Bioprocess Engineers"	Dr. SivamaniSelvaraju, Salalah College of Technology, Oman Dr.K. Haribabu, NIT, Calicut	17.06.2020-18.06.2020
16	Virtual Workshop on " BIOFIRM - Scaling Lab2Market"	Dr. John Thambirajah AMIST University, Malaysia. Dr. Jennet Rani, Prof & Head, Sadakathullah Appa College. Tirunelveli	18.06.2020-20.06.2020
17	Virtual Workshop on " Basic Animal Handling Techniques"	Dr. R. Vadivelan.Professor, JSS College of Pharmacy Ooty Dr.S. Muthukrishnan, Associate Professor, PSG College of Pharmacy, Coimbatore	19.06.2020
18	2 nd National Conference on “Innovations in Bio & Chemical Engineering for Sustainable Life”	Dr. K. Balakrishnan, MK University Dr. K.M. Gothandam Prof, VIT, Vellore Dr.M. Arivazhagan, Prof, NIT, Trichy.	20.05.2021-21.05.2021
19	One day workshop on “Nurturing and Transforming Research”	Dr.K.Sundar, Prof. KARE Dr. Sankarganesh Arunachalam, Associate Prof. KARE Dr.T.Kathiresan, Prof & Head, KARE Dr. K.Selvaraj, Assistant Prof, KARE Dr. S. Achiraman, Prof, Bharathidasan University	09.03.2022
20	One day workshop on “Lab Safety and Management”	Dr. G.Kanthimathi, Associate Prof, Ramco Institute of Technology. Dr.K.Venkadeswaran, Assistant Prof, PSR Engineering College.	20.04.2022

B. One-Credit Courses

The department also offer one credit courses to under graduate students. These courses are taught by academic/Industry experts or scientists from abroad (through video conferencing). The list of one credit courses offered by the department is shown below.

The students will get a chance to understand the real time projects that are undergoing in the industry and this can help to bridge the gap between practical and theory courses. These industry-need based courses, also enhance the placement opportunities for our students.

List of one credit courses offered for B.Tech students

S.No	Resource person	Name of the course	Date of conducting program	No students attended.
1	Dr. S .R. Senthil Kumar, Founder and Chief Operating officer, Padmasini Lifesciences LLP, Chennai	Current Good Manufacturing Practices	24.1.2021 31.1.2021 07.2.2021 14.2.2021	46
2	Dr. H. Nellaiah, Head, Research and Development, BioZeen, Bangalore	Biopharmaceutical production: An Industry Perspective	06.11.2021 07.11.2021 14.11.2021	35
3	Dr. H. Nellaiah, Head, Research and Development, BioZeen, Bangalore	Biopharmaceutical production: An Industry Perspective	07.03.2020-08.03.2020	35
4	Dr. NavaniethaKrishnaraj R, Research Professor, Department of Chemical & Biological Engineering, South Dakota School of Mines and Technology, Rapid City, SD	Bioelectrochemical Engineering	15.11.2020-22.11.2020	30
5	Dr. S .R. Senthil Kumar, Founder and Chief Operating officer, Padmasini Lifesciences LLP, Chennai	Current Good Manufacturing Practices	18.10.2019-19.10.2019	28
6	Dr. H. Nellaiah, Head, Research and Development, BioZeen, Bangalore	Biopharmaceutical production: An Industry Perspective	19.10.2019-20.10.2019	21
7	Dr. S .R. Senthil Kumar, Appasamy Ocular Devices (Biopharma), Chennai	Current Good Manufacturing Practices	08.09.2018-09.09.2018	31
8	Dr. Lakshmi Subramanian, Dalmia Research Centre, Coimbatore	Bioseparations in Phytochemistry	16.3.2019 – 17.3.2019	25

2.2.5. Initiatives related to Industry Internship/Summer Training(10)

Students are encouraged to do summer internship in the industries. This enhances their knowledge and skills besides the students learn to work as a team. This also provides employment in the industries.

Initiatives

The inplant training coordinator encourages students undergoing in-plant training or internship, in their semester vacations. These will enable the students

- To gain hands-on experience in implementing whatever they have learned in their curriculum.
- To train themselves on the state of the art equipment's and standards used by the industries.
- To present themselves as complete professionals, when they go for placements.

Arranging for In-plant training/Internship

Students will choose a domain that they come across in their academia and find the industries available on that particular domain which provides training.

- Students will then approach the TPO for getting approval.
- The TPO will Issue the necessary documents like a bonafide certificate and request letter to the concerned industry.
- After the consent of the industry the students will attend the training program in the respective industries.

Impact Analysis of Industrial Training

- Assessment will be based on type of industry, objectives, relevant area of training, documented visit report.
- Analyzing the likely impacts of the training on the performance of the student through detailed interaction with students.

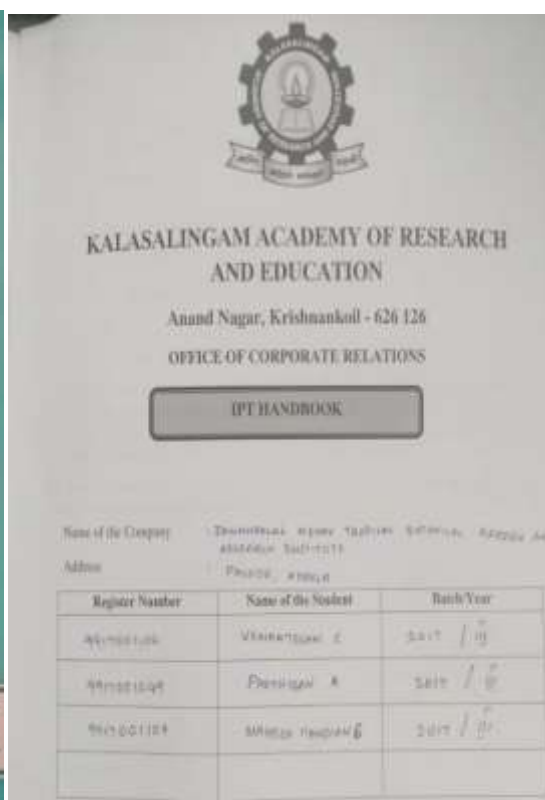
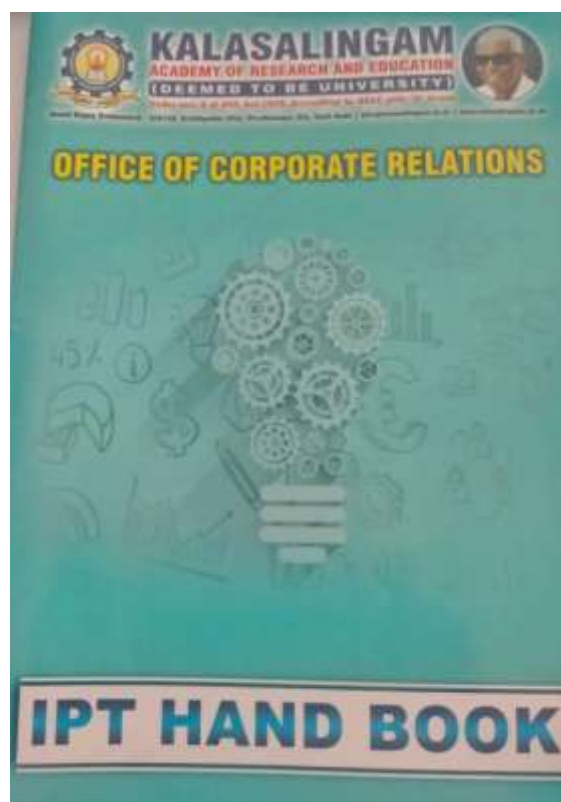
Student Feedback on Initiative

- Feed back is obtained from the students regarding the training.
- Taking necessary actions with regard to the feedback given by the students.

Subject Code: BIT18R397 Category: Implant training
Department: Biotechnology Academic Year: Batch:

[illegible]

Implant training/Internship Evaluation form



IPT/Internship Handbook

Details of students opted for Internship/Inplant training (2021-2022)

S.No	Register No.	Name of the student	Company Name
1	9918001011	Barath V	Helix Bio Genesis, Noida.
2	9918001032	Nithish P	
3	9918001060	DroseIgnatious Shane M	
4	9918001070	Bhavani R	
5	9918001013	Dharshana T U	Biosetup Life Science, India
6	9918001014	Dhayal M	
7	9918001025	Lakshmi Praba P	
8	9918001057	DeverDivya Subramanian	
9	9918001033	Nivethidha K	Biosrishti Online Life Science Solution, Tiruvannamalai.
10	9918001039	Rithika Kalyani	
11	9918001040	Rooba P	
12	9918001049	Subiksha N	
13	9918001067	Gopikrishna G	Zygene Biotechnologies. Kochin, Kerala
14	9918001061	Anjali Pandey	Department of Science & Technology, (Molecular Biology) Madhya Pradesh Council of Science & Technology. Bhopal
15	9918001024	Kopperundevi M	Centre for Stem Cell & Cancer Genomics, AMI Bioscience, Coimbatore
16	9918001002	Abirami M	Phyco Spectrum Research Foundation., Chennai
17	9918001015	DhivyaSree J	
18	9918001053	Vedhashree A	
19	9918001005	Akkarshana P	Veridian Micro lab, Kelambakkam, Tamilnadu
20	9918001008	AsmithaSherin	
21	9918001010	BalaBharathy	
22	9918001030	Muneeswari R	Veridian Micro lab, Kelambakkam, Tamilnadu
23	9918001009	AthiraRajan	
24	9918001035	Pavithra P	
25	9918001073	Suvega M P	VJ Biotech, Coimbatore, Tamilnadu
26	9918001069	Precilla K	
27	9918001072	Jaya Surya V	
28	9918001001	Abinaya AR	VJ Biotech, Coimbatore, Tamilnadu
29	9918001006	AmalinAbarna	
30	9918001046	Sneka R	VJ Biotech, Coimbatore, Tamilnadu

31	9918001047	Subash M	
32	9918001050	Sudhiksha S	
33	9918001022	Kanmani Geetha	
34	9916001136	Thayaagharan S	VJ Biotech, Coimbatore, Tamilnadu
35	9918001036	Ramya S	Trichy Research Institute of Biotechnology Pvt.Ltd (TRI Biotech)
36	9918001028	Mohamed InshamamulHuk	
37	9918001029	Mohammed SulthanilFazith A	
38	9918001065	Rajakumaran G	
39	9918001066	Sherwin Camillas R	Trichy Research Institute of Biotechnology Pvt.Ltd (TRI Biotech)
40	9918001041	Saran Babu S	
41	9918001054	Venugopal G	
42	9918001055	Vineeth R K R	
43	9918001003	Abishak G	Helix Biogenesis, Noida
44	9918001021	Kamini M	
45	9918001052	Varsha K	
46	9918001056	Yaswanth Kumar P	Helix Biogenesis Noida
47	9918001051	Sweatha S	
48	9918001062	Aarthi A	
49	9918001064	Naganandhini K	Clinbiocare Technology, Chennai
50	9918001018	Haritha V	
51	9918001023	Kirthika Varnam R	
52	9918001034	Nivethitha S	
53	9918001042	Sethu R	Clinbiocare Technology, Chennai
54	9918001043	ShainiDeshaw Z	
55	9918001026	Mariya Sneha Rani	
56	9918001031	Neelaveni V	Clinbiocare Technology, Chennai
57	9918001044	Shineetha P	
58	9918001045	Shreya Bratha N M	
59	9918001004	Agila Eswari J	
60	9918001007	Anitha S	AVN Ayurveda Formulations. Madurai
61	9918001048	Subash S	
62	9918001016	Gokul M	
63	9918001017	Harish R	
64	9918001027	Mohammed Asif	Trichy Research Institute of Biotechnology Pvt.Ltd (TRI BIOTECH)
65	9918001071	Dasari Hari Sumanth	
66	9918001068	VashidaMousami G	AVN Ayurveda Formulations. Madurai
67	9918001037	Rasik Ranvir Ramana V	

Details of students opted for Internship/Inplant training (2020-2021)

S.No	Register No.	Name of the student	Company Name
1	9917001050	C.Ponmani	Vadamalayan Hospitals Madurai
2	9917001054	P. Praveen	
3	9917001072	M.Subash	
4	9917001022	K. Dravid Kannan	Vadamalayan Hospitals Madurai
5	9917001066	Shynijasmin P	Clinbiocare Technology, Chennai
6	9917001018	Deepeeka R	
7	9917001088	Abitha Sri K	
8	9917001078	M. Vijayanthi	
9	9917001005	Ajitha Murugesan	Center for Bioscience and Nanoscience Research (CBNR) Coimbatore
10	9917001008	AntoTheodictaJefrina	
11	9917001032	Karunya Sri C.M	
12	9917001001	Abarna Radhakrishnan	Center for Bioscience and Nanoscience Research (CBNR) Coimbatore
13	9917001009	Antony Sherina.A	
14	9917001067	Siva Bharathi.V	
15	9917001044	Nadar AbelJoseDavidraja	Apex Biotechnolgy Training and Research Institute, Chennai
16	9917001046	S Narayanan	
17	9917001011	S Arul Joseph	
18	9917001028	P Jashin	
19	9917001086	Yaswanth J	Center for Bioscience and Nanoscience Research (CBNR) Coimbatore
20	9917001094	Y. Yeswanth Kumar	
21	9917001037	N. Lakshmanan	Apex Biotechnolgy Training and Research Institute, Chennai
22	9917001057	N. Ramar	
23	9917001055	Raghul R	KEMIN Industries South Asia Pvt. Ltd. Chennai
24	9917001012	Athmarishi	Clinbiocare Technology Chennai
25	9917001051	Pooja S	
26	9917001060	Sabitha T	
27	9917001084	Vijaya M	
28	9917001027	S. Janani	Clinbiocare Technology Chennai
29	9917001029	M. Karthick	Center for Bioscience and Nanoscience Research (CBNR) Coimbatore
30	9917001056	E. D. Ramanathan	
31	9917001108	S. Vignesh muthu	
32	9917001048	P. Padhma Priya	ClinbiocareTechnology, Chennai
33	9917001033	N.B. Kavyalakshmi	
34	9917001010	C.Anushiya Mary	
35	9917001068	A. Sivakkani	
36	9916001004	Abinaya.S. R	ClinbiocareTechnology, Chennai

37	9917001021	V.Dilaksha Mary	
38	9917001030	J. Karthigaiselvi	
39	9917001071	K.S. Souparnika	
40	9917001083	M.Vignesh Balan	Alpha Hospital & Research Center, Madurai
41	9917001052	K. Pradeep Kumar	
42	9917001006	A. Amal Raj	Phyco Spectrum Research Foundation, Chennai
43	9917001017	R. Deepak Selva Hariharan	
44	9917001061	S. Santhosh Krishnan	
45	9917001062	H. Saravana Sundar	
46	9917001091	S. Shruthi	ClinbiocareTechnology, Chennai
47	9917001059	B. Renuga Devi	
48	9917001013	Bala Varun S.	Center for Bioscience and Nanoscience Research (CBNR) Coimbatore
49	9917001014	BalaMurugan M.	
50	9917001085	A. Vishwa	
51	9917001020	Derina. J. Pearlin. D	AVANZ Bio Pvt.Ltd, Chennai
53	9917001019	Deepikaa V	Weill Cornell Medical College, Qatar
54	9917001064	P. Sharmila	Jawaharlal Nehru Tropical Botanical Garden and Research Institute. Trivandrum.
55	9917001099	R. Ghurupreya	
56	9917001103	K. Geetika Devi	
57	9917001074	K. Suriya Lakshmi	Clinbiocare Technology. Chennai
58	9917001047	S. Nivedhita	
59	9917001043	B. Mirunalinisha	
60	9917001101	SuvethaCinnakonda Janardhanan	ShreedharBhats Laboratory
61	9917001082	A.P. Vidhya Sri	
62	9917001058	Ramkumar A. K	Xcellogen Biotech Pvt Ltd
63	9917001096	M.Sivamunieswaran	Phyco Spectrum Research Foundation., Chennai
64	9917001098	A.Balamurugan	
65	9917001035	R. Kishore Kumar	
66	9916001073	M. Mohamed Arif	REXER PharmaPvt.Ltd, Hyderabad
67	9917001107	S. Jency Emi Carolin	
68	9917001042	A. Martina Jemimal	
69	9917001090	R. Karthika Chandran	

Details of students opted for Internship/Inplant training (2019-2020)

S. No	Register No.	Name of the student	Company Name
1	9916001019	S. Bhairavi	Uniq Technologies, Coimbatore
2	9916001029	Ch. Mohanrao	Uniq Technologies, Coimbatore

3	9916001031	S. Deepika	Uniq Technologies, Coimbatore
4	9916001113	Shaik Muhammad Sohail	Nandi Milk Products Pvt.Ltd. Kurnool, Andrapradesh
5	9916001143	R. Vigneshperumal	AavinCo operative milk producers. Pudukkottai
6	9916001111	S. Sathiyakumar	AavinCo operative milk producers. Pudukkottai
7	9916001062	M. Lingeswari	Vadamalayan Hospital, Madurai
8	9916001147	R. Yuvasri	Vadamalayan Hospital, Madurai
9	9916001163	M.Prakash	AavinCo operative milk producers. Pudukkottai
10	9916001151	Sarah Afreen B	Phyco Spectrum Algal Research Centre, Chennai
11	9916001071	Miruthula R	Vadamalayan Hospital, Madurai
12	9916001100	Ramalakshmi G	Phyco Spectrum, Chennai
13	9916001134	Swathi V	Vadamalayan Hospital, Madurai
14	9916001101	Ramya Krishnaveni M	Phyco Spectrum Algal Research Centre, Chennai
15	9916001120	Sindhe Lakshmi Priya	Janani Biotech, Theni
16	9916001157	Harshi S	Phyco Spectrum Algal Research Centre, Chennai
17	9916001091	Preethika M	ARMATS Biotek
18	9916001082	Oviya S	ICAR- Sugarcane Breeding Institute. Coimbatore.
19	9916001162	Uma Maheswari D	Medall Health Care Pvt.Ltd.
20	9916001144	Vignesh S	Green Life Biotechnology Lab
21	9916001149	Murugananth K	Green Life Biotechnology Lab
22	9916001094	Premkumar K	Green Life Biotechnology Lab
23	9916001001	Abarna E	Vadamalayan Hospital, Madurai
24	9916001117	Shekar Priyadharshini	Vadamalayan Hospital, Madurai
25	9916001011	F AngelinJenit	Vadamalayan Hospital, Madurai
26	9916001120	S Lakshmi Priya	AMI Bioscience, Coimbatore.
27	9916001030	Darszhan B	Averin Biotech Pvt Ltd. Hyderabad
28	9916001156	IlakiyaSuruthi	NIT, Trichy
29	9916001105	Roobamathi	Aaranya Biosciences, Chennai
30	9916001122	Sophie	Phyco Spectrum Algal Research Centre, Chennai
31	9916001159	Sahana Parveen	Phyco Spectrum Algal Research Centre, Chennai
32	9916001138	R. Vaishnavisruthi	AKAY Spices. Cochin
33	9916001139	K. Vandhana	AKAY Spices. Cochin
34	9916001085	Ponraj R	Green life biotech, Ramachiyampalayam, Tamil Nadu

35	9916001096	Raja Ganapathy K	Green life biotech, Ramachiyampalayam, Tamil Nadu
36	9916001110	Sathish T	Green life biotech, Ramachiyampalayam, Tamil Nadu
37	9916001058	Keerthika K	N. Ramavarier Ayurvedic Foundation, Madurai
38	9916001008	Akila S	N. Ramavarier Ayurvedic Foundation, Madurai
39	9916001057	Kayalvizhi. M	N. Ramavarier Ayurvedic Foundation, Madurai
40	9916001041	Hemelatha A	N. Ramavarier Ayurvedic Foundation, Madurai
41	9916001153	Shreen Taj S	N. Ramavarier Ayurvedic Foundation, Madurai
42	9916001046	Jayashree. S	Vadamalayan Hospitals. Madurai
43	9916001036	ElakkiyaRuba S	Dharani Sugars & Chemicals. Vasudevanallur.
44	9916001027	Chandra Murali B	Aavin Pvt. Ltd, Pudukkottai
45	9916001044	Inbajothi D	International Institute of Renewable Energy, Coimbatore
46	9916001138	R. Vaishnavisruthi	AKAY Spices. Cochin
47	9916001037	S. Eugith palcy	Dharani Sugar & Chemicals. Vasudevanalur
48	9916001048	M. Jhanani	Vadamalayan Hospital. Madurai
49	9916001128	T.Sreeshma Revathi	Vadamalayan Hospital. Madurai
50	9916001074	I. Mohammed Basheeth Ali	Vadamalayan Hospital. Madurai
51	9916001017	Bala Kiruthika. B	Phyco Spectrum Algal Research Centre, Chennai
52	9916001016	M.Athimeera	Meenakshi Mission Hospital and Research Centre. Madurai
53	9916001024	Bincy Benny	Dinesh Foods. Kannur. Kerala
54	9916001012	M.Anusuya	Meenakshi Mission Hospital and Research Centre. Madurai
55	9916001021	Bhoobalan.D	Phycospectrum. Chennai
56	9916001053	Kamalraj.R	Phyco Spectrum Algal Research Centre, Chennai
57	9916001137	T. Tvareta	AVN Ayurveda Formulation. Pvt. Ltd. Madurai
58	9916001155	N.S.Supraja	AVN Ayurveda Formulation. Pvt. Ltd. Madurai

59	9916001083	R.Pavithran	Greenlife biotech lab. Coimbatore
60	9916001081	U. Nivas	Greenlife Biotech. Coimbatore
61	9916001119	P. Silamparasan	Greenlife Biotech. Coimbatore
62	9916001019	S. Bhairavi	Phyco Spectrum Algal Research Centre, Chennai
63	9916001126	A. Sowndariya	Vadamalayan Hospital. Madurai
64	9916001070	S. Marimuthu	Vadamalayan Hospital. Madurai
65	9916001039	S. Harishmitha	Phyco Spectrum Algal Research Centre, Chennai
66	9916001051	B. Kalanandhini	Vadamalayan Hospital. Madurai
67	9916001003	K. Abinaya	Vadamalayan Hospital. Madurai
68	9916001046	S. Jayashree	Vadamalayan Hospital. Madurai
69	9916001106	Rounack Cherian	AVT natural products.Cochin
70	9916001033	Dhanush Damodaran	AVT natural products.Cochin
71	9916001006	G. Abisha	ARMATS Biotek. Chennai
72	9916001007	Adhvitha premanand	Softgel Health care Pvt. Ltd
73	9916001011	F. Angelin Jenit	AMI Bioscience
74	9916001068	R. Mari Selva Sundari	AMI Bioscience
75	9916001050	A. Kalaiyarasan	Vadamalayan Hospital. Madurai
76	9916001053	R. Kamalraj	Vadamalayan Hospital. Madurai
77	9916001080	R.K. Nithish Ram	Vadamalayan Hospital. Madurai
78	9916001069	S. Maria Agnes Raganzia	AMI Bioscience
79	9916001141	B.Vennila Sankari	ARMATS Biotek
80	9916001125	S.R. Sowmya	ARMATS Biotek
81	9916001086	M. Pooja Vaisnavi	ARMATS Biotek
82	9916001157	Harishi .S	Phyco Spectrum Algal Research Centre, Chennai
83	9916001040	K. Harsitha	Phyco Spectrum Algal Research Centre, Chennai
84	9916001151	Sarah Afreen	Phyco Spectrum Algal Research Centre, Chennai
85	9916001100	Ramalakshmi	Phyco Spectrum Algal Research Centre, Chennai
86	9916001101	Ramya Krishnaveni. M	Phyco Spectrum Algal Research Centre, Chennai
87	9916001054	M. Karthik	Phyco Spectrum Algal Research Centre, Chennai

88	9915001043	Keeran Sethupathi S	Vadamalayan Hospital ,Madurai
89	9916001112	Selvakeerthana M	Shri Ramyaa Multi Speciality Hospital, Trichy
90	9916001055	Karthikadevi. S	International Institute of Renewable Energy, Coimbatore
92	9916001150	Abinaya R	International Institute of Renewable Energy, Coimbatore
93	9916001013	Arun Lakshmi T	International Institute of Renewable Energy, Coimbatore
94	9916001015	Atchaya R	International Institute of Renewable Energy, Coimbatore
95	9916001032	Dhana Pradeeba V	International Institute of Renewable Energy, Coimbatore
96	9916001132	Suguna. T	International Institute of Renewable Energy, Coimbatore

Criterion 3	Course Outcomes and Program Outcomes	175
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3.1. Establish the correlation between the courses and the Program Outcomes (POs) & Program Specific Outcomes

Course Outcomes (COs) were prepared for all the courses available in the curriculum and they were included in the program curriculum and syllabi book. The core Courses and the respective Course Outcome (as per SAR guidelines) are listed in Table 3.1.

Semester	Course code/ Name	Course Outcomes
1.	BIT18R101/ Biology for Engineers	1. Understand the fundamentals of cell structure and cell cycle 2. Understand the classification and functions of biomolecules 3. Understand the basic molecular functions such as replication, transcription and translation 4. Describe the underlying concepts of infection and immunity. 5. Explain various applications of biology
2.	BIT18R102/ Cell Biology and Genetics	1. Distinguish prokaryotic cell from eukaryotic cell and understand the structure and function of different parts of a eukaryotic cell 2. Explain the mitosis and meiosis cell division and the consequences 3. Understand the mechanism of transport across the cell membrane 4. understand the discovery of Mendelian laws 5. Explain about sex determination
3.	BIT18R271/ Microbiology	1. Describe the diversity, classification and identification of microorganisms. 2. Explain the structure and function of bacterial, fungal and algal cells and viruses 3. Explain the bacterial physiology and basic genetic systems of bacteria, bacteriophages and plasmids. 4. Demonstrate skills in medical microbiology and understand the host-pathogen and the applications of antibiotics. 5. Explain how microorganisms interact with their environment.
4.	BIT18R273/ Molecular Biology	1. Understand the role of DNA as genetic material, organization and packing of genes in chromosomes of both prokaryotic and eukaryotic systems 2. Describe the process of replication, repair and recombination of DNA in both prokaryotes and eukaryotes. 3. Explain the structure and function of RNA polymerase and how describe their role in transcription 4. Understand the concept of post-transcriptional modification, splicing, various patterns of gene expression 5. Understand genetic code, types of ribosomes and RNAs and their involvement in the translational machinery of an organism
5.	BIT18R372/ Genetic Engineering	1. understand the role of restriction enzymes and ligases in recombinant DNA technology 2. Describe the methods and factors involved in creating recombinant DNA molecules. 3. Explain the cloning of a gene in an expression vector and understand the various protein purification techniques 4. Explain the construction and screening of cDNA and genomic

		libraries. 5. Describe the application of recombinant DNA technology in animal, plant and industrial biotechnology.
6.	BIT18R374/ Immunology	1. Understand the development and differentiation of hematopoietic stem cell, synthesis and mode of action of complements and anatomy of lymphoid organs 2. Explain the structure, function, and genetic regulation of antibody and, the development, maturation and activation of B-lymphocytes. 3. Describe the process of antigen processing and presentation 4. Explain the development, maturation and mechanism of activation of T cells and the role of cytokines in immune response 5. Describe the molecular mechanisms of Graft rejection, mode of action of immunosuppressive drugs, and autoimmune diseases
7.	BIT18R471/ Bioseparations: Principles and Applications	1. Understand the fundamental physical and chemical properties of biological materials and the principles of their separation and purification. 2. Explain the various principles that underlie major unit operations used in bio separations such as settling, evaporation, centrifugation, and membrane filtration. 3. Explain the principles of protein precipitation, aqueous two-phase extraction, adsorption and chromatography 4. Describe the various concepts of final bioproduct formulation and finishing operations such as crystallization, drying and lyophilization 5. Discuss various processes involved in the recovery and purification of bio-molecules.
8.	BIT18R402/ Animal Biotechnology	1. Understand the use of various animal cell culture media and techniques used in animal cell culture. 2. Describe the expression vectors, gene transfer methods and production of recombinant products using animal cells. 3. Apply embryonic methods for basic research to improve animal and human healthcare. 4. Apply reproduction methods with particular reference to gamete and embryo manipulation techniques, production of transgenic animals and cloning 5. Design strategies to manipulate genes for the improved livestock production.

For all the courses in curriculum, course outcomes and their level are clearly discussed in the curriculum book. The printed version of curriculum and syllabi book for B.Tech. Biotechnology is distributed to all the students of UG biotechnology and soft copy of the same is available in university website. In addition to that the COs are also included in the following documents:

1. In all Sessional Examination Question papers
2. End Semester Examination Question papers

3. Course Plan of individual courses included in the course file and distributed to the students
4. Assessment Record

For reference, a sample copy of the question paper framed during the year 2019-2020 for the course BIT18R372-Genetic Engineering is scanned and placed in Figure 3.1a. The Question paper includes Blooms taxonomy, pattern/ level with mark allocation and mapping.

Figure 3.1b represents the sample course plan prepared for course material file indicating the course outcome, program outcome, mapping and other details related to the course content.

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KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION

(Deemed to be University)

Anand Nagar, Krishnankoil – 626 126.

END SEMESTER EXAMINATIONS - NOV/DEC 2019

BIT18R372-Genetic Engineering

(Common To All Sections)

Time : 180 Minutes

Degree: B.Tech.

Maximum : 100 Marks

(Answer ALL Questions of PART A and PART B)

Assessment Pattern as per Bloom's Taxonomy:

Remember	Understand	Apply	Analyze	Evaluate	Create	Total
6	12	34	32	64	32	180

PART – A (10 × 2 = 20 Marks)		Pattern	Mapping COs	
1.	Differentiate DNA and RNA polymerase	Remember	CO1	
2.	What is the principle of restriction mapping?	Understand	CO1	
3.	Highlight the characteristic features of a vector	Understand	CO2	
4.	Outline the basic criteria for the design of linkers	Understand	CO2	
5.	How protein expression is induced by IPTG	Remember	CO3	
6.	Illustrate the principle of western blotting	Understand	CO3	
7.	Give an account on screening of genomic library by DNA probes	Understand	CO4	
8.	What is genome editing?	Understand	CO4	
9.	Differentiate mRNA and cDNA	Remember	CO5	
10.	How knock out animals used in research?	Apply	CO5	
PART – B (5 × 16 = 80 Marks)		Pattern	Mapping COs	
11a	Elaborate an essay on the isolation & purification of DNA	Evaluate	CO1	(16)
[OR]				
11b	Describe the safety guidelines to be followed for research with recombinant DNA	Evaluate	CO1	(16)
12a	Describe the structural features of insect vectors	Analyze	CO2	(16)
[OR]				
12b	Illustrate and narrate the features of cloning strategies	Analyze	CO2	(16)
13a	Summarize the principle and applications of different types of PCR	Evaluate	CO3	(16)
[OR]				
13b	Discuss the principle and application of size exclusion and affinity chromatography for the purification of recombinant proteins	Evaluate	CO3	(16)
14a	Discuss how western blotting is applied in the characterization of recombinant clones	Create	CO4	(16)
[OR]				
14b	Elaborate in detail the technique and application of genomic library construction	Create	CO4	(16)
15a	Discuss the principle and application of recombinant DNA technology for pharmaceutical industry	Apply	CO5	(16)
[OR]				
15b	Describe the technique and application of transcriptome analysis	Apply	CO5	(16)

Assessment Summary:

COs	Remember	Understand	Apply	Analyze	Evaluate	Create	Total
CO1	2	2	0	0	32	0	36
CO2	0	4	0	32	0	0	36
CO3	2	2	0	0	32	0	36
CO4	0	4	0	0	0	32	36
CO5	2	0	34	0	0	0	36
TOTAL	6	12	34	32	64	32	180

Course Plan for Genetic Engineering (BIT18R372)

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION
ANAND NAGAR, KRISHNANKOIL- 626 126
DEPARTMENT OF BIOTECHNOLOGY
ODD SEMESTER 2020-2021
COURSE PLAN

SUBJECT WITH CODE	Genetic Engineering/ BT18R372
COURSE	B. Tech Biotechnology
SEMESTER / SEC	V- ALL
COURSE CREDIT	5
COURSE FACULTY	Dr. S. Ram Kumar Pandian Dr. T. Kathiresan
COURSE COORDINATOR	Dr. T. Kathiresan
MODULE COORDINATOR	Dr. T. Kathiresan
PROGRAMME COORDINATOR	Dr. B. Vairud
HOD	Dr. A. Mohankannan

Prerequisite:

Basic understanding of biology and genetics at higher secondary level is required.

Course description:

Genetic Engineering is that field which is related to genes & DNA. Genetic engineering is used by scientists to improve or modify the traits of an individual organism. The goal of this course is to learn the core concepts of genetic modifications that is applied in human health care. Moreover, these basics will facilitate further learning in molecular modifications through advanced techniques.

Career Opportunities:

This course will develop basic problem solving and analytical skills that are vital to the understanding of life sciences that makes them employable in various health care industries.

Course Outcomes:

At the end of the course the students would be able to,

CO1	Summarize the enzymes involved in cloning and restriction enzymes in recombinant DNA technology
CO2	Describe different types of vectors such as plasmid, cosmid, phage and YAC
CO3	Explain the cloning of a gene in different types of vectors and its applications
CO4	Illustrate construction and screening of cDNA and genomic libraries
CO5	Describe cloning and transformation of Ti vectors in plants

1

PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO and PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PSO1	H			H	M	M		H		M	M	
PSO2	H			M	M	M		M		M	M	
PSO3	M			M	M	M		M		M	M	
PSO4	M			M	M	M		M		M	M	

CO and PO Mapping:

COs	POs	1	2	3	4	5	6	7	8	9	10	11	12
CO 1: Summarize the enzymes involved in cloning and restriction enzymes in recombinant DNA technology						H		H	M			M	
CO 2: Describe different types of vectors such as plasmid, cosmid, phage and YAC.				H				H	M	M			
CO 3: Explain the cloning of a gene in different types of vectors and its applications				H				H	M	M	H	H	M
CO4: Illustrate construction and screening of cDNA and genomic libraries				H				H	M				
CO5: Describe cloning and transformation of Ti vectors in plants				H				H	M	M	H	H	M

S-Strong Correlation, M-Medium correlation, L-Low correlation

3

Program Specific Objectives (PSOs)

PSO1: Identify and analyze the problems related to biopharmaceutical production, agricultural production and bioinformatics, and develop solutions to these through appropriate methods, aided by their knowledge of engineering.

PSO2: Apply their knowledge and analytical abilities to the investigation of complex problems in the manufacture of biological products; and in the prevention, diagnosis and treatment of diseases, using cutting-edge technologies, to promote the health and well-being of society.

PSO3: Recognize the need for a clean environment and optimize use of natural resources for sustainability, either individually or as a team, governed by ethical considerations.

PSO4: Manage various projects in biotechnology using effective written and oral communication skills, with the firm conviction that learning for life is the key to their functioning as intelligent and responsible engineers.

Program Outcomes (POs)

PO1	Graduates will be able to: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problem: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for, sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

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Books:

S.No	Name of the Book	Author/Publisher/Year	Companion websites
Text	1. Principles of Gene Manipulation, an Introduction to Genetic Engineering	Old, R.W., Primrose, S.B., Blackwell Science Publications, Oxford, 5th Edition, 1993	https://www.ncbi.nlm.nih.gov/books/NBK21473/ http://www.sparknotes.com/biology/
	2. An introduction to Genetic Engineering	Desmond S.T. Nicholl, Cambridge University Press, 3rd Edition, 2008.	https://www.ncbi.nlm.nih.gov/books/NBK21914/ https://www.ncbi.nlm.nih.gov/books/NBK9338/
Reference	3. Gene Cloning and DNA analysis-An Introduction	Brown, T.A., Blackwell Science Ltd, Oxford, 2nd Edition, 2001	https://www.ncbi.nlm.nih.gov/books/NBK22183/ https://www.ncbi.nlm.nih.gov/books/NBK21248/
	4. From Genes to Genomes	Jessy W. Dale and Malcolm von Schantz, 2002, John Wiley and sons Publications - 353 pages	https://www.ncbi.nlm.nih.gov/books/NBK22212/ https://www.ncbi.nlm.nih.gov/books/NBK7112/
	5. Molecular Biology of the Gene	Watson, J.D., Hopkins, W.H., Roberts, J.W., Swier, J.A., Weiner, A.M., Scientific American Book, New York, 3rd Edition, 1987	https://www.ncbi.nlm.nih.gov/books/NBK21914/ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4067464/
	6. Techniques for Engineering Genes	Butterworth-Heinemann, Elsevier Publication, Biotechnology by Open Learning, Reprint 2004.	

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6.	Gene Biotechnology	S.N.Jardani, Himalaya Publishing House, 2 nd Edition, 2005 (Reprint)	
7.	Genetic Engineering and its Applications	P.Joshi, "Genetic Engineering and its Applications", Agrobios, 2 nd Edition, 2007	
8.	Genetic Engineering	Sastrya Mitra, "Genetic Engineering", Macmillan India Ltd, 1 st Edition, 2001.	

Web Resources:

S. No	Unit	Website
1.	I	http://www.colostate.edu/books/genetics/biotech/enzymes/index.html http://www.sciencedirect.com/sci http://www.colostate.edu/books/genetics/biotech/enzymes/index.html
2.	II	http://www.colostate.edu/page113.htm http://www.scribd.com/doc/100000000/Genetic-Engineering-Principles http://www.scribd.com/doc/100000000/Genetic-Engineering-Principles
3.	III	http://www.colostate.edu/page113.htm http://www.scribd.com/doc/100000000/Genetic-Engineering-Principles http://www.scribd.com/doc/100000000/Genetic-Engineering-Principles
4.	IV	http://www.colostate.edu/page113.htm http://www.scribd.com/doc/100000000/Genetic-Engineering-Principles http://www.scribd.com/doc/100000000/Genetic-Engineering-Principles
5.	V	http://www.colostate.edu/page113.htm http://www.scribd.com/doc/100000000/Genetic-Engineering-Principles http://www.scribd.com/doc/100000000/Genetic-Engineering-Principles

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Web links for similar courses offered at other universities:

S. No	Course title	Name of the University	Website
1.	Genetics	Cambridge University	www.gen.cam.ac.uk
2.	Genetics Engineering	Harvard University	genetics.med.harvard.edu/faculty.htm
3.	Biomolecular Genetic Engineering	University of California	engineering.ucr.edu/bio/biotech/biomolecular-genetic-engineering
4.	Genetic Engineering	Purdue University	www.purdue.edu/catalog/science/plan_aQStudy/BiologicalSci.../genetics.htm

Magazine/Journals:

- The Journal of Cell Biology: JCB
- Nature Cell Biology
- European Journal of Cell Biology
- Trends in Cell Biology
- Cell Biology International
- Journal of Genetics
- Nature Genetics
- Journal of Medical Genetics

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Topic No	Topic Name	No. of Period	Cumulative no. of periods
Unit-1 BASICS OF RECOMBINANT DNA TECHNOLOGY			
1.	Organization of genes in a chromosome	1	1
2.	Genetic elements that control gene expression	2	3
3.	Purification and Separation of Nucleic Acids	2	5
4.	Restriction and modifying enzymes	2	7
5.	Restriction mapping	2	9
6.	Safety guidelines of recombinant DNA research	2	11
Unit-2 CREATION OF RECOMBINANT MOLECULES			
7.	Characteristics of plasmid and phage vectors	2	13
8.	Prokaryotic and eukaryotic expression vectors - Insect, yeast and mammalian vectors	2	15
9.	Method of creating recombinant DNA molecules	2	17
10.	Cloning strategies- restriction digestion - blunt and cohesive end ligation	2	19
11.	design of linkers and adaptors - cloning after homopolymer tailing	2	21
12.	cloning of genes in correct reading frame in expression vector, Promoter problem, Couak sequences	2	23
Unit-3 EXPRESSION OF RECOMBINANT PROTEIN			
13.	Strategies for cloning PCR products	2	25
14.	Primer designing- Creation of restriction sites	2	27
15.	Types of polymerases used in PCR	1	28
16.	Factors involved in expression of cloned genes, IPTG induction, inclusion bodies	2	30
17.	Strategies for purification of recombinant proteins	2	32
18.	Synthetic Biology: Chemical synthesis of DNA - E. coli and Mycoplasma	2	34

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Unit-4 CONSTRUCTION & SCREENING OF LIBRARIES			
19.	Characterization of recombinant clones by Southern & Western Blotting	3	37
20.	Characterization of recombinant clones by Northern Blotting & PCR analysis	2	39
21.	Construction of cDNA libraries - Construction of genomic libraries	3	42
22.	Screening of libraries with DNA probes and antisera	2	44
Unit-5 APPLICATION OF RECOMBINANT DNA TECHNOLOGY			
23.	Methods of gene transfer: Gene transfer to plants	2	46
24.	Methods of gene transfer - Gene transfer to animals	2	48
25.	Applications of recombinant technology in pharmaceutical industry & medicine	2	50
26.	Transgenic and knockout animals	2	52
27.	Genome editing techniques	2	54
28.	Gene expression profiling: transcriptome analysis	2	56

Individual Assignment:

S. No	Assignment/Tutorials	Topics	CO
1.	Assignment-I	Safety guidelines of recombinant DNA research	1
2.	Assignment-II	Chromosome walking	2
3.	Assignment-III	DNA Finger printing	3
4.	Assignment-IV	Applications of recombinant technology	4
5.	Assignment-V	Practice Problems in Site directed mutagenesis	5

Assessment Plan for the Course:

S.No	Course outcomes	Measurement Tools	Time of Measurement
1.	CO 1,2	Assignment, Quiz, SE-I, End Semester Examination	September 26, 2020 October 5, 2020
2.	CO 2,3	Assignment, Quiz, SE-I, End Semester Examination	September 26, 2020 October 5, 2020

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3.	CO 3,4	Assignment, Quiz, SE-II, End Semester Examination	October 30, 2020 November 26, 2020
4.	CO 4,5	Assignment, Quiz, SE-II, End Semester Examination	October 30, 2020 November 26, 2020

Sample Measurement Tools:
Assignment, Quiz, Class Test

Related Projects (If any):

- Expression of protein using western blotting
- Transfection of genes to mammalian cells

Content Delivery methods:

- Black Board, LCD /PPT, Smart board/ Easy class

Assessment methods:

	Direct	Indirect
Examinations		Course exit surveys
Assignments		Quiz
Seminars		Tutorials

Online Course:

S.No	Course	Link
1.	DNA: Biology's Genetic Code EdX	https://www.edx.org/course/bio-biology-genetic-code-rxam-bioc100-2x-1
2.	Genetic engineering of vectors Coursera	http://www.coursera.org/learn/genetics/lecture/genetic-engineering-of-vectors-pt

Certification courses (If any):

MIT –Open course- Biochemistry

http://study.com/online_biochemistry_courses.html

Test Portion:

S.No	Test	Units
1.	Sessional Exam I	1&2
2.	Sessional Exam II	3&4
3.	End Semester Exam	All 5

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Assessment methodologies

Direct	Indirect
Examinations	Course Exit Survey
Observation	
Viva Voce	Quiz

Test Portion

S. No	Test	Experiments
1	Online quiz	Weekly experiments
2	Model Test	All experiments
3	End semester examinations	All experiments

S. Ram Kumar Paudyal

Dr. S. Ram Kumar Paudyal
Course Teacher

T. Kathiresan

Dr. T. Kathiresan
Course coordinator

B. Vanavil

Dr. B. Vanavil
Programme Coordinator

T. Kathiresan

Dr. T. Kathiresan
Module coordinator

A. Muthukumaran

Dr. A. Muthukumaran
HoD Biotechnology

Genetic Engineering Laboratory

List of Experiments

1. Isolation of chromosomal DNA from bacteria
2. Sub-cloning of a gene in *E. coli* – (restriction digestion, gel isolation and ligation, transformation and screening of recombinants)
3. Polymerase Chain Reaction
4. Restriction digestion
5. Isolation of RNA
6. Southern blotting
7. Northern blotting
8. Western blotting
9. Colony hybridization
10. Site-directed mutagenesis

Lesson Plan

S. No	Experiments	No. of Periods	Cumulative No. of Periods	Content Delivery
1.	Isolation of chromosomal DNA from bacteria	3	3	Class room teaching, Experiment demonstration, Power point presentation, Virtual Lab
2.	Sub-cloning of a gene in <i>E. coli</i>	3	6	
3.	Polymerase Chain Reaction	3	9	
4.	Restriction digestion	3	12	
5.	Isolation of RNA	3	15	
6.	Southern blotting	3	18	
7.	Northern blotting	3	21	
8.	Western blotting	3	24	
9.	Colony hybridization	3	27	
10.	Site-directed mutagenesis	3	30	

Assessment Plan for the course

S. No	Course Outcomes	Measurement Tools
1	CO 1	Lab practice observation, Observation Note, Viva Voce, Model Examination, End Semester Examination
2	CO 2	
3	CO 3	
4	CO 4	
5	CO 5	

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Table 3.2a Course Articulation Matrix (2018 Regulation)

Course Outcome		Program Outcome												PSO		
Course Code	Statement	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
BIT18R101/ Biology for Engineers/ 1st semester																
BIT18R101.1	Describe the fundamentals of cell structure and cell cycle	1	1		1											
BIT18R101.2	Understand the classification and functions of biomolecules	1	2		1											
BIT18R101.3	Elaborate the basic cellular mechanisms such as replication, transcription and translation	1			1											
BIT18R101.4	Describe the underlying concepts of infection and immunity	1	2		1											
BIT18R101.5	Explain various applications of biology	2	1		1											
BIT18R102/ Cell Biology and Genetics/ 2nd semester																
BIT18R102.1	Distinguish prokaryotic cell from eukaryotic cell and describe the structure and function of different parts of a eukaryotic cell	1			1								1			
BIT18R102.2	Explain the mitosis and meiosis cell division and the consequences	1			1								1			
BIT18R102.3	Demonstrate the cell membrane transport mechanism	2			1		1						1			
BIT18R102.4	Appreciate the discovery of Mendelian laws	3		1	1											
BIT18R102.5	Describe about the sex determination	3		1			1						1			
BIT18R271/ Microbiology/ 3rd semester																
BIT18R271.1	Describe diversity, classification and identification methods of microorganisms	1	1	1	1	1										
BIT18R271.2	Explain the structure and function of bacterial cell including other organisms like fungi, viruses, algae etc.	1	1		1	1										

BIT18R271.3	Explain the bacterial physiology and basic genetic systems of bacteria, bacteriophage and plasmids.	1	1	1	1				3							
BIT18R271.4	Demonstrate skills in medical microbiology and pathogen interaction with the host, identification and application of antibiotics.	1	1	1		1			1	1						
BIT18R271.5	Demonstrate the knowledge as to how microorganisms interact with their environment and interaction between humans and microorganisms					1	1		1							
BIT18R273/ Molecular Biology/ 4th Semester																
BIT18R273.1	Summarize DNA as a genetic material, organization and packing of genes in chromosomes of both prokaryotic and eukaryotic systems	3									2		2			
BIT18R273.2	Describe replication, repair and recombination of DNA, in both prokaryotic and eukaryotic organism	3				2					2		3			
BIT18R273.3	Explain the structure and function of RNA polymerase and how they are involved in transcription	3				3					2		3			
BIT18R273.4	Understand the concept of post-transcriptional modification, splicing, various patterns of gene expression	3			2	3					2	2	3			
BIT18R273.5	Understand genetic code, types of ribosome, RNA and how they are involved in translational machinery of an organism	3			2	3					2	2	3			
BIT18R372/ Genetic Engineering/ 5th Semester																
BIT18R372.1	Summarize the enzymes involved in cloning and restriction enzymes in recombinant DNA technology	3	3				2									
BIT18R372.2	Describe the methods and factors involved in	3					2	2								

	creating recombinant DNA molecules																
BIT18R372.3	Explain the cloning of a gene in vectors, expression and purification of proteins and its applications	3	2				2					2	3				
BIT18R372.4	Illustrate construction and screening of cDNA and genomic libraries	3					2	2		2							
BIT18R372.5	Describe the application of recombinant DNA technology in animal, plant and industry	3	3	2		3	2		3			2					
BIT18R374/ Immunology/ 6th Semester																	
BIT18R374.1	Understand the development and differentiation of hematopoietic stem cell, synthesis and mode of action of complementary molecules and anatomy of immune related organ	2	3	2		2	2		3			2	2				
BIT18R374.2	Explain structure, function, and genetic regulation of antibody and B-Lymphocytes development, maturation and their activations	3	2		2	2	2		2		2	2					
BIT18R374.3	Describe various mechanisms and different types of antigen presenting cells and how to regulate mechanism of phagocyte and macrophage	2	2			3	2				2						
BIT18R374.4	Explain the different types development, maturation and mechanism of activation of T cell and various cytokine role in immune response	2	2		2	3	2		2			2	2				
BIT18R374.5	Describe molecular mechanism of Graft rejection, mode of action of immunosuppressive drugs, and autoimmune diseases	3	2		2	3	2		3				2				
BIT18R471/ Bioseparations: Principles and Applications/ 7th Semester																	
BIT18R471.1	Recognize the fundamental understanding of physical and chemical properties of biological materials and their separation and purification	3	3	2	3	2											
BIT18R471.2	Explain the various principles that underlie major unit operations used in bioseparations	3		2		2											

	such as settling, evaporation, centrifugation, and membrane filtration.															
BIT18R471.3	Explain the principles of protein precipitation, aqueous two phase extraction, adsorption and chromatography	3		2		2										
BIT18R471.4	Describe the various concepts of final bioproduct formulation and finishing operations such as crystallization, drying and lyophilization	3	3			2										
BIT18R471.5	Sketch different types of process to recover and purify the bio-molecules	3	3	3				3		2						
BIT18R402/ Animal Biotechnology/ 8th Semester																
BIT18R402.1	Understand animal cell culture media and animal cell culture techniques	2											3			
BIT18R402.2	Describe expression vectors, gene transfer methods and production of recombinant products using animal cells	2				2										
BIT18R402.3	Apply embryonic methods for basic research to improve animal and human healthcare	3	3	2	3											
BIT18R402.4	Apply reproduction methods with particular reference to gamete and embryo manipulation techniques, production of transgenic animals and cloning	3	3		3							2				
BIT18R402.5	Design strategies to manipulate for improvement of livestock production	3	3	3			2					2				

Table 3.2b Course Articulation Matrix (2013 Regulation)

S. No	Course Code/ Name	Course Outcomes	1	2	3	4	5	6	7	8	9	10	11	12
1.	BIT103/ Cell Biology and Genetics	Distinguish prokaryotic cell from eukaryotic cell and describe the structure and function of different parts of a eukaryotic cell	2		3					3				
		Explain the mitosis and meiosis cell division and the consequences			3		3	2		3		3		
		Explain different types of microscopes and their main uses	3				3					3		3
		Appreciate the discovery of Mendelian laws	3					2	3					3
		Describe human chromosome and basis of genetic diseases		3				3			3		2	
2.	BIT209/ Molecular Biology	Summarize DNA as a genetic material, organization and packing of genes in chromosomes of both prokaryotic and eukaryotic systems	3	-	-	-	-	2	-	-	-	2	-	-
		Describe replication, repair and recombination of DNA, in both prokaryotic and eukaryotic organism	3	-	-	-	-	2	-	2	-	3	-	-
		Explain the structure and function of RNA polymerase and how they are involved in transcription with cap formation, splicing and polyadenylation	3	-	-	-	-	2	-	3	-	3	-	-
		Understand genetic code, types of ribosome, RNA and how they are involved in translational machinery of an organism	3	-	-	-	-	2	-	3	-	3	-	-
		Illustrate various molecular biological techniques such as Southern, Northern and western blotting, PCR types, and next generation sequencing	3	-	-	3	2	2	2	2	2	2	-	2
3.	BIT214/ Analytical Techniques In Biotechnology	Describe the working principles of pH meter and estimation of macromolecules	3						2	2				
		Explain the principles and instrumentation of spectroscopy	3						2	2				
		Describe the principles of centrifugation methods				3			2	2				
		Classify separation methods	3						2	2				
		Understand the principles of chromatography	3							2		2		
4.	BIT 211/ Principles of	Describe the role of biomolecules and their applications	3	3	2									
		Calculate the pH of required buffers	3	2	3		2							

	Biochemistry	Classify vitamins and their deficiency symptoms	2		2		2						3	
		Compare the structures of amino acids and lipids	3	2			2							
		Explain the role of hydrogen bonds in DNA structure	2		2		2							
5.	BIT 281/ Biochemistry Laboratory	Explain the concept of pH	3					2						
		Perform calibration of pH meter and colorimeter	3		2									
		Prepare the required buffers	3		2									
		Identify unknown amino acids from titration curves	2	3										
		Analyze carbohydrates, lipids and amino acids qualitatively and quantitatively	2		3	2								
6.	BIT 283/ Microbiology Laboratory	Prepare nutrient agar media and pour in Petri plates	2				2	3	3		2			
		Stain and differentiate between gram positive and gram-negative bacteria	3			2	2	3	3	2	2	2		
		Perform serial dilution and plating	3					3	2					2
		Perform single colony streaking	3	2		2	2	3	2					
		Draw and interpret a growth curve of bacterial culture	3					3	3		2			2
7.	BIT286/ Cell and Molecular Biology Laboratory	Observe sub-cellular organelles under the microscope	2				3							
		Visualize DNA bands in agarose gels	2		3									
		Isolate plasmid DNA from bacteria	2		3									
		Isolate genomic DNA from bacteria and plant	2		3									
		Prepare competent cells for transformation	2		3		3							
8.	CHE 252/ Unit Operations	Explain the phenomena of fluid statics and dynamics and their applications	3			3				2			2	
		Describe the principles of mixing & agitation and its applications	3			3				2			2	
		Explain the concepts of filtration & sedimentation and its applications	3			3				2			2	
		Describe the mechanism of heat transfer	3			3							2	
		Discuss heat exchangers used in process industries	3			3				2			2	
9.	BIT203/ Bioenergetics and Metabolism	Describe the fundamental concepts of biochemistry and their implications for biology	3	3		2	2							
		Write the pathways involved in the synthesis and regulation of macromolecules	3	3	2		2							

		Explain the role of enzymes in biosynthesis	3		2		2							
		Discuss the metabolic disorders of nucleic acids			2		2							
		Summarize the cell metabolism and various reactions	3	2			2							
10.	BIT205/ Industrial Biotechnology	Illustrate the screening procedures of microbes of industrial importance	3		2					2		3		
		Explain the medium requirements for fermentation processes	2	3						3				3
		Compare various types of fermentation processes		3		2		3	2			2		
		Sketch and describe the production of industrially important products	3	3				3		2	3			
		Discuss the production of microbial enzymes, vaccines and microbial transformations	3	3		2			3	3			2	3
11.	BIT215/ Bioinformatics and Computational Biology	Describe the use of computers in storing, retrieving and annotating biological information	3							2				
		Access, search and retrieve information from various biological databases	3			2				3				
		Comparatively analyze DNA and Protein sequences	3			2	2							
		Perform phylogenetic analyses and determine the evolutionary relationship between organisms	3			2								
		Explain the algorithms to predict primary, secondary and tertiary structure of proteins from their sequences	3			2								
12.	BIT216/ Protein Science and Engineering	Explain and compare the different level of protein structure and their interdependence and protein folding	3	2	2	2	3	2		2		2		
		Describe the regulation of gene expression control and function of proteins with an examples of proton pump and photoreaction centre	3	2		2	2	2		2		2	2	
		Explain the theoretical knowledge of cloning of a gene on expression vector and purification of proteins with various column	3	2		3				3		2	2	2
		Describe various bioinformatics tools which are involved in phylogenetic analysis, structure and functional prediction of proteins	3	2			2				2		2	
		Describe the protein engineering techniques how to utilize in industrial biotechnology	3	2	2	2			2	3		2	2	3
13.	BIT288/	Access, search and retrieve information from various Biological	3			2	2			3		2		

	Computational Biology Laboratory	databases													
		Perform database similarity search using online tools	3			2	2								
		Use online tools for sequence analysis, alignment and comparison to find out sequencesimilarity	3	2			2								
		Predict primary, secondary and tertiary structure of proteins using online proteomictools	3	2			2								
		Construct phylogenetic trees form DNA / Protein sequences using specialized software	3				2								
14.	BIT303/ Bioprocess Principles	Explain fermenter design		3		2									
		List the roles of a bioprocess engineer in the bioprocess industry		2									3		
		Summarize the role of medium formulation and optimization in fermentation processes		2	2								3		
		Describe sterilization kinetics and the various modes of sterilization		2									2		
		Express microbial growth kinetics in various modes of fermentation		3						2		2			
		Apply metabolic stoichiometry and energetics data in assessing and optimizing fermentation process		2	2										
15.	BIT304/ Genetic Engineering	Summarize the enzymes involved in cloning and restriction enzymes in recombinantDNA technology	3					2							
		Describe different types of vectors such as plasmid, cosmid, phage and YAC.	3					2	2						
		Explain the cloning of a gene in different types of vectors and its applications	3	2				2					2	3	
		Illustrate construction and screening of cDNA and genomic libraries	3					2	2		2				
		Describe cloning and transformation of Ti vectors in plants	3	3	2		3	2		3			2		
16.	BIT322/ Enzyme Technology	Summarize the enzymes involved in cloning and restriction enzymes in recombinantDNA technology	3	2		2									
		Describe different types of vectors such as plasmid, cosmid, phage and YAC.	3	2		2									
		Explain the cloning of a gene in different types of vectors and its applications	3	2	3	2	2								
		Illustrate construction and screening of cDNA and genomic libraries	3				2								

		Suggest a preliminary design for biosensors	3		3		3						2	
17.	CHE357/ Reaction Engineering for Biotechnologis ts	Describe the kinetics of reactions	3						2					
		Design equations to determine the performance of ideal reactors				3							2	
		Create various models for describing non- ideal behavior of reactors				3							2	
		Analyze performance of combined reactors		3									2	
		Explain adsorption and desorption phenomena in heterogeneous systems.	3						2					
18.	BIT387/ Bioprocess Laboratory	Screen amylase producing bacteria from soil samples		3		2			3				3	3
		Optimize the effect of pH, temperature, substrate concentration and reaction time on amylase activity		3	3	2			3				3	2
		Use immobilization techniques	3	3	3	3				3	2		3	3
		Study the activity of enzymes and the kinetics of different enzymatic reactions	3		3	3	2			3		3	2	3
		Screen amylase producing bacteria from soil samples	3	3		3			2	3			2	3
19.	BIT388/ Genetic Engineering Laboratory	Isolate the plasmid DNA from bacterial cells	3			2	2	3	2	2	3		2	
		Design the setting up of restriction digestion of DNA	3				2	3	2	2	3			
		Isolate genomic DNA from prokaryotic and eukaryotic cells	3			2	2	3	2	2	3	2		2
		Demonstrate the Southern blotting technique	3					3	2	2	3			
		Formulate PCR reaction conditions	3			2	2	3	2	2	3	2	2	
20.	BIT305/ Biochemical Engineering	Explain ideal and non-ideal behaviour of reactors	3			2			2					
		Describe the configurations and applications of various bioreactors	3											
		Suggest scale up of design parameters for bioreactors	3						2	2				
		Illustrate immobilization techniques and their principles advantages and disadvantages	3				2							
		Explain the models of cell growth	3			2	2							
21.	BIT306/ Immunology	Understand the differentiation of hematopoietic stem cell, complementary cascade and anatomy of lymphoid organ	2	3	2		2	2		3			2	2
		Explain the structure, function, and genetic regulation of antibody and their development, and activations	3	2		2	2	2		2		2	2	
		Describe various mechanisms of antigen presenting cells and how to regulate phagocytosis and macrophage	2	2			3	2				2		

		Explain the different types hypersensitive reactions and cytokine molecules	2	2		2	3	2		2			2	2
		Describe molecular mechanism of Graft rejection, immunosuppressive drugs, and autoimmune diseases	3	2		2	3	2		3				2
22.	BIT389/ Immunology Laboratory	To identify the blood group of unknown sample by agglutination test	3					3	3	2	2	2	3	
		To perform radial and double immuno-diffusion	3			2	2	3	3				2	
		To handle animals for bleeding techniques	3		2			3	2	2	2	2		3
		To demonstrate rocket immuno-electrophoresis	3			2	2	3	3	2			2	
		Execute clinical tests such as ELISA and Widal test	3			3	3	3	3	2	2	2	3	2
23.	BIT390/ Biochemical Engineering Laboratory	Compute residence time distribution for PFR and MFR	2		2			2	3					
		Determine mixing time in a reactor			2			3						
		Optimize media by Plackett-Burman method	3		3			2						
		Simulate batch and fed batch fermentation	3		2			2						
		Study growth and product formation kinetics	3	3	3			2	2					
24.	BIT401/ Animal Biotechnology	Explain animal cell culture media and animal cell culture techniques	3							3				
		Describe expression vectors and production of recombinant products using animal cells	3							3				2
		Apply biotechnological methods for basic research		2			3							
		Apply reproduction methods with particular reference to gamete and embryomanipulation techniques, production of transgenic animals and cloning	3	2						2				
		Discuss manipulation strategies to improve livestock production including meat and milk production		3			3						2	
25.	BIT402/ Plant Biotechnology	Outline the method of creating transgenic plants in general	2	3		2	3	2		2		2	2	2
		Explain how to make commercially important compounds using plant tissue culture	2	3		2	2	2		2		2	3	
		Describe how micropropagation is carried out and its advantages	2	3		2	2	2		2		2	3	
		Differentiate plant breeding and genetic engineering approaches	3	3		3	3	2		2		2	3	2
		Report the strategy and advantages of creation of BT cotton	3	3		3	2	2		2		2	3	2
26.	BIT403/	Describe the advantages of bioprocesses as well as explain the	3	3	2	3		2					2	

	Downstream Processing	principles of various separation processes													
		Explain the various concepts of centrifugal separation and diffusion-based processes, such as dialysis	3	2		3									
		Demonstrate knowledge of the principles of pressure-driven processes, such as reverse osmosis, and adsorption-desorption phenomena	3	3		3	2								
		Explain the principles of aqueous two-phase extraction and the various techniques of protein precipitation.	3	2		3		2							
		Explain the principles of planar chromatography and those of the various finishing operations used for bioproducts	3	2		2	2							2	
27.	BIT491/ Downstream Processing Laboratory	Carry out isoelectric precipitation of proteins from a protein mixture; perform ultrasonication of cells and monitor kinetics of protein release	3	3	2	3	2								
		Explain the principles of microfiltration and homogenization and perform these processes	3	2	2	3	3								
		Understand the principles of centrifugation and adsorption and carry out these processes	3	3		3									
		Understand and explain reaction equilibria; be familiar with the physical properties of filtration cakes	3			3	2								
		Explain the principles of the various types of planar and columnar chromatography	3			3	2								

This section includes two main sets of articulation matrix. As the student has to pursue both the theory and, practical courses along with list of Non-CGPA Courses (which is mandatory) to complete his / her undergraduate program. Based on the importance of the course, course evaluation and assessment are varied. To ascertain the PO attainment, it has been classified as with a weightage of 60% for theory course cum practical courses and 30% for non-CGPA Courses.

Table 3.3a shows the list of Theory and Practical Courses with the program articulation matrix for the batch 2016-2020 followed by model calculation for PO articulation matrix.

<i>S. No</i>	<i>Course Code</i>	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>	<i>PO7</i>	<i>PO8</i>	<i>PO9</i>	<i>PO10</i>	<i>PO11</i>	<i>PO12</i>
1.	BIT18R101	2.8	2		2.6		2.5						
2.	BIT18R102	3		2	3	3	2				2		2.5
3.	BIT18R271	3	3	2.67	3	3	3		3	3	3	3	3
4.	BIT18R272	2.6	2.33	2			3	2.25					
5.	BIT18R273	3			2	2.75					2	2	2.8
6.	BIT18R274	3	2.33	2	2.75	2.8				2			
7.	BIT18R205	3	2	2	2	2	2	3					2
8.	BIT18R371	2	3		2.25	2				2			
9.	BIT18R372	3	2.5	2		3	2	2	3	2		2	3
10.	BIT18R373	3	3		2	2							
11.	BIT18R374	2.4	2.2	2	2	2.6	2		2.5		2	2	2
12.	BIT18R471	3	3	2.33		2		3		2			
13.	BIT18R499	3	2.2	2.5	2	2.25	2.67	2	2.6	3	2.6	3	2.67

<i>S. No</i>	<i>Course Code</i>	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>	<i>PO7</i>	<i>PO8</i>	<i>PO9</i>	<i>PO10</i>	<i>PO11</i>	<i>PO12</i>
1.	BIT103	3			3	2	2		3		2.5	2	
2.	CHE253	3	3		2						2		
3.	BIT204	2.6	3	3		3	2.3	3	3	3	3	2	3
4.	BIT209	3			3	2	2	2	2.5	2	2.6		2
5.	BIT211	2.6	2.3	2.25		2					3		
6.	BIT214	3			3			2	2		2		
7.	BIT281	2.6	2.3	2.25		2						3	
8.	BIT283	2.8	2		2	2	3	2.6	2	2	2		2
9.	BIT286	2		3		3							
10.	CHE252	3			3				2			2	
11.	BIT203	3	2.6	2	2	2							

<i>S. No</i>	<i>Course Code</i>	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>	<i>PO7</i>	<i>PO8</i>	<i>PO9</i>	<i>PO10</i>	<i>PO11</i>	<i>PO12</i>
12.	BIT205	2.75	3	2	2		3	2.5	2.5	3	2.5	2	3
13.	BIT215	3			2	2			2.5				
14.	BIT216	3	2	2	2.25	2.3	2	2	2.5	2	2	2	2.5
15.	BIT288	3	2		2	2			3		2		
16.	BIT303		2.3	2	2				2		2	2.6	
17.	BIT304	3	2.5	2		3	2	2	3	2		2	3
18.	BIT322	3	2	3	2	2.3						2	
19.	CHE357	3	3	3					2			2	
20.	BIT387	3	3	3	2.6	2		2.6	3	2	3	2.6	2.8
21.	BIT388	3			2	2	3	2	2	3	2	2	2
22.	BIT305	3			2	2		2	2				
23.	BIT306	2.4	2.2	2	2	2.6	2		2.5		2	2	2
24.	BIT389	3		2	2.3	2.3	3	2.8	2	2	2	2.5	2.5
25.	BIT390	2.75	3	2.4			2.2	2.5					
26.	BIT401	3	2.3			3			2.6			2	2
27.	BIT402	2.4	3		2.4	2.4	2		2		2	2.8	2
28.	BIT403	3	2.4	2	2.8	2	2					2	
29.	BIT491	3	2.6	2	3	2.25							

The CO and PO mapping with the correlation was taken from Table 3.2 for reference. The uncorrelated CO and PO columns are left empty. The same procedure is followed for all the courses and tabulated in Table 3.3a, for calculation of PO attainment. From the program articulation matrix, the number of courses (including basic sciences, core courses, elective courses and practical courses) contributing towards the PO attainment for B.Tech. Biotechnology is shown in Fig. 3.2a. Majority of these courses are influencing PO1, PO2 and PO3. As the courses framed for the program are covering the basic knowledge in problem identification, problem analysis and design with strong fundamentals. The supporting skills with emerging technology tool usage and societal impact are also influencing PO4 and PO5

3.2. Attainment of Course Outcomes (75)

3.2.1 Describe the assessment processes used to gather the data upon which the evaluation of course outcome is based.

The information on CO assessment is explained in detail under the following sections; namely

A1. List of assessment tools used for CO attainment

A2. Mark Allotment for CO assessment

A3. Assessment Procedure for CO Attainment with sample calculations

A1. List of assessment tools used for CO attainment

Table 3.4 shows the different assessment tools used for the CO attainment process.

Table 3.4 Assessment Tools

<i>Assessment Tool</i>		<i>Description</i>
<i>Direct Assessment (Theory Courses)</i>	<i>Sessional Examinations</i>	The assessment tool is initiated during the sessional examination which is held thrice in a semester. Every sessional examination will focus on the attainment of each course outcome during the semester. If the COs are found to be not attained in the sessional examination, then, corresponding actions for improvement of the particular COs will be taken to improve the attainment of CO in the subsequent end semester.
	<i>End Semester Examination</i>	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 to consider all COs for assessment.

	<i>Assignments</i>	<p>An assignment is a qualitative performance assessment tool designed to assess the student's knowledge of engineering practices. An analytic rubric was developed to assess student's knowledge for the learning outcomes.</p> <p>Assignment can be given as Quiz, Seminar, Industry expert-based evaluation, Research Article based evaluation, etc. The course coordinator will fix any of the above corresponding to the course outcomes.</p> <p>Quiz Quizzes will be conducted during regular class hours. Surprise quizzes are conducted in the respective classes and the evaluation is done based on their performances. After the quiz, the answers will be discussed in the respective class itself.</p> <p>Seminar It should be an individual student seminar. Seminar topics should be well planned as per the course outcomes of the concerned course and the presentation should contain all the technical components including literature review, any methodology, analysis methods, and specific conclusions</p> <p>Open Book Test Questions framed should not be directly from one or more published textbooks – either as solved or unsolved examples. The faculty must design the question himself as per the course outcome of the concerned course and preferably based on real-time case studies.</p> <p>Industry Expert Evaluation Industry persons can be invited to offer a real-time industry problem related to the course outcome of the concerned course and evaluate the students' performance. It can also include an interview by the industry persons</p> <p>Research Article Based Evaluation The topic will be given as an individual student exercise based on the course outcome of the concerned course. Research articles should be searched from standard journals such as Elsevier/Springer etc. The objectives should be clearly defined on what is the intended outcome of the research article's study.</p>
<i>Direct (Laboratory)</i>	<i>Internal</i>	The internal marks for laboratory courses are awarded based on rubrics framed by the course coordinator for the corresponding lab course consisting of experimentation, interpretation, and result analysis.

ry Cour ses)	Mini Project	The mini-project provides an opportunity for students to demonstrate independence and originality, to plan and organize a project over a given period, and to put into practice, the techniques that have been taught. Students must identify a problem related to the laboratory course and carry out a mini project on the problem defined. Two reviews are conducted during lab hours. Marks are awarded based on the rubrics defined by the course coordinator.
	External	The external examinations for laboratory courses are conducted at the end of the semester for 3 hours. It is evaluated based on rubrics framed by the course coordinator for the corresponding lab course.
Indir ect Asse ssme nt	Course end Survey	At the end of every semester, every student is asked to give their opinion about the knowledge level of course outcomes of the corresponding course they have studied with assigned rubrics. The course end survey is assessed based on rubrics which will be designed by the course coordinator.

A2. Mark Allotment for CO assessment

Table 3.5 shows the marks allotment for each COs in the internal and external assessment.

Table 3.5. Marks allotment indicatively for CO assessment

COs	INTERNAL ASSESSMENT				EXTERNAL ASSESSMENT
	SE-I	SE-II	Assignment	Total	END SEM
CO1	30		10	40	20
CO2	20		10	30	20
CO3		30	10	40	20
CO4		20	10	30	20
CO5			10	10	20
Total	50	50	50	150	100

Table 3.5 shows the indicative marks allotment for all the examinations conducted during the study. A minimum of two COs has been planned to cover all the sessional examinations for 50 marks. For example, in Sessional Examination I the split-up for 50 marks is 30 marks from CO1 and 20 marks from CO2 approximately. For Sessional Examination II; 30 marks from CO3, 20 marks from CO4. In the End Semester Examination, the question paper covers all the COs. Assignment's topics are also framed to cover the entire CO's.

A 3. Assessment Procedure for CO Attainment

The assessment procedure for CO attainment is based on Direct and Indirect assessment. The Direct Assessment is completely based on the examinations and the indirect assessment is

based on the survey taken for a particular course. The consideration of direct attainment was 80% and indirect attainment was 20%.

The overall CO attainment is obtained with a weighted average of Direct and Indirect assessment and the assessment methodologies are shown below.

Direct Assessment (Theory Courses)	Sessional Examination (SE-I, SE-II)
	Assignment
	End Semester Examination
Indirect Assessment	Course exit Survey

The model calculation performed for the course **BIT18R374–Immunology** is explained in detail in Table 3.6. The assessment was calculated separately for Cumulative Internal Assessment and External Assessment as per the table. The detailed procedure and weightage for Internal Assessment and End Semester Examination are discussed in detail.

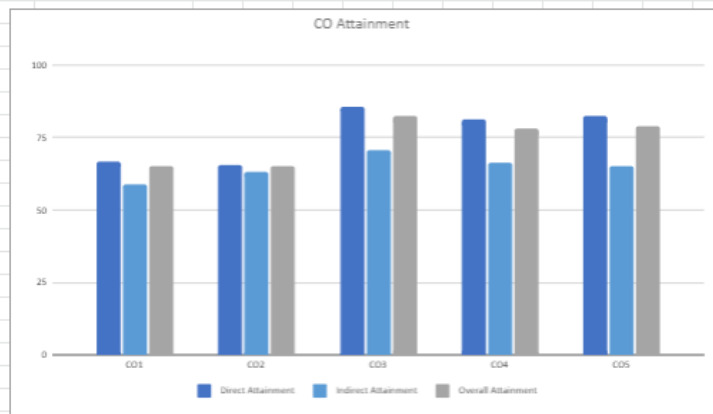
Table 3.6. The model calculation for CO attainment of Immunology / BIT18R374

Course 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Course Title	Immunology
Course Code	BIT18R374
Month and Year of Exam	May/June 2021
Batch	2017-2021
Bench Mark Score	60

S.No.	COs Reg.No.	Internal Assessment									Cumulative Internal Assessment 30% SE + 20%ASSGMNT					External Assessment End Semester					Direct Attainment 50% Int Assmnt + 50% End Sem									
		SE I			SE II			Assignment																						
		CO1	CO2	CO3	CO4	CO1	CO2	CO3	CO4	CO5	CO1	CO2	CO3	CO4	CO5	CO1	CO2	CO3	CO4	CO5	CO1	Attain nmen	CO2	Attain nmen	CO3	Attain nmen	CO4	Attain nmen	CO5	Attain nmen
1	9916001004	9	6	22	14	9	9	9	9	7	27	27	40	39	35	10	11	12	11	9	52	N	55	N	70	Y	67	Y	58	N
2	9916001073	10	7	7	5	8	7	8	7	7	26	25	23	22	35	5	5	5	5	3	39	N	38	N	36	N	35	N	43	N
3	9916001158	20	14	24	16	10	10	10	10	8	40	41	44	44	40	15	14	15	14	13	78	Y	76	Y	82	Y	79	Y	73	Y
4	9917001001	13	9	25	17	9	8	9	8	8	31	30	43	42	40	14	14	14	14	14	66	Y	65	Y	78	Y	77	Y	75	Y
5	9917001002	21	14	27	18	10	9	10	9	8	41	39	47	45	40	9	10	11	10	8	64	Y	64	Y	75	Y	70	Y	60	Y
6	9917001005	16	11	28	18	10	9	10	9	9	36	35	48	45	45	12	12	12	12	10	66	Y	65	Y	78	Y	75	Y	70	Y
7	9917001006	12	8	20	13	8	8	8	8	8	28	28	36	36	40	9	10	11	10	10	51	N	53	N	64	Y	61	Y	65	Y
8	9917001007	12	8	26	17	10	9	10	9	9	32	30	46	44	45	9	10	11	10	10	55	N	55	N	74	Y	69	Y	70	Y
9	9917001008	14	9	30	20	8	8	8	8	8	30	30	46	46	40	14	15	16	15	15	65	Y	68	Y	86	Y	84	Y	78	Y
10	9917001009	19	12	29	20	10	10	10	10	8	39	38	49	50	40	14	14	16	14	13	74	Y	73	Y	89	Y	85	Y	73	Y
11	9917001010	12	8	19	12	10	9	10	9	9	32	30	39	36	45	9	10	11	10	9	55	N	55	N	67	Y	61	Y	68	Y
12	9917001011	12	8	23	15	8	8	8	8	8	28	28	39	39	40	13	13	13	13	12	61	Y	61	Y	72	Y	72	Y	70	Y
13	9917001012	19	13	23	15	8	8	8	8	8	35	36	39	39	40	14	15	16	15	13	70	Y	74	Y	79	Y	77	Y	73	Y
14	9917001013	19	12	28	19	10	9	10	9	9	39	36	48	47	45	14	14	14	14	12	74	Y	71	Y	83	Y	82	Y	75	Y
15	9917001014	14	9	25	17	10	9	10	9	9	34	32	45	44	45	11	11	11	11	10	62	Y	60	Y	73	Y	72	Y	70	Y

96	9917001113	20	13	0	0	10	10	10	10	8	40	40	20	20	40	-1	0	1	0	0	38	N	40	N	23	N	20	N	40	N
																					CO1	64	CO2	63	CO3	82	CO4	78	CO5	79
																				32		33		14		18		17		
																				0		0		0		0		0		
																				96		96		96		96		96		
																				666666		65.625		416666		81.25		291666		
CO1 Implement																														



COs	Direct Attainment	Indirect Attainment	Overall Attainment	Attainment Level
CO1	66.7	58.9	65.1	2
CO2	65.6	63.2	65.1	2
CO3	85.4	70.5	82.4	3
CO4	81.3	66.3	78.3	3
CO5	82.3	65.3	78.9	3
Average Attainment Level				2.6

Attainment Level

- 0 - Less than 40% of students attained the bench mark score
- 1 - 40% - 60% of students attained the bench mark score
- 2 - 60% - 75% of students attained the bench mark score
- 3 - 75% - 100% of students attained the bench mark score

A.3.1 Course Outcome Attainment through Cumulative Internal Examination (CIE):

i. Sessional Examination

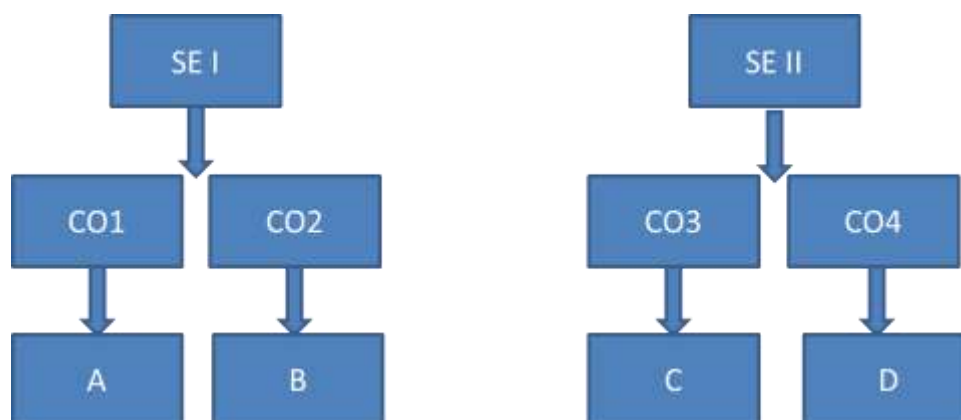


Fig 3.3. Contribution of COs in-sessional examination

Let us consider,

A - Contribution of CO1 in-sessional examination I

B - Contribution of CO2 in-sessional examination I

C - Contribution of CO3 in-sessional examination II

D – Contribution of CO4 in-sessional examination II

ii. Assignment

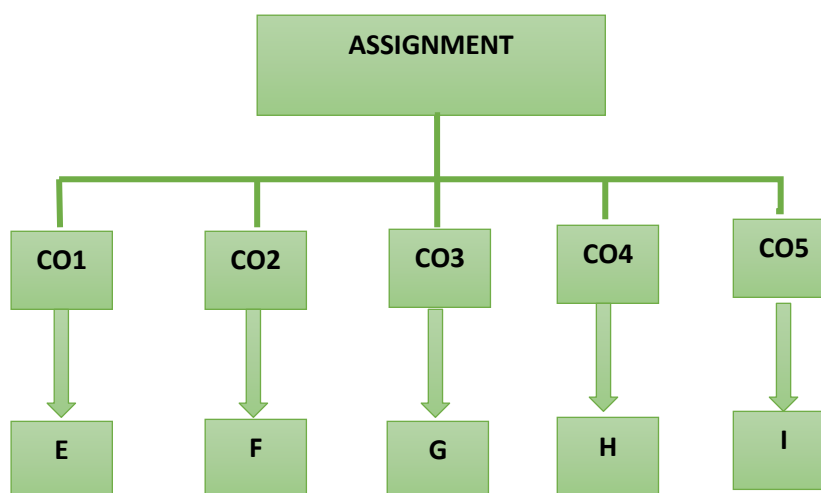


Fig 3.4. Contribution of COs in assignment

Let us consider,

E - Contribution of CO1 in Assignment.

F - Contribution of CO2 in Assignment.

G - Contribution of CO3 in Assignment.

H - Contribution of CO4 in Assignment.

I - Contribution of CO5 in Assignment

Immunology (**BIT18R374**), a course offered in the Third-year sixth semester (III/VI), has been selected for CO attainment model calculations. Fig 3.3 and Fig 3.4 show the contribution of COs in-session examinations and assignments respectively. The benchmark score for the course was fixed as **60 out of 100**. The benchmark score for a particular course was selected based on the previous 3 years results and approved by the Program Advisory Board. To understand the calculations from Table 3.6, ‘Y’ indicates **CO attained** when the score of the individual is greater than the benchmark score, and ‘N’ indicates **Not Attained**. Consider **Serial No:4** Reg Number: **9917001001** in SE I scored 13 marks out of 30 marks in CO1 (A=13) and in the assignment he scored 9 marks out of 10 marks in CO1 (E=9). So, in the cumulative internal assessment for CO1, he scored 31 (30% of A+ 20% of E) out of 50.

$$0.3*(13/30*100) + 0.2 * (9/10*100) = 31/50$$

A.3.2. Course Outcome Attainment Through Semester End Examination (SEE)

i. End Semester Examination

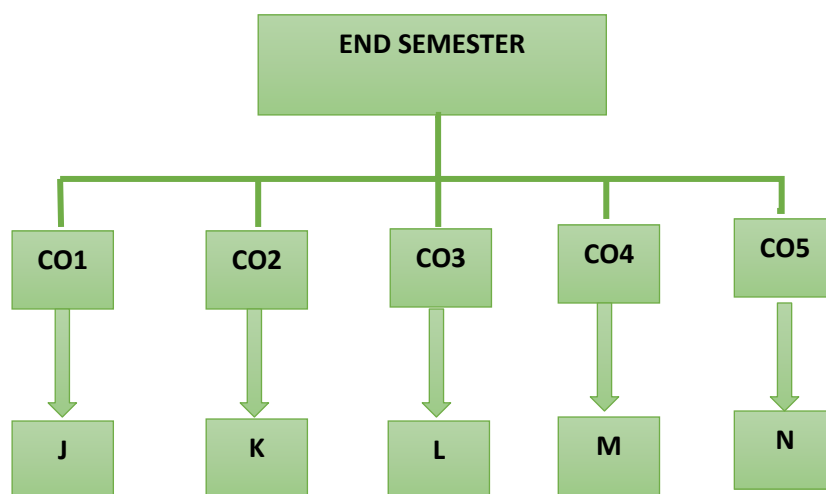


Fig 3.5. Assessment process of CO attainment for End semester

Let us consider,

J - Attainment of CO1 in the End semester exam

K - Attainment of CO2 in the End semester exam

L - Attainment of CO3 in the End semester exam

M - Attainment of CO4 in the End semester exam

N - Attainment of CO5 in the End semester exam

Fig 3.5 shows the assessment process for end-semester examinations. Let us consider the same course **BIT18R374**– Immunology for a better understanding of the calculations. The same condition followed as Y indicates CO attained when the score of the individual is greater than the benchmark score and N indicates not attained. The same referred student

Reg. Number: **9917001001 (Serial No.4)** scored 14 out of 20 in CO1 that is 70%; it is higher the benchmark score and therefore it is attained.

To calculate the Direct attainment 50% of total internal attainment score and 50% of external attainment score for each student was calculated.

Direct Assessment	Cumulative Internal Assessment	50% of attainment
	End Semester Examination	50% of attainment

The same referred student Reg. Number: **9917001001 (Serial No.4)** scored 66 out of 100 in CO1 that is 70%; it is higher the benchmark score and therefore it is attained.

$$0.5*(31/50*100) + 0.5*(14/20*100) = 66$$

The total number of Y and N is 64, and 32 out of 96 students appeared. Therefore; for particular CO1 from end semester examination results 66.66% of students (i.e. $64 / 96 = 0.66$) scored above benchmark.

Table 3.7. Direct CO Attainment for BIT18R374– Immunology

<i>S. No</i>	<i>Assessment Tool</i>	<i>Course Outcome (CO)</i>	<i>Indicator Contribution</i>	<i>CO Attainment</i>	<i>Percentage of CO Attainment (%)</i>
1	50% of Cumulative internal attainment + 50% of End semester examination	CO1	A + E + J	0.66	66.7
		CO2	B + F + K	0.65	65.6
		CO3	C + G + L	0.85	85.4
		CO4	D + H + M	0.81	81.3
		CO5	I + N	0.82	82.3

A.3.3 Attainment level

Initially, attainment levels for overall CO attainment are calculated as in Fig 3.6.

Attainment Level
0 - Less than 40% of students attained the bench mark score
1 - 40% - 60% of students attained the bench mark score
2 - 60% - 75% of students attained the bench mark score
3 - 75% - 100% of students attained the bench mark score

Fig 3.6. Attainment level indicators

Table 3.8 shows the calculation of attainment level from CO attainment. The attainment level is calculated by referring the Fig 3.6, which is clearly stated that if the attainment value is less than 60% then the attainment level is 0, if the attainment value is less than 70% and greater than 60% then the attainment level is 1, if attainment value is less than 80% and greater than 70% then the attainment level is 2 and finally attainment value greater than 80% then the attainment level is 3.

In-Direct CO attainment

Course exit survey:

Course End survey is conducted to analyze the CO attainment, at the end of every semester. Figure 3.8 is the scanned copy of the Course exit survey form. The survey form includes questionnaires for the entire COs with a provision to mark whether the course has supported building the knowledge. Students will tick on the appropriate column in five-point scales. Considerations on surveys are made as the marks calculated based on normalized value.

Let us consider the course **BIT18R374/ Immunology**, for CO1, 58.9% students chose strong/medium out of 96 students. Similarly, 63.2%, 70.5%, 66.3% and 65.3% for CO2, CO3, CO4 and CO5 respectively.

S.No	Questions	Options	Your Choice (Please enter a number within given options)
1	I am able to explain fermenter design and list out the roles of a bioprocess engineer in the bioprocess industry (CO1)		5
2	I am able to summarize the role of medium formulation and optimization in fermentation processes (CO2)	5 - "Strongly Agree" 4 - "Agree" 3 - "Neutral" 2 - "Disagree" 1 - "Strongly Disagree"	5
3	I am able to describe sterilization kinetics and the various modes of sterilization (CO3)		4
4	I am able to apply metabolic stoichiometry and energetics data in assessing and optimizing fermentation process (CO4)		4
5	I am able to express microbial growth kinetics in various modes of fermentation (CO5)		5
6	Remarks and suggestions for improvement		

Fig 3.7. A sample copy of the Course exit survey

Overall CO attainment

The overall CO attainment is calculated from direct and indirect assessments for individual courses. The weightage given for direct assessment is 80% and 20% for indirect attainment.

For eg. For CO1 80% of Direct attainment (0.8×66.7) + 20% of Indirect attainment (0.2×58.9) = 65.1 (Overall attainment) which lies between 65%-70% (Level 2 indicator of attainment level)




Table 3.8. Overall CO Attainment for BIT18R374– Immunology

COs	Direct Attainment	Indirect Attainment	Overall Attainment	Attainment Level
CO1	66.7	58.9	65.1	2
CO2	65.6	63.2	65.1	2
CO3	85.4	70.5	82.4	3
CO4	81.3	66.3	78.3	3
CO5	82.3	65.3	78.9	3
Average Attainment Level				2.6

Therefore, the Overall CO attainment for the course **BIT306 / Immunology** is **1.84**

B. The quality /relevance of assessment processes & tools used

Table 3.11 Quality of assessment tools

<i>Assessment Tool</i>		<i>Description</i>
Direct Assessment Tools	Sessional Examinations	<ul style="list-style-type: none"> ☐ Three SE will be conducted for every course ☐ SE-I evaluates CO1 and CO2 ☐ SE-II evaluates CO3, and CO4 ☐ The question papers are strictly prepared by using bloom's taxonomy. ☐ The quality of question papers is ensured as follows. <p style="text-align: center;">Course teacher- Prepares the QP According to Bloom's Taxonomy</p> <p style="text-align: center;"></p> <p style="text-align: center;">Course Coordinator- Verifies the QP</p> <p style="text-align: center;"></p> <p style="text-align: center;">Module Coordinator- Verifies the QP for understanding levels</p> <p style="text-align: center;"></p> <p style="text-align: center;">Program Coordinator- Approval</p> <ul style="list-style-type: none"> ☐ The IQAC office allocates internal experts to audit the question paper and answer scripts in the name of pre-audit and post-audit to ensure quality.
	End Semester Examination	<ul style="list-style-type: none"> ☐ Two sets of question papers for each course are prepared following Bloom's taxonomy by internal experts. ☐ Another set of question papers for each course is prepared following Bloom's taxonomy by external experts from reputed institutions like (NIT and Renowned institutions). ☐ The End semester examination evaluates CO1, CO2, CO3, CO4 and CO5. ☐ Valuation is done by external experts ☐ The controller of examination allocates internal and external experts to audit the question paper before the examination to maintain the curriculum content and to avoid conflict on examinations. and also, to ensure the quality of valuation controller of examination, allocate external experts for post auditing the corrected papers.

Direct Assessment Tools	Assignment	Five assignments will be given for every course corresponding to the COs. Assignment 1(A1) will meet the CO1 and similarly the other assignments will meet the corresponding COs. The assignments are given based on the knowledge level of COs.
	Observation (Laboratory Sessions, Practical Examination)	<ul style="list-style-type: none"> ☐ The practical sessions are evaluated based on the rubrics assigned as follows with correlation levels • Viva-voce • Observation • Programming knowledge • Usage of modern tools • Analysis • Result
	Project and Community service projects	<p>1. Main Project</p> <ul style="list-style-type: none"> ☐ Ten credits are allocated for project work ☐ Project Review Committee constituted by the project coordinator and the continuous internal assessment evaluated by them based on the rubrics assigned by the project coordinator ☐ External experts evaluate the projects based on the rubrics assigned by the project coordinator. <p>2. Community service project (CSP):</p> <ul style="list-style-type: none"> ☐ CSP is carried out in two phases in the third year with a total credit of three. ☐ The CSP projects are evaluated by internal experts and CSP coordinators based on the rubrics assigned by the CSP coordinator.
Indirect Assessment Tools	Course end Survey	<ul style="list-style-type: none"> ☐ Survey has been taken for all the courses at the end of Semester ☐ Collect a variety of information about course outcomes from the students after learning entire courses. ☐ The questionnaires are framed by the course coordinator to ensure the knowledge levels of all the course outcomes of the corresponding course. ☐ The survey is evaluated based on the correlation levels (strong, medium, and low) against all the course outcomes of the corresponding course.

3.2.2. Record the attainment of Course Outcomes of all courses with respect to set attainment levels

The target percentage of marks scored by the students is set by the course coordinator after approval by the Program Advisory Board (PAB) at the beginning of the semester. Table 3.12 shows the CO attainment for the batch 2017 – 2021.

Table 3.12 CO Attainment for the batch 2017-2021

S. No	Course Code	Course Name	Overall CO Attainment
1	CHY17R101	Environmental Science	2.4
2	CIV17R101	Basic Civil Engineering	2.8
3	CSE17R171	Programming Language	2.2
4	HSS17R151	English for Technical Communication - I	2.8
5	MAT17R101	Calculus and Differential Equations	2.2
6	MEC17R105	Basic Mechanical Engineering	2.8
7	MEC17R181	Engineering Practice Laboratory	2.8
8	PHY17R171	Engineering Physics	3
9	BIT17R101	Cell biology and Genetics	2.2
10	CHY17R171	Chemistry	2.6
11	EEE17R151	Basic Electrical and Electronics Engineering	2
12	HSS17R152	English for Technical Communication II	3
13	MAT17R102	Linear Algebra, Partial Differential Equations and Complex Variable	1.2
14	MEC17R101	Engineering Drawing	2.6
15	PHY17R152	Materials Physics - II	1.8
16	BIT18R271	Microbiology	2.2
17	BIT18R272	Principles of Biochemistry	1.4
18	CHE18R206	Principles of Chemical Engineering	2.6
19	CHE18R281	Chemical Engineering Laboratory	3
20	MAT18R201	Biostatistics	2.8
21	BIT18R101	Biology for Engineers	3
22	BIT18R205	Bioenergetics and Metabolism	3
23	BIT18R273	Molecular Biology	2.2
24	BIT18R274	Bioinformatics	2
25	CHE18R321	Mass Transfer	2.8

26	BIT18R371	Bioprocess Principles	2
27	BIT18R372	Genetic Engineering	2
28	CHE18R320	Reaction Engineering for Biotechnologists	2.2
29	HSS18R013	Professional Ethics	2.2
30	BIT18R310	Pharmaceutical Biotechnology	2.4
31	BIT18R311	Healthcare Biotechnology	2.8
32	BIT18R373	Biochemical Engineering	2.8
33	BIT18R374	Immunology	2.6
34	BIT18R421	Functional Genomics	2.6
35	BIT18R499	Project Work	3
36	BIT18R403	Plant Biotechnology	2.2
37	BIT18R402	Animal Biotechnology	3
38	BIT18R424	Clinical Trials and Management	3
39	BIT18R313	Metabolic Engineering	2
40	BIT18R471	Bioseparations: Principles and Applications	2.6
41	HSS18R015	Total Quality Management	2.8

3.3. Attainment of Program Outcomes and Program Specific Outcomes (75)

3.3.1. Describe assessment tools and processes used for measuring the attainment of each Program Outcome and Program Specific Outcomes

The Program attainment of a particular student is based on his academic curriculum, which includes:

- (i) Theory courses
- (ii) Practical / Laboratory courses
- (iii) Project courses
- (iv) Integrated Courses (Theory + Practical)

Table 3.13 describes the list of assessment tools used to calculate the POs and PSOs directly.

The assessment tools used to attain POs and PSOs is mapped and tabulated as follows:

Table 3.13 Assessment tools for POs and PSOs

<i>Direct Assessment</i>																		
<i>Assessment Tools</i>	<i>Frequency (per course)</i>	<i>Responsible Person to conduct the Assessment</i>	<i>Program Outcomes (PO)</i>												<i>PSO</i>			
			<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
<i>Assignment</i>	Five in a semester	Course Teacher	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Direct Assessment																		
Assessment Tools	Frequency (per course)	Responsible Person to conduct the Assessment	Program Outcomes (PO)												PSO			
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
Sessional Examinations	Three in a semester	COE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
End Semester	Once in a semester	COE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Project (Review)	Thrice in a semester	Project Review Committee	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Laboratory Sessions	Fifteen Sessions in a semester	Course Teacher	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Laboratory / Practical Examination (Model , End Semester)	Once in a Semester	Course Coordinator	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Indirect Assessment																		
Course Exit survey	Every Semester	Course Teacher	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Graduate Survey	Yearly		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Alumni survey	Yearly		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Employer survey			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

The procedure used to calculate PO / PSO attainment is explained in table 3.14. It describes the process involved in theory courses and practical / laboratory courses under the category of direct assessment. Indirect Assessments are completely based on a survey at the end of the program. Weightage is 80% for Direct Assessment (theory courses and practical / laboratory courses), 10% for Non – CGPA Courses, and 10% Indirect Assessment.

Table 3.14 List of Direct Assessment Tool / Process for PO attainment

<i>S. No</i>	<i>Assessment Tool</i>	<i>Method / Processes</i>
1	<i>Sessional Examinations</i>	<p>The Course Outcome attainment is the source input to calculate the PO attainment. The CO attainments are calculated based on the outcome of the following activities:</p> <ol style="list-style-type: none"> 1. Conducting three Sessional examinations per semester to evaluate the continuous performance of the students. 2. Questions were set by the course coordinator. 3. Questions are based on standard level by following Bloom's Taxonomy for evaluation. 4. Valuations are made by sharing/exchanging the answer papers with Department course experts.

S. No	Assessment Tool	Method / Processes
		5. Sessional Examination Question papers and Answer scripts are evaluated regularly.
2	Assignment	<ol style="list-style-type: none"> 1. Seminars and Presentations are given on advanced topics related to the course content. 2. Students are asked to prepare a survey cum pertinent study on present industrial conditions.
3	End semester examinations	<ol style="list-style-type: none"> 1. End semester examination questions set by internal/external experts. 2. Valuation made by different external experts and answer scripts distributed to the students.
4	End semester Practical Examination	<ol style="list-style-type: none"> 1. The practical examination is focused on the practical knowledge, skill, and attitude of the students. 2. Students are involved to perform the practical examinations to evaluate their knowledge.
5	Project	<ol style="list-style-type: none"> 1. Students are accompanied in both Internal and External Projects. 2. The Project Review Committee was formed internally to approve and evaluate the research in three stages (i) Zeroth Review; (ii) First Review and (iii) Third Review. 3. Students have to come forward to present their project in reputed conferences/meet organized by IISc, IITs, NITs, Other Universities, etc. 4. External Examiner(s) are invited to evaluate the project as a final examination.

Table 3.15 List of Indirect Assessment Tool/ Processes for PO attainment

S. No	Assessment Tool	Method Description / Processes
1.	Alumni survey	<ol style="list-style-type: none"> 1. Survey made with a set of Questionnaires which was prepared based on POs. 2. These surveys have been taken with Passed out Students.
2.	Graduate Survey	<ol style="list-style-type: none"> 1. Survey made with a set of Questionnaires which was prepared based on POs. 2. These surveys have been taken with the graduate of the academic year.
3.	Employer Survey	<ol style="list-style-type: none"> 1. Survey made with a set of Questionnaires which was prepared based on POs. 2. These surveys have been taken with the employer of the passed-out students.
4.	Co-Curricular and Extra-Curricular activities (Non-CGPA)	At the end of every academic year annual report is developed where the statistics of students who have participated in professional bodies/student chapters/ workshops/seminars/conferences/ paper presentations /internships /industry visits etc are prepared. This statement is considered to indirectly assess the POs.

Direct Assessment

The POs and PSOs are quantitatively measured by assigning weights for the correlation of CO and POs/PSOs of a particular course. The weights assumed for the analysis are as: w1, w2, and w3 for strong, medium, and low correlation respectively.

Where:

w1 = 3/3 = 1 for strong correlation

w2 = 2/3 = 0.67 for medium correlation and

w3 = 1/3 = 0.33 for low correlation.

$$PO = \frac{\sum_{Wi=1}^3 Wi \times CO \text{ attainment}}{\sum_{Wi=1}^3 Wi \times No. of Subjects}$$

Table 3.16 Model calculation for PO1 attainment for 2017 – 2021 batch

S.No.	Course Code	Course Name	PO1 Correlation	CO Attainment	Normalized Value
1	CHY17R101	Environmental Science	2	2.4	1.61
2	CIV17R101	Basic Civil Engineering	2	2.8	1.88
3	CSE17R171	Programming Language	3	2.2	2.20
4	MAT17R101	Calculus and Differential Equations	3	2.2	2.20
5	MEC17R105	Basic Mechanical Engineering	3	2.8	2.80
6	MEC17R181	Engineering Practice Laboratory	2	2.6	1.71
7	PHY17R171	Engineering Physics	3	3	3.00
8	BIT17R101	Cell biology and Genetics	3	2.2	2.20
9	CHY17R171	Chemistry	3	2.6	2.60
10	EEE17R151	Basic Electrical and Electronics Engineering	3	2	2.00
11	MAT17R102	Linear Algebra, Partial Differential Equations and Complex Variable	3	1.2	1.20
12	MEC17R101	Engineering Drawing	2	2.4	1.61
13	PHY17R152	Materials Physics - II	3	1.8	1.80
14	BIT18R271	Microbiology	1	2.2	0.73
15	BIT18R272	Principles of Biochemistry	3	1.4	1.40
16	CHE18R206	Principles of Chemical Engineering	3	2.6	2.60
17	CHE18R281	Chemical Engineering Laboratory	3	3	3.00
18	MAT18R201	Biostatistics	2	2.8	1.88
19	BIT18R101	Biology for Engineers	3	3	3.00
20	BIT18R205	Bioenergetics and Metabolism	3	3	3.00
21	BIT18R273	Molecular Biology	3	2.2	2.20
22	BIT18R274	Bioinformatics	3	2	2.00
23	CHE18R321	Mass Transfer	3	2.8	2.80
24	BIT18R372	Genetic Engineering	3	2	2.00

25	CHE18R320	Reaction Engineering for Biotechnologists	3	2.2	2.20
26	HSS18R013	Professional Ethics	0	2.2	0.73
27	BIT18R373	Biochemical Engineering	3	2.8	2.80
28	BIT18R374	Immunology	2	2.6	1.74
29	BIT18R421	Functional Genomics	3	2.6	2.60
30	BIT18R499	Project Work	3	3	3.00
31	BIT18R403	Plant Biotechnology	2	2.2	1.47
32	BIT18R402	Animal Biotechnology	3	3	3.00
33	BIT18R424	Clinical Trials and Management	2	3.00	2.01
34	BIT18R313	Metabolic Engineering	3	2	2.00
35	BIT18R471	Bioseparations: Principles and Applications	3	2.6	2.60

Similarly, a procedure has been followed to calculate for PO / PSO attainment whole batch result. The model calculation for PO attainment for the first program outcome PO1 is given in Table 3.17. Tables 3.18 show the Direct PO attainment for the Batch 2017-2021.

Table 3.17 shows the Direct PO attainment for the Batch 2017-2021.

<i>PO Attainment</i>	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>	<i>PO7</i>	<i>PO8</i>	<i>PO9</i>	<i>PO10</i>	<i>PO11</i>	<i>PO12</i>
<i>Direct Attainment</i>	2.2	1.88	1.67	1.74	1.77	1.67	1.85	1.92	1.69	2.09	1.82	1.95

<i>PO Attainment</i>	<i>PSO1</i>	<i>PSO2</i>	<i>PSO3</i>
<i>Direct Attainment</i>	1.83	1.82	1.74

Indirect Assessment

Questionnaires were prepared for the PO Survey and customized to an average value as per levels 1, 2 & 3 (i.e. Low – 1, Medium – 2, and Strong – 3). The survey form includes questionnaires for all the POs with a provision to mark whether the course has supported building the knowledge. Considerations on the survey are made as total number of the mark in medium and it's above. Similar to the course exit survey number of students' responses towards medium and its above are considered for attainment calculation. The indirect attainment for PO and PSOs are listed in Table 3.19.

The various indirect attainment tools are,

1. Program Exit Survey
2. Employer Survey
3. Alumni Survey
4. Co-Curricular and Extra-Curricular Activities (Non-CGPA)



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Academy of Research and Education
(DEEMED TO BE UNIVERSITY)
(Under Section 3 of the UGC Act 1956)
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Anand Nagar, Krishnankoil - 626 126.

GRADUATE STUDENT SATISFACTION SURVEY

Name : Ritha Munigesan Reg. Number : 9917001005
Programme : B.Tech Biotechnology Department : Biotechnology
Period of Study : From 2021 (Year) To 2021 (Year)

(The purpose of this survey is to assess the quality of the academic programmes offered at KARE
We seek your valuable help in completing this survey.) (Mark '✓' in the appropriate box)

RATINGS (Level of Agreement)					
		4-Strongly agree	3-Agree	2- Neither agree nor disagree	1-Strongly disagree
S. No.	Criteria	Attributes			
		Level of Agreement			
		4	3	2	1
1.	Admission	Before joining the programme, I was aware of the academic reputation of KARE			
2.		The information brochure of admission is more informative about the Salient Features of KARE			
3.		The admission procedure of KARE is transparent and reasonable			
4.	Courses / Curriculum	The academic content of my programme is good			
5.		The courses in my programme are sequenced in the organized manner			
6.		Courses I took, provided me the necessary knowledge and professional skills needed for my field			
7.		The academic flexibility of the programme (choice of minor/major/free elective/humanities elective/self study elective) is satisfactory			
8.		My Programme facilitate skills and motivation for continued self education i.e. capacity for Lifelong Learning			
9.	Classes for ICT	Provision to earn credits through on-line courses helped me to improve my subject knowledge			
10.		Class room facilities are conducive for learning			
11.		Use of ICT tools like multimedia projector, online quiz, e-learning portal in teaching & learning process is good			
12.	Faculty	Computing facilities with Wi-Fi Access is good			
13.		Professional and Instructional competency of the faculty is satisfactory			
14.		Interaction of faculty members with students beyond class hours is satisfactory			
15.		Faculty advisory system provided sufficient academic counselling /career planning in my study			
16.	Central Library	The evaluation methods, and grades awarded, properly differentiated levels of students in terms of performance			
17.		Availability of learning resources in the Central Library is adequate and appropriate			
18.	Laboratory	The quality of services provided by the Central Library is good			
19.		Science and Engineering labs are adequately equipped and properly maintained.			

S. No.	Criteria	Attributes	Level of Agreement			
			4	3	2	1
20.	Examination system	The Academic Calendar with the details of exams schedule (SE-I, SE-II, End semester Exam, End semester result publication) is provided in advance (During the opening day of each semester)		✓		
21.		The conduct of the examination and result announcement are in adherence to the academic calendar without any deviation	✓			
22.		The Sessional / End Semester Questions measure knowledge acquired and competence of students	✓			
23.		High level of Transparency in the evaluation system by distribution of SE-I, SE-II, End Sem Exam answer papers to rectify any errors, if any		✓		
24.		The Academic Information System through SIS for the access of regularly updated Attendance & Grade details and Online Registration of Courses (OCRS) for every semester is good.	✓			
25.		Elimination of the term fail - by permitting the - Makeup Exam /Summer term courses /Arrear exam system - is satisfactory	✓			
26.	Non - CGPA	Non-CGPA courses helped the students to acquire the employability skills / opportunities for the placement		✓		
27.		Conducting value added courses, Workshops/Seminars/ International and National conferences for improving student's technical skills are good.	✓			
28.		Conducting Co-curricular /Extracurricular activities like NSS,NCC, Professional Societies/Nature club, Photographic club etc is satisfactory		✓		
29.	Training & Placement	Conducting Pre-placement training programme for improving the communication skills and personality is good	✓			
30.		Conducting Career Guidance programmes, Credit Transfer Scheme for pursuing Higher studies and Research in India and abroad is good.	✓			
31.		Conducting series of On Campus Recruitment Programmes is good		✓		
32.	Sports	The indoor stadium / outdoor games facilities with floodlights, Gym facilities and swimming pool is satisfactory	✓			
33.	Hostel	Hostel facilities available within the university campus is good		✓		
34.	Canteen	The food facilities available in the university campus i.e. canteen / cafeteria is satisfactory		✓		
35.	Miscellaneous Facility	Transport facilities of the university is good	✓			
36.		Health care facilities available within the university campus is adequate		✓		
37.		Availability of the uninterrupted power supply in the campus is good	✓			
38.		The safety and security measures inside the campus are good.		✓		
39.		The campus is well maintained with clean and green environment.		✓		
40.		TANCET / GATE Score >=				
41.		Whether employer / pursuing higher studies / self employed / unemployed. If Yes, please provide details Name of company / college : <u>SVC E</u> Address of company / college : <u>Shri Ram Budhan</u>				
42.	Any other Suggestions / Comments :-					
Date : 11/12/2021			Signature			

Fig 3.8. A sample copy of the Graduate survey

Table 3.19 shows the Indirect PO attainment for the Batch 2017-2021.

PO Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
Program Exit Survey	3	3	3	3	3	2	2	2	3	3	3	3	3	2	3
Employer Survey	3	3	3	3	2	3	2	3	2	3	2	3	3	3	3
Alumni Survey	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3
Non CGPA	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3
Average	3	3	2.75	3	2.75	2.75	2.5	2.75	2.75	3	2.75	2.75	3	2.75	3

PO Attainment level will be 80% of Direct Assessment + 20% of Indirect Assessment

For Example: PO1 attained 1.88 from direct assessment and 2.4 from indirect assessment.
So final PO attainment is

$$\Rightarrow [\text{PO1 Direct} \times 80\%] + [\text{PO1 Indirect} \times 20\%]$$

$$\Rightarrow 2.44 \times 0.8 + 3 \times 0.2$$

$$\Rightarrow 2.55 > \text{Target Value (2)}$$

Therefore, PO1 has been attained because the target fixed by the Program Advisory Committee for PO / PSO attainment was “2”.

Similarly, the POs and PSOs are calculated and tabulated in table 3.20.

Table 3.20 shows the Overall PO Attainment for the Batch 2017-2021

<i>PO Attainment</i>	<i>PO₁</i>	<i>PO₂</i>	<i>PO₃</i>	<i>PO₄</i>	<i>PO₅</i>	<i>PO₆</i>	<i>PO₇</i>	<i>PO₈</i>	<i>PO₉</i>	<i>PO₁₀</i>	<i>PO₁₁</i>	<i>PO₁₂</i>
<i>Direct Attainment</i>	2.2	1.88	1.67	1.74	1.77	1.67	1.85	1.92	1.69	2.09	1.82	1.95
<i>Indirect Attainment</i>	3	3	2.75	3	2.75	2.75	2.5	2.75	2.75	3	2.75	2.75
<i>Overall Attainment</i>	2.36	2.104	1.886	1.992	1.966	1.886	1.98	2.086	1.902	2.272	2.006	2.11

<i>PO Attainment</i>	<i>PSO₁</i>	<i>PSO₂</i>	<i>PSO₃</i>
<i>Direct Attainment</i>	1.83	1.82	1.74
<i>Indirect Attainment</i>	3	2.75	3
<i>Overall Attainment</i>	2.064	2.006	1.992

CRITERION 4	STUDENT'S PERFORMANCE	100
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4.1 Enrolment Ratio

Table 4.1 Enrollment details

Item (Informed to be provide cumulatively for all the shifts with explicit headings wherever applicable)	(CAY) 2021-2022	(CAYm1) 2020-2021	(CAYm2) 2019-20	(CA Y m3) 2018-19	(CA Y m4) 2017-18	(CA Y m5) 2016-17	CAYm 6 (2015-16)	CAYm 7 (2014-15)
Sanctioned intake of the program (N)	120	120	120	120	120	180	180	120
Total number of students admitted in first year <i>minus</i> number of students migrated to other programs/institutions, plus no. of students migrated to this program (N1)	70	80	70	67	96	129	136	60
Number of students admitted in 2 nd year in the same batch via lateral entry (N2)	-	-	-	-	-	-	-	-
Separate division students, if applicable (N3)	-	-	-	-	-	-	-	-
Total number of students admitted in the Program (N1+N2+N3)	70	80	70	67	96	129	136	60

Enrollment Ratio:

	N	N1	Enrollment Ratio (N1/N)*100
2021-22 (CAY)	120	70	58.33
2020-21 (CAYm1)	120	80	66.67
2019-20 (CAYm2)	120	70	58.33

Average [(ER1+ER2+ER3) / 3]: **61.11**

4.2 Success Rate in the stipulated period of the program (20)

4.2.1 Success rate without backlogs in any semester / year of study (15)

Table 4.2 Success rate without backlog

Year of entry	Total No of students admitted in the program (N1 + N2 + N3)	Number of students who have successfully graduated without backlogs in any semester/year of study (Without Backlog means no compartment or failures in any semester/year of study)			
		I YEAR	II	III	IV
2021-22 (CAY)	70				
2020-21 (CAY m-1)	80	54			
2019-20 (CAYm-2)	70	65	61		
2018-19 (CAYm-3)	67	55	53	53	
2017-18 (LYG)	96	46	45	44	44
2016-17 (LYGm1)	129	68	64	64	64
2015-16 (LYGm2)	136	67	55	53	53
2014-15 (LYGm3)	60	49	33	32	32

SI= (Number of students who have graduated from the program without backlog)/(Number of students admitted in the first year of that batch and actually admitted in 2nd year via lateral entry and separate division, if applicable)

Average SI = Mean of Success Index (SI) for past three batches

Success rate without backlogs in any semester/year of study = 15 × Average SI

Item	Latest Year Of Graduation, LYG (2017-18)	Latest Year Of Graduation, LYGm1 (2016-17)	Latest Year Of Graduation, LYGm2(2015-2016)	Latest Year Of Graduation, LYGm3 (2014-2015)
X Number of students admitted in the corresponding First Year + admitted in 2nd year via lateral entry and separate division, if applicable	96	129	136	60
Y Number of students who have graduated without backlogs in the stipulated period	44	64	53	32
Success Index (SI) =(Y/X)	0.46	0.5	0.39	0.54
Average	0.45			

Success rate without backlogs in any semester/year of study = $15 \times 0.45=6.75$

4.2.2 Success rate in stipulated period of study [Total of with backlog + without backlog] (5)

Table 4.3 Success rate with backlog + without backlog

Year of entry	Total No of students admitted in the program (N1 + N2 + N3)	Number of students who have successfully graduated in stipulated period of study) Total of with backlog + without backlog			
		I YEAR	II	III	IV
2021-22 (CAY)	70				
2020-21 (CAYm1)	80	56			
2019-20 (CAYm2)	70	70	70		
2018-19 (CAYm-3)	67	67	67	67	
2017-18 (LYG)	96	96	95	95	95
2016-17 (LYGm1)	129	129	129	129	125
2015-16 (LYGm2)	136	136	136	134	133
2014-15 (LYGm3)	60	60	60	60	56

$SI = (\text{Number of students who graduated from the program in the stipulated period of course duration}) / (\text{Number of students admitted in the first year of that batch and actually admitted in 2}^{nd} \text{ year via lateral entry and separated division, if applicable})$

$\text{Average SI} = \text{mean of Success Index (SI) for past three batches}$
 $\text{Success rate} = 5 \times \text{Average SI}$

Items	Latest Year Of Graduation, LYG (2017-2018)	Latest Year Of Graduation, LYGm1 (2016-2017)	Latest Year Of Graduation, LYGm2 (2015-2016)	Latest Year Of Graduation, LYGm3(2014-2015)
X Number of students admitted in the corresponding First Year + admitted in 2 nd year via lateral entry and separate division, if applicable	96	129	136	60
Y Number of students who have graduated in the stipulated period	95	125	133	56
Success Index (SI)=(Y/X)	0.99	0.97	0.98	0.93
Average Success Index	0.98			

Success rate = $5 \times 0.98 = 4.9$

4.3 Academic Performance in Second Year (10)

Academic Performance = Average API (Academic Performance Index), where

$API = ((\text{Mean of 2nd Year Grade Point Average of all successful Students on a 10 point scale}) \text{ or } (\text{Mean of the percentage of marks of all successful students in Second Year}/10)) \times (\text{number of successful students}/\text{number of students appeared in the examination})$

Successful students are those who are permitted to proceed to the third year.

Academic Performance	CAYm2 (2019-20)	CAYm3 (2018-19)	LYG (2017-18)	LYGm1 (2016-17)
Mean of CGPA or Mean Percentage of all successful students (X)	7.71	7.41	6.37	6.19
Total no. of successful students (Y)	70	67	95	129
Total no. of students appeared in the examination (Z)	70	67	96	129

$API = X * (Y/Z)$	7.71	7.41	6.37	6.19
Average API = $(AP1 + AP2 + AP3)/3$	7.16			

Table B.4.3

Assessment 1.5 * 7.16 = 10.75

4.4. Placement, Higher Studies and Entrepreneurship (30)

Assessment Points = 30 X average placement

Item	CAYm1 (2020-21)	CAYm2 (2019-20)	CAYm3 (2018-19)	LYG (2017-18)
Total No. of Final Year Students (N)	96	129	134	60
No of students placed in companies or Government Sector(x)	77	105	114	51
No. of students admitted to higher studies with valid qualifying scores (GATE or equivalent State or National Level Tests, GRE, GMAT etc.) (y)	18	21	18	6
No. of students turned entrepreneur in engineering / technology (z)	0	1	0	0
$x + y + z =$	95	127	132	57
Placement Index: $(x+y+z) / N$	0.99	0.98	0.99	0.95
Average placement = $(P1+P2+P3)/3$	0.986			
Assessment Points = 30 X average placement	29.58			

Fig. 4.41 Figure representing the Placement, Higher studies and Entrepreneurship Details of

4.4a. Provide the placement data in the below mentioned format with the name of the program and the assessment year:

B.Tech. Biotechnology (2020-21)

S. No	Enrollment No.	Name of the Student Placed	Name of the Employer	Appointment letter reference no. with date
1	9916001004	S.R.ABINAYA	LEADPRO	LEAABI22022021
2	9916001073	M.MOHAMED ARIF	FUTURE GENERALI	FUTMOH28122020
3	9916001158	A,R, LALITHA	INTELLIPAAT	INTLAL07042021
4	9917001001	ABARNA RADHAKRISHNAN	SUTHERLAND	SUTABA02022021
5	9917001002	ABINAYA.P	SUTHERLAND	SUTABI02022021
6	9917001006	AMAL RAJ A	FUTURE GENERALI	FUTAMA28122020
7	9917001007	AMMU M	SUTHERLAND	SUTAMM02022021
8	9917001008	ANTO THEODICTA JEFIRINA A.	SUTHERLAND	SUTANT02022021
9	9917001009	ANTONY SHERINA.J	SUTHERLAND	SUTSHE02022021
10	9917001010	ANUSHIYA MARY.C	FUTURE GENERALI	FUTANU28122020
11	9917001011	ARUL JOSEPH S	VISIONARY RCM	VISARU03052021
12	9917001012	ATHMA RISHI	NETTY FISH	B1-235/02082021
13	9917001014	M.BALAMURUGAN	VISIONARY RCM	VISBAL03052021
14	9917001016	J.CATHRINE	FUTURE GENERALI	FUTCAT28122020
15	9917001021	V.DILAKSHA MARY	LEADPRO	LEADIL22022021
16	9917001022	DRAVID KANNAN.K	LUMINA DATAMATICS	LUMDRA16112021
17	9917001023	M. GAYATHRI	FUTURE GENERALI	FUTGAY28122020
18	9917001024	GOWSHIKI S	CALYX	CALGOW29092021
19	9917001025	K.HARI NIVASHINI	INDIAN HEALTHCARE	INDHAR15032021
20	9917001027	JANANI	FUTURE GENERALI	FUTJAN28122020
21	9917001028	P.JASHIN	VISIONARY RCM	VISJAS03052021
22	9917001029	M. KARTHICK	LEADPRO	LEAKAR22022021
23	9917001030	KARTHIGAISELVI. J	NETTY FISH	B1-264/02082021
24	9917001033	KAVYALAKSHMI N.B	SUTHERLAND	SUTKAV02022021
25	9917001034	S. KIRTHIKA	VISIONARY RCM	VISKIR03052021
26	9917001035	R. KISHORE KUMAR	LUMINA DATAMATICS	LUMKIS16112021

27	9917001036	M.KOWSALYA	VISIONARY RCM	VISKOW03052021
28	9917001037	N.LAKSHMANAN	VISIONARY RCM	VISLAK03052021
29	9917001038	LAVANYA.R	NETTY FISH	B1-237/02082021
30	9917001042	MARTINA JEMIMAL.A	NETTY FISH	B1-255/02082021
31	9917001043	NAMIRIRUNALINISHA	VISIONARY RCM	VISMIR03052021
32	9917001046	S.NARAYANAN	HEALTHWATCH	HEANAR18122020
33	9917001048	PADHMA PRIYA P	VISIONARY RCM	VISPAD03052021
34	9917001050	PONMANI C	VISIONARY RCM	VISPON03052021
35	9917001051	POOJA.S	FUTURE GENERALI	FUTPOO28122020
36	9917001052	K.PRADEEP KUMAR	INDIAN HEALTHCARE	INDPRA15032021
37	9917001053	PRADEEPA. R	VISIONARY RCM	VISPRA03052021
38	9917001054	PRAVEEN P	KOTAK	KOTPRA19042021
39	9917001055	RAGHUL R	VISIONARY RCM	VISRAG03052021
40	9917001056	E. D. RAMANATHAN	GREEN SIGNAL BIOPHARMA	GRERAM16042021
41	9917001057	RAMAR.N	FUTURE GENERALI	FUTRAM28122020
42	9917001058	A.K.RAMKUMAR	HEALTHWATCH	HEARAM18122020
43	9917001060	SABITHA T	NETTY FISH	BI-244/02082021
44	9917001061	SANTHOSH KRISHNAN S	NETTY FISH	BI-247/02082021
45	9917001062	SARAVANA SUNDAR H	LUMINA DATAMATICS	LUMSAR16112021
46	9917001063	SATHIYA DEVI. P	LUMINA DATAMATICS	LUMSAT16112021
47	9917001064	SHARMILA.P	VISIONARY RCM	VISSHA03052021
48	9917001065	SHRUTI SIVARAMAN	INDIAN HEALTHCARE	INDSHR15032021
49	9917001066	P.SHYNI JASMIN	SUTHERLAND	SUTSHY02022021
50	9917001068	A. SIVAKKANI	INDIAN HEALTHCARE	INDSIV15032021
51	9917001070	R. SNEKHA	LUMINA DATAMATICS	LUMSNE16112021
52	9917001071	K.S.SOUPARNIKA	NETTY FISH	BI-256/02082021
53	9917001072	M.SUBASH	LUMINA DATAMATICS	LUMSUB16112021
54	9917001074	K.SURIYALAKSHMI	SUTHERLAND	SUTSUR02022021
55	9917001077	UMA MAHESWARI G	VISIONARY RCM	VISUMA03052021
56	9917001078	M.VAIJAYANTHI	NETTY FISH	BI-279/02082021
57	9917001080	G.VASUNTHARA	SUTHERLAND	SUTVAS02022021
58	9917001082	A.P.VIDHYA SRI	VISIONARY RCM	VISVID03052021
59	9917001083	M.VIGNESH BALAN	INDIAN HEALTHCARE	INDVIG15032021

60	9917001084	VIJAYA M	NETTY FISH	BI-261/02082021
61	9917001085	VISHWA A	INDIAN HEALTHCARE	INDVIS15032021
62	9917001086	YASWANTH.J	VISIONARY RCM	VISYAS03052021
63	9917001088	ABITHA SRI K	KOTAK	KOTABI19042021
64	9917001090	KARTHIKA CHANDRAN R	KOTAK	KOTKAR19042021
65	9917001092	M. DHIVYADHARSHINI	VISIONARY RCM	VISDHI03052021
66	9917001093	M. S. AATHI KESAVAN	LEADPRO	LEAAAT22022021
67	9917001094	YESWANTH KUMAR Y	SUTHERLAND	SUTYES02022021
68	9917001096	M.SIVAMUNIESWARAN	LUMINA DATAMATICS	LUMSIV16112021
69	9917001098	A.BALAMURUGAN	FUTURE GENERALI	FUTBAL28122020
70	9917001101	SUVETHA CINNAKONDA JANARDHANAN	VISIONARY RCM	VISSUV03052021
71	9917001103	GEETIKA DEVI K.	FUTURE GENERALI	FUTGEE28122020
72	9917001106	VENKATESAN C	FUTURE GENERALI	FUTVEN28122020
73	9917001107	S.JENCY EMI CAROLIN	VISIONARY RCM	VISJEN03052021
74	9917001108	S.VIGNESH MUTHU	SUTHERLAND	SUTVIG02022021
75	9917001109	MAHESHPANDIAN.S	LEADPRO	LEAMAH22022021
76	9917001110	NINO FLAVIANA. R	SUTHERLAND	SUTNIN02022021
77	9917001111	DESIHA.B	NETTY FISH	BI-241/02082021
78	9917001113	V SUBHARAGA	INDIAN HEALTHCARE	INDSUB15032021

B.Tech Biotechnology (2019-20)

S. No	Enrollment Number	Name of the student placed	Name of the Employer	Appointment letter reference no. with date
1	9916001001	ABARNA E	Zifo Technologies	OL-1743_26022020
2	9916001003	ABINAYA K	Indian Healthcare	INDABI09032020
3	9916001150	ABINAYA R	TNQ	TNQ06012020
4	9916001005	ABIRAMI M S	Healthwatch	HEAABI20122019
5	9916001006	ABISHA G	Zifo Technologies	OL-1748_26022020
6	9916001008	AKILA S	Healthwatch	HEAAKI20122019
7	9916001010	AKSHAYA S V	Healthwatch	HEAAKS20122019
8	9916001012	ANUSUYA M	Healthwatch	HEAANU20122019
9	9916001013	ARUNLAKSHMI T	Nettyfish	B1-425_19082020

			Networks	
10	9916001015	ATCHAYA R	Healthwatch	HEAATH20122019
11	9916001016	ATHIMEERA M	Nettyfish Networks	B1-543_19082020
12	9916001017	BALA KIRUTHIKA B	Healthwatch	HEABAL20122019
13	9916001019	BHAIRAVI S	Healthwatch	HEABHA20122019
14	9916001023	BHUVANESHWARI A	Healthwatch	HEABHU20122019
15	9916001024	BINCY BENNY	Nettyfish Networks	B1-442_19082020
16	9916001025	BOYA THARUNI	TNQ	TNQBOY06012020
17	9916001027	CHANDRA MURALI B	Healthwatch	HEACHA20122020
18	9916001029	CHEBROLU MOHAN RAO	Indian Healthcare	INDCHE09032020
19	9916001031	DEEPIKA S	Healthwatch	HEADEE20122019
20	9916001033	DHANUSH DAMODHARAN	Nettyfish Networks	B1-506_19082020
21	9916001152	DUKKIREDDY MALLIKARJUNA REDDY	Kotak	KOTDUK10022020
22	9916001036	ELAKKIYA RUBA S	Leadpro	LEAELA07052018
23	9916001037	EUGITH PALCY S	Indian Healthcare	INDEUG09032020
24	9916001038	GANESH PRABU E	Nettyfish Networks	B1-473_19082020
25	9916001039	HARISHMITHA S	Lumina Datamatics	LUMHAR09112020
26	9916001157	HARSHI S	Nettyfish Networks	B1-372_19082020
27	9916001040	HARSITHA K	Leadpro	LEAHAR07052018
28	9916001041	HEMALATHA A	Healthwatch	HEAHEM20122019
29	9916001042	HEMAPRIYA S	Indian Healthcare	INDHEM09032020
30	9916001156	ILAKIYASURUTHI V	Ria International	RIAILA15072020
31	9916001043	IMMANUEL DAVID S	Healthwatch	HEAIMM20122019
32	9916001044	INBA JOTHI D	TNQ	TNQINB06012020
33	9916001154	JANANI S	Healthwatch	HEAJAN20122019
34	9916001046	JAYASHREE S	Healthwatch	HEAJAT20122019
35	9916001047	JAYASURIYAN N	Visionary RCM	VISJAY25112019
36	9916001048	JHANANI M	Visionary RCM	VISJHA25112019
37	9916001051	KALA NANDHINI B	Indian Healthcare	INDKAL09032020
38	9916001050	KALAIYARASAN A	Healthwatch	HEAKAL20122019
39	9916001053	KAMALRAJ R	Visionary RCM	VISKAM25112019
40	9916001055	KARTHIKADEVI S	TNQ	TNQKAR06012020
41	9916001057	KAYALVIZHI M	SBL Knowledge Services	SBL/MDR/EMP/19-20/5910_04032020
42	9915001043	KEERAN SETHUPATHI S	Visionary RCM	VISKEE25112019

43	9916001058	KEERTHIKA K	Healthwatch	HEAKEE20122019
44	9916001062	LINGESWARI M	Healthwatch	HEALIN20122019
45	9916001063	LOGES V	Healthwatch	HEALOG20122019
46	9916001065	MAKIMAA B S	Lumina Datamatics	LUMMAK09112020
47	9916001067	MANOJKUMAR A	Visionary RCM	VISMAN25112019
48	9916001068	MARI SELVA SUNDARI R	Nettyfish Networks	B1-448_19082020
49	9916001069	MARIA AGNES ROGANZIA S	Zifo Technologies	OL-1741_26022020
50	9916001070	MARIMUTHU S	Healthwatch	HEAMAR20122019
51	9916001071	MIRUTHULA R	Indian Healthcare	INDMIR09032020
52	9916001072	MOGHAL ALMAAZ	Healthwatch	HEAMOG20122019
53	9916001074	MOHAMED BASHEETH ALI I	Nettyfish Networks	B1-362_19082020
54	9916001076	MULLA SARIYANAZ	Healthwatch	HEAMUL20122019
55	9916001149	MURUGANANTH K	Nettyfish Networks	B1-476_19082020
56	9916001077	MUTHUKUMAR K	Healthwatch	HEAMUT20122019
57	9916001079	NAVEEN KUMAR R	Healthwatch	HEANAV20122019
58	9916001080	NITHISHRAM R K	TNQ	TNQNT06012020
59	9916001081	NIVAS U	Nettyfish Networks	B1-469_19082020
60	9916001084	PERIYAVELLAI C	Leadpro	LEAPER07052018
61	9916001085	PONRAJ R	Zealous	HRM/Campus/2020/177_1103 2020
62	9916001087	POORNIMA DEVI B	Healthwatch	HEAPOO20122019
63	9916001163	PRAKASH M	Healthwatch	HEAPRK20122019
64	9916001089	PRASANNADEVI S	Healthwatch	HEAPRA20122019
65	9916001091	PREETHIKA M	Healthwatch	HEAPRE20122019
66	9916001094	PREMKUMAR K	TNQ	TNQPRE06012020
67	9916001095	PRIYADHARSHINI S	Healthwatch	HEAPRI20122019
68	9916001098	RAJ BABU P	Healthwatch	HEARAJ20122019
69	9916001096	RAJAGANAPATHY K	Nettyfish Networks	B1-517_19082020
70	9916001101	RAMYA KRISHNAVENI M	Leadpro	LEARAM07052018
71	9916001102	RAMYA S A	TNQ	TNQRAM06012020
72	9916001104	REVATHI G	Healthwatch	HEAREV20122019
73	9916001105	ROOBAMATHI S	Zifo Technologies	OL-1733_26022020
74	9916001159	SAHANA PARVEEN	Nettyfish Networks	B1-358_19082020
75	9916001108	SANKARAGOMATHI N	Zifo Technologies	OL-1749_26022020
76	9916001161	SANTHIYAKAYATHRI M	Indian Healthcare	INDSAN09032020
77	9916001151	SARAH AFREEN B	Nettyfish Networks	B1-367_19082020

78	9916001110	SATHISH T	Leadpro	LEASAT07052018
79	9916001113	SHAIK MAHAMMAD SOHAIL	Healthwatch	HEASHA20122019
80	9916001115	SHAMINI A S	Sutherland	SUTSHA02122019
81	9916001117	SHEKAR PRIYADHARSHINI	Healthwatch	HEASHE20122019
82	9916001153	SHREENTAJ S	Visionary RCM	VISSHR25112019
83	9916001118	SHWETHA S	Healthwatch	HEASHW20122019
84	9916001120	SINDHE LAKSHMI PRIYA	Leadpro	LEASIN07052018
85	9916001122	SOPHIE P	Healthwatch	HEASOP20122019
86	9916001148	SOURAV KHANRA	Visionary RCM	VISSOU25112019
87	9916001125	SOWMYA S R	Healthwatch	HEASOW20122019
88	9916001126	SOWNDARIYA A	Leadpro	LEASOW07052018
89	9916001128	SREESHMA REVATHI T	Healthwatch	HEASRE20122019
90	9916001129	SRIGA SHAN	HCL	HCLSRI06012020
91	9916001130	SUBIKSHAA M	Healthwatch	HEASUB20122019
92	9916001131	SUGANTHI J	Nettyfish Networks	B1-483_19082020
93	9916001132	SUGUNA T	TNQ	TNQSUG06012020
94	9916001155	SUPRAJA N S	Indian Healthcare	INDSUP09032020
95	9916001134	SWATHI V	Leadpro	LEASWA07052018
96	9916001162	UMA MAHESWARI D	Healthwatch	HEAUMA20122019
97	9916001138	VAISHNAVISRUTHI R	Healthwatch	HEAVAI20122019
98	9916001139	VANDHANA K	Leadpro	LEAVAN07052018
99	9916001141	VENNILA SANKARI B	Leadpro	LEAVEN07052018
100	9916001142	VENNILA V	Leadpro	LEAVEV07052018
101	9916001144	VIGNESH S	Healthwatch	HEAVIG20122019
102	9916001143	VIGNESHPERUMAL R	SBL Knowledge Services	SBL/MDR/EMP/19-20/5916_04032020
103	9916001145	VIJAYARAGHAVAN B	SBL Knowledge Services	SBL/MDR/EMP/19-20/5913_04032020
104	9916001146	YALLANTI RAMAKRISHNA	Nettyfish Networks	B1-443_19082020
105	9916001147	YUVA SRI R	Indian Healthcare	INDYUV09032020

B.Tech Biotechnology (2018-19)

S. No	Enrollment Number	Name of the student placed	Name of the Employer	Appointment letter reference no. with date
1	9914001003	AISHWARYA S.	VISIONARY RCM	VISAIS24122018
2	9915001001	AARTHI J	HGS	HGSL/ HGSL17748/Bangalore_241 12018
3	9915001003	ALAGESWARI MAHESH	VISIONARY RCM	VISALA24122018

4	9915001004	ANAND G	TNQ	TNQANA02082019
5	9915001005	ANANTHA PRIYA S	VISIONARY RCM	VISANA24122018
6	9915001006	ANNISH LOURDHURAJ J	FACE	FACANN19022019
7	9915001007	ARTHI P	VISIONARY RCM	VISART24122018
8	9915001009	ASHIQILAHIKHAN M	EDUVIRTUOSO	EDUASH18022019
9	9915001010	ATHULYA SANKAR	MAGUS	MAGATH01042019
10	9915001011	BALA SHARASWATHI G	VISIONARY RCM	VISBAK24122018
11	9915001012	BALAKRISHNAN K	KOTAK	KOTBAL24012019
12	9915001015	DAVID THANGARAJ J	PFIZER	PFIDAV08042019
13	9915001016	DHARANI S	MAGUS	MAGDHA01042019
14	9915001017	DHIVAGAR K	THINKSYNQ	THIDHI21012019
15	9915001018	DIVYA N	HGS	HGSL/ HGSL17754/Bangalore_241 12018
16	9915001019	ELAKKIYA P	EDUVIRTUOSO	EDUALA18022019
17	9915001020	EZHILARASAN M	THINKSYNQ	THIEZH21012019
18	9915001021	FAUSTINNA S	VISIONARY RCM	VISFAU24122018
19	9915001022	GANESH PREM KUMAR V	VISIONARY RCM	VISGAN24122018
20	9915001024	GOWSALYA R	HGS	HGSL/ HGSL17756/Bangalore_241 12018
21	9915001027	HADIYA DAMAN J	VISIONARY RCM	VISHAD24122018
22	9915001028	INBA VENU P	VISIONARY RCM	VISINB24122018
23	9915001029	ISHWARIYA G	PFIZER	PFIISH08042019
24	9915001030	JAYA SHILPA S	GLOBAL HEALTH CARE	<u>GLOJAY02032019</u>
25	9915001032	JAYADEVI J	GLOBAL HEALTH CARE	<u>GLOJAT02032019</u>
26	9915001034	JEHINA BABY J	VISIONARY RCM	VISJEH24122018
27	9915001035	JEYALAKSHMI S	HGS	HGSL/ HGSL17764/Bangalore_241 12018
28	9915001036	<u>KALEESWARI@SUHASHI NI M</u>	HGS	HGSL/ HGSL17765/Bangalore_241 12018
29	9915001037	KARISHMA KAPOOR A	EDUVIRTUOSO	EDUKAR18042019
30	9915001038	KARPAGAPRIYA S	PFIZER	PFIKAR08042019
31	9915001040	KARTHICK KUMAR S	HGS	HGSL/ HGSL17767/Bangalore_241 12018
32	9915001041	KARUPPASAMY V	THINKSYNQ	THIKAR21012019
33	9915001044	KEERTHI.D	VISIONARY RCM	VISKEE24122018
34	9915001045	LAKSHMI PRIYA S	VISIONARY RCM	VISLAK24122018
35	9915001046	LAVANYA D	VISIONARY RCM	VISLAV24122018
36	9915001047	LAVANYA K S	HGS	HGSL/ HGSL17771/Bangalore_241 12018

37	9915001048	MAHALAKSHMI G	HGS	HGSL/ HGSL17773/Bangalore_241 12018
38	9915001049	MAHALAKSHMI N	HGS	HGSL/ HGSL17774/Bangalore_241 12018
39	9915001050	MAHALAKSHMIPRABHA M	HGS	HGSL/ HGSL17775/Bangalore_241 12018
40	9915001051	MANIKANDAN S	VISIONARY RCM	VISMAN24122018
41	9915001052	MEGA M	GLOBAL HEALTH CARE	<u>GLOMEG02032019</u>
42	9915001054	MIGUELA MIN N	TECH MAHINDRA	<u>TECMIG062019</u>
43	9915001055	MUTHURAJA S	VISIONARY RCM	<u>VISMUT24122018</u>
44	9915001061	NIVETHA S	VISIONARY RCM	VISNIV24122018
45	9915001064	PAVITHRA K	PFIZER	PFIPAV6408042019
46	9915001065	PONMUTHU U	OMICS	OMICS/HR/OFFER/FTE/08 1_06052019
47	9915001066	PRADEEPKUMAR B	HEALTH WATCH	HEAPRA18022019
48	9915001067	PRADEEP KUMAR M	NEEYAMO	NEEPRA05062019
49	9915001068	PRADEEP PANDIAN P	ZIFO RND	OL-1590_02042019
50	9915001069	PRAKRUTHI M	HGS	HGSL/ HGSL17779/Bangalore_241 12018
51	9915001070	PRAVEEN KUMAR S	VISIONARY RCM	VISPRA24122018
52	9915001071	PRAVEENAHARI C	OMICS	OMICS/HR/OFFER/FTE/08 2_06052019
53	9915001072	PRIYA DHARSHINI R	HGS	HGSL/ HGSL17780/Bangalore_241 12018
54	9915001073	PRIYADHARSHINI K	VISIONARY RCM	VISPRI24122018
55	9915001074	RAHUL RAJ B	ALGAL R	ALGRAH25022019
56	9915001075	RAJ BABU P	VISIONARY RCM	VISRAJ24122018
57	9915001076	RAJA C	HGS	HGSL/ HGSL17783/Bangalore_241 12018
58	9915001079	RAMAR S	KOTAK	KOTRAM24012019
59	9915001082	REVATHY P	SANOFI	SANREV06062019
60	9915001083	SARANI K	HGS	HGSL/ HGSL17785/Bangalore_241 12018
61	9915001085	SATHIYA K	OMICS	OMICS/HR/OFFER/FTE/08 3_06052019
62	9915001086	SHOBI N	GLOBAL HEALTH CARE	<u>GLOSHO02032019</u>
63	9915001087	SOUNDARYA L	HEALTH WATCH	HEASOU18022019
64	9915001088	SOUNDARYA R	VISIONARY RCM	VISSOU24122018
65	9915001090	SUDAR BALAKRISHNAN K	HGS	HGSL/ HGSL17787/Bangalore_241 12018

66	9915001091	SUJITHA P	HEALTH WATCH	HEASUJ18022019
67	9915001094	TAJSABREEN B	VISIONARY RCM	VISTAJ24122018
68	9915001096	UDAYAKUMAR M	KOTAK	KOTUDA24012019
69	9915001097	UNISH KUMAR K.K.	VISIONARY RCM	VISUNI24122018
70	9915001098	VAISHNAVI DEVI L	OMICS	OMICS/HR/OFFER/FTE/084_06052019
71	9915001100	VIGNESH B	EDUVIRTUOSO	EDUVIG18022019
72	9915001103	YOGEESH A	HGS	HGSL/ HGSL17789/Bangalore_24112018
73	9915001106	PREETHI SUSHMA M	HEALTH WATCH	HEAPRE18022019
74	9915001107	HEPHZIBAHGLORY S J	OMICS	OMICS/HR/OFFER/FTE/085_06052019
75	9915001108	N MRUDUL LALITYA	BYJUS	BYJMRU26062019
76	9915001109	GURU DHARINI I	VISIONARY RCM	VISGUR24122018
77	9915001110	ISWARYA A B	VISIONARY RCM	VISISW24122018
78	9915001111	KOSURI JAYA SAHITYA	VISIONARY RCM	VISKOS24122018
79	9915001116	JANANI P	HEALTH WATCH	HEAJAN18022019
80	9915001117	VIJAYAKUMAR.T	SCOPE E KNOWLEDGE	SEK/TRG/O1_20082019
81	9915001118	VARSHA M	CODE MANTRA	REF/CAMPUS/PROD/037_20022019
82	9915001119	PRAVEEN K	HGS	HGSL/ HGSL17792/Bangalore_24112018
83	9915001120	LAVANYA S	SANOFI	SANLAV23072019
84	9915001122	PETCHIAMMAL@ Mahalakshmi S	GLOBAL HEALTH CARE	<u>GLOMAH02032019</u>
85	9915001123	MEENALOCHINI A	HEALTH WATCH	HEAMEE18022019
86	9915001126	AARTHI B	EDUVIRTUOSO	EDUAAR18022019
87	9915001127	AKILAN M	THINKSYNQ	THIAKI21012019
88	9915001128	ANU KRITHIKA A K	SPI GLOBAL	Spi/OL/BKS/2018/1791_12122018
89	9915001129	ANUPRIYA C	VISIONARY RCM	VISANU24122018
90	9915001130	BALA DEVI R	HGS	HGSL/ HGSL17796/Bangalore_24112018
91	9915001131	BANDARU MONIKA	EDUVIRTUOSO	EDUBAN18022019
92	9915001133	BHUVANESHWARI M	EDUVIRTUOSO	EDUBHU18022019
93	9915001134	CHILAKA DHINESH MOHITH REDDY	EDUVIRTUOSO	EDUCHI18022019
94	9915001135	GANESH KUMAR S	HGS	HGSL/ HGSL17797/Bangalore_24112018
95	9915001136	MANIAN.V.A	HGS	HGSL/ HGSL17798/Bangalore_24112018
96	9915001137	MOHAMED AKHIL M	TECH MAHINDRA	<u>TECMOH062019</u>
97	9915001138	NAGA VENKATA SAI	VISIONARY RCM	VISNAG24122018

		GIRIDHAR REDDY		
98	9915001139	PAVITHRA K	PFIZER	PFIPAV3908042019
99	9915001140	PAVITHRA K R	SPI GLOBAL	Spi/OL/BKS/2018/1795_12 122018
100	9915001145	TAMIL VANI M	VISIONARY RCM	VISTAM24122018
101	9915001146	K USHA SRI	VISIONARY RCM	VISUSH24122018
102	9915001151	YOGALAKSHMI A	OMICS	OMICS/HR/OFFER/FTE/08 7_06052019
103	9915001152	SABITHA R	GLOBAL HEALTH CARE	<u>GLOSAB02032019</u>
104	9915001156	SUMITH CHRISTY	HGS	HGSL/ HGSL17801/Bangalore_241 12018
105	9915001159	RAMAGIRI PAVITHRA	OMICS	OMICS/HR/OFFER/FTE/08 8_06052019
106	9915001160	AYYAVARISETTY SUSHMITHA	OMICS	OMICS/HR/OFFER/FTE/08 9_06052019
107	9915001161	BACKIALAKSHMI R	OMICS	OMICS/HR/OFFER/FTE/09 0_06052019
108	9915001163	R KARTHIKE	VISIONARY RCM	VISKAR24122018
109	9915001165	HARISH KUMARAN G	HGS	HGSL/ HGSL17805/Bangalore_241 12018
110	9915001166	ADHILKHAN A	GROUP PHARMACEUTIC ALS	VP/123/19-20_23092019
111	9915001167	AMIRTHA VARSHINI R	EDUVIRTUOSO	EDUAMI18022019
112	9915001168	IHSANA BANU I	EDUVIRTUOSO	EDUIHS18022019
113	9915001169	M SIVA SANKAR	HGS	HGSL/ HGSL17807/Bangalore_241 12018
114	9915001170	SWARNALATHA A	VISIONARY RCM	VISSWR24122018

Table B.4.4a

4.5 Professional Activities (20)

4.5.1 Professional societies / chapters and organizing engineering events (5)

The local chapters of Indian Association of Applied Microbiologists and Biotechnology Research Society of India are active in our institution. The following events are organized with the guidance of these societies.

Engineering Events organized by the Department

S. NO	NAME OF PROGRAMME	DATE
1	National Conference on "Innovations in Biotechnology for Sustainable Life"	23.04.2022
2	One Day Workshop on Lab Safety and Management	20.04.2022
3	Industry Expert Guest Lecture on "What are the expectations of a hiring	05.04.2022

	manager and how to prepare a candidate: Interactions on the industry perspective”	
4	One Day Workshop on Nurturing and Transforming Research	11.03.2022
5	2 nd National Conference on “Innovations in Bio and Chemical Engineering for Sustainable Life”	20.05.2021-21.05.2021
6	Virtual Workshop on "Biotechniques for Extraction of Metabolites from Plant and Microalgae Sources"	11.05.2020 - 12.05.2020
7	Online Workshop on "Bread, Butter and Biotechnology"	13.05.2020-14.05.2020
8	Virtual Workshop on "Protein and Genome Bioinformatics"	15.05.2020
9	Webinar on "What's New About Sars-Cov-2?"	03.06.2020
10	Webinar on "Vaccines: The Covid-19 Challenge	04.06.2020
11	Webinar on "Is Ventilator a Double-Edged Sword?"	05.06.2020
12	Webinar on "Missing Links in The Enemy Territory."	06.06.2020
13	Webinar on "Does Complement Cascade a Culprit?"	10.06.2020
14	Webinar on "Viral Diagnosis: The Covid-19 Scenario"	11.06.2020
15	Virtual Conference on Innovations in Bio and Chemical Engineering for Sustainable Life	08-09.06.2020
16	Virtual Workshop on "Caterpillar to Butterfly 2.0 – Personality Development"	04.06.2020-06.06.2020
17	Virtual Workshop on "Protein Bioinformatics"	08.06.2020-10.06.2020
18	Virtual Workshop on "Plant Bioinformatics"	11.06.2020-12.06.2020
19	Virtual Workshop on "Waste –an Offer Letter"	11.06.2020
20	Virtual Workshop on "Understanding Proteins in the Post-Genomic Era"	13.06.2020-14.06.2020
21	Virtual Workshop on " From Student To Bio Entrepreneur"	14.06.2020
22	Virtual Workshop on " The Era Of Digital Bioprocessing: Exploitation Of Matlab For Bioprocess Engineers"	17.06.2020-18.06.2020
23	Virtual Workshop on " Biofirm - Scaling Lab2market"	18.06.2020-20.06.2020
24	Virtual Workshop on " Basic Animal Handling Techniques"	19.06.2020
25	Virtual Conference on Innovation In Interdisciplinary Research 2020	23-24.06.2020
26	Workshop on Metagenomics	29.06.2020
27	Virtual Workshop on “Biologically Inspired Nanomaterials”	30.06.2020
28	International Virtual Workshop on “Experiment, Data, Report and Beyond-	15.07.2020-

	2020”	16.07.2020
29	Virtual Workshop on “Python Programming”	08.07.2020-17.07.2020
30	Workshop on “Recent Trends in Functional Proteomics”	06-07.07.2020
31	Virtual Symposium on Origene 2k20	16.08.2020
32	Webinar on “Technology for Effective Presentation”	08-08-2020
33	Indo-Us Workshop on Thermophilic Bioprocessing	01-02.01.2019
34	Indo-Us Workshop on Extremophiles in Biotechnology	27-28.11. 2019
35	17 th Iaam Annual Conference on Microbiology in the New Millennium	29-30.11. 2019
36	Guest lecture on “Extremophiles and Deep Biosphere Microbes for Bioenergy Applications”	02.01.2018
37	Guest lecture on “Bioelectrochemical Interface Technologies for Energy Applications in Space”	02.01.2018
38	Guest lecture on “Defective Decidualization - a primer for preeclampsia”	04.01.2018
39	Guest lecture on “Agricultural challenges and opportunities”	06.01.2018
40	Guest lecture on “Societal Relevance of Ophthalmic Genetics”	06.01.18
41	Guest lecture on “Heavy metal removal by Algae derived activated carbon”	01.02.18
42	Guest lecture on “Biological Waste water treatment proces”	07.03.18
43	Entrepreneur Awareness Camp	15-03-2018
44	Techniques in Sustainable Urbanization	17-03-2018
45	One day Workshop on "Design of Experiments and Bioprocess optimization"	22-03-2018
46	Biomasteros	18-08-2018
47	Guest lecture on “Functional Genomics of Plants"	20-09-2018
48	Workshop on Basic Animal Cell Culture Techniques	23-10-2018
49	Workshop on "Effective Report Writing And Presentation Skills"	26-10-2018

4.5.2 Publication of technical magazines, news letters, etc.(5)

The Department regularly publishes newsletters every year. The following faculty members were the Editors:

S.no.	Academic Year	Editor
1	2021-2022	Dr. S. Ram Kumar Pandian
2	2020-2021	Dr. K. Selvaraj

3	2019-2020	Mr. S. J. Kabilan
4	2018-2019	Dr. S. Ram Kumar Pandian



Fig 4.5.2(a) A glimpse from the Newsletter published in 2019



Fig 4.5.2(b) A glimpse from the Newsletter published in 2020



Fig 4.5.2(c) A glimpse from the Newsletter published in 2021



Fig 4.5.2(d) A glimpse from the Newsletter published in 2022

4.5.3 Participation in inter-institute events by students of the program of study (10)

ACADEMIC YEAR: 2019-20					
S.No	Register Number	Name of The Students	Event Name (Seminar, Workshop, Conference)	Date of The Event	Name of The Organization
1	9916001069	S.Maria Agnes Roganzia	Recent Trends in Bioinorganic Chemistry (RTBIC19)	Feb 18, 2019	Loyola College (Autonomous),Chennai
2	9916001068	R.Mari Selva Sundari	Recent Trends in Bioinorganic Chemistry (RTBIC19)	Feb 18, 2019	Loyola College (Autonomous),Chennai
3	9916001013	T.Arun lakshmi	Applications of Chromatography ,Thermal analysis & Cyclic Voltammetry Techniques for Characterization of biomolecules /Materials (ACTCTVT2020)	Feb 5-7 , 2020	Bannari Amman Institute of Technology,Sathyamangalam
4	9916001015	R.Atchaya	Applications of Chromatography ,Thermal analysis & Cyclic Voltammetry Techniques for Characterization of biomolecules /Materials (ACTCTVT2020)	Feb 5-7 , 2020	Bannari Amman Institute of Technology,Sathyamangalam
5	9916001055	S.Karthika Devi	Applications of Chromatography ,Thermal analysis & Cyclic Voltammetry Techniques for Characterization of biomolecules /Materials (ACTCTVT2020)	Feb 5-7 , 2020	Bannari Amman Institute of Technology,Sathyamangalam
6	9916001150	R.Abinaya	Applications of Chromatography ,Thermal analysis & Cyclic Voltammetry Techniques for Characterization of biomolecules /Materials (ACTCTVT2020)	Feb 5-7 , 2020	Bannari Amman Institute of Technology,Sathyamangalam
7	9916001095	S.Priyadharshini	Computational Biology &Mediaci Biotechnology in Health Care (CBMH -19)	Sep 17 &18 ,2019	Sathyabama Institute of Science and Technology
8	9916001159	Sahana Praveen	Computational Biology &Mediaci Biotechnology in Health Care (CBMH -19)	Sep 17 &18 ,2019	Sathyabama Institute of Science and Technology
9	9916001089	S.Prasannadevi	Computational Biology	Sep 17 &18	Sathyabama Institute of

			&Mediac Biotechnology in Health Care (CBMH -19)	,2019	Science and Technology
10	9916001131	J.Suganthi	Computational Biology &Mediac Biotechnology in Health Care (CBMH -19)	Sep 17 &18 ,2019	Sathyabama Institute of Science and Technology
11	9916001159	Sahana Praveen	Western Blotting Techniques	Feb 07- 09, 2020	Centre for Stem Cell and Cancer Genomics, AMI Bioscience ,Coimbatore
12	9916001106	Rounack Cherian	Research Methology	Aug 2-4, 2019	Amrita Centre for Research and Development
13	9916001024	Bincy Benny	Research Methology	Aug 2-4, 2019	Amrita Centre for Research and Development
14	9916001033	Dhanush Damodaran	Research Methology	Aug 2-4, 2019	Amrita Centre for Research and Development
15	9916001133	S.P.Suresh Krishnan	Instrumental Mthods of Analysis	Jan 24 - 26,2019	National Institute of Technology ,Tiruchirappalli
16	9916001081	U.Nivas	Analytical /Bioanalytical Instrumental Methods of Analysis in Life Science, Chemical Sciences &Biotechnology (ABIMA2019)	Jul 24-26,2019	Bannari Amman Institute of Technology,Sathyamangalam
17	9916001080	R.K.Nithish Ram	Analytical /Bioanalytical Instrumental Methods of Analysis in Life Science, Chemical Sciences &Biotechnology (ABIMA2019)	Jul 24-26,2019	Bannari Amman Institute of Technology,Sathyamangalam
18	9916001145	B.Vijayaraghavan	Analytical /Bioanalytical Instrumental Methods of Analysis in Life Science, Chemical Sciences &Biotechnology (ABIMA2019)	Jul 24-26,2019	Bannari Amman Institute of Technology,Sathyamangalam
19	9916001119	P.Silamparsan	Analytical /Bioanalytical Instrumental Methods of Analysis in Life Science, Chemical Sciences &Biotechnology (ABIMA2019)	Jul 24-26,2019	Bannari Amman Institute of Technology,Sathyamangalam
20	9916001038	E.Ganesh Prabu	Advancements &Explorations in Augmented Biology	Oct 10- 11,2019	Karunya Institute of Technology and science ,Coimbatore
21	9916001041	A.Hemalatha	Stem cell Therapy in Heart and Eve Treatment	Mar 13- 14,2019	Bannari Amman Institute of

					Technology,Sathyamangalam
22	9916001133	S.P.Suresh Krishnan	Emerging Trends in Energy Harvesting and Energy Storage Techniques	Jan 3&4 2020	Mepco Schlenk Engineering College ,Sivakasi
23	9916001159	Sahana Parveen	Identification ,Bioprospecting and Conservation of Lichens	Sep 12&13, 2019	Indian Lichenological Society and CSIR-National Botanical Research Institute ,Uttar Pradesh
24	9917001103	K.Geethika Devi	Identification ,Bioprospecting and Conservation of Lichens	Sep 12&13, 2019	Indian Lichenological Society and CSIR-National Botanical Research Institute ,Uttar Pradesh
25	9916001126	A.Sowndariya	Hands on Training on Microbiology Techniques	Aug 21-22,2019	Sathyabama Institute of Science and Technolgy
26	9916001070	S.Marimuthu	Hands on Training on Microbiology Techniques	Aug 21-22,2019	Sathyabama Institute of Science and Technolgy
27	9916001106	Raunack Cheriyan	Pilot Scale Biodiesel Production,Wastewater Analysis and Treatment	Sep 16-17 ,2019	Sathyabama Institute of Science and Technolgy
28	9916001019	S.Bhairavi	Solid Waste Management:Challenges Towards Healthier Environment (SWACHH)	Jan 09-2020	Sathyabama Institute of Science and Technolgy
29	9916001111	E.Sathiya Khumar	Emerging Trends inAdvance Biofuel and Bioenergy	Mar 06-2020	Dr.N.G.P.Institute of Technology,Coimbatore
30	9916001038	E.Ganesh Prabu	Emerging Trends inAdvance Biofuel and Bioenergy	Mar 06-2020	Dr.N.G.P.Institute of Technology,Coimbatore
31	9916001143	R.Vignesh Perimal	Emerging Trends inAdvance Biofuel and Bioenergy	Mar 06-2020	Dr.N.G.P.Institute of Technology,Coimbatore
32	9916001084	C.Periya Vellai	Emerging Trends inAdvance Biofuel and Bioenergy	Mar 06-2020	Dr.N.G.P.Institute of Technology,Coimbatore
33	9916001042	A.Hemalatha	Real Time project design Using Arduino Tools and Techniques	Jun 20-21,2019	National Institute of Technology,Tiruchirappali
34	9916001126	A.Sowndariya	Real Time project design Using Arduino Tools and Techniques	Jun 20-21,2019	National Institute of Technology,Tiruchirappali
35	9916001058	K.Keerthika	Real Time project design Using Arduino Tools and Techniques	Jun 20-21,2019	National Institute of Technology,Tiruchirappali
36	9916001008	S.Akila	Real Time project design Using Arduino Tools and Techniques	Jun 20-21,2019	National Institute of Technology,Tiruchirappali
37	9916001057	M.Kayavizhi	Real Time project design Using Arduino Tools and Techniques	Jun 20-21,2019	National Institute of Technology,Tiruchirappali

38	9916001033	Dhanush Damodaran	Soft Computing Techniques using MATLAB	Jan 23-24,2020	Karpagam College of Engineering,Coimbatore
39	9916001138	R.Vaishnavi Sruthi	Soft Computing Techniques using MATLAB	Jan 23-24,2020	Karpagam College of Engineering,Coimbatore

ACADEMIC YEAR: 2018-19

S.No	Register Number	Name Of The Students	Event Name (Seminar, Workshop, Conference)	Date Of The Event	Name Of The Organization
1	9915001166	Adhil Khan	Recent Innovations in Biomedical Engineering	Aug 7-9 2018	Satyabama University
2	9915001156	Sumith Christy	Recent Innovations in Biomedical Engineering	Aug 7-9 2018	Satyabama University
3	9916001130	M Subiksha	Biology and Medicine	Feb 7- 8 2019	Bharathiar University
4	9916001045	Jeya Prabhakaran	Biology and Medicine	Feb 7- 8 2019	Bharathiar University
5	9916001004	S V Abinaya	Biology and Medicine	Feb 7- 8 2019	Bharathiar University
6	9916001018	Bazeera Ferdouzs	Biology and Medicine	Feb 7- 8 2019	Bharathiar University
7	9916001042	Hema Priya	Biology and Medicine	Feb 7- 8 2019	Bharathiar University
8	9916001007	Advitha Premanand	Biology and Medicine	Feb 7- 8 2019	Bharathiar University
9	9916001118	S Shewtha	Biology and Medicine	Feb 7- 8 2019	Bharathiar University
10	9916001024	Bincy Benny	Computational Genomics and Proteomics	Feb 22-23 2019	Vivekanandha Arts and Science College
11	9916001106	Rounack Cherian	Computational Genomics and Proteomics	Feb 22-23 2019	Vivekanandha Arts and Science College
12	9916001036	Illakiyasruthi D	Unearth the New Fronteirs in Life Sciences	Feb 11 2019	Sri Krishna Arts and Science College
13	9916001143	Vigensh Perumal	Unearth the New Fronteirs in Life Sciences	Feb 11 2019	Sri Krishna Arts and Science College
14	9916001111	Sathiya Kumar E	Unearth the New Fronteirs in Life Sciences	Feb 11 2019	Sri Krishna Arts and Science College
15	9916001090	Praseetha S	Unearth the New Fronteirs in Life Sciences	Feb 11 2019	Sri Krishna Arts and Science College
16	9916001027	Chandra Murali	Frontiers in Anlaytical and Clinclal Technology	Jan 24-25 2019	Noorul Islam University
17	9916001044	Inbajothi	Frontiers in Anlaytical and Clinclal Technology	Jan 24-25 2019	Noorul Islam University
18	9916001150	Abinaya	Frontiers in Anlaytical and Clinclal Technology	Jan 24-25 2019	Noorul Islam University
19	9916001055	Karthika Devi S	Frontiers in Anlaytical and Clinclal Technology	Jan 24-25 2019	Noorul Islam University
20	9916001072	Mogul Almaaz	Metamorphosis from	Feb 25 -	Anna University

			Academia to Bioindustrialization	27 2019	
21	9916001013	Arun Lakshmi	Metamorphosis from Academia to Bioindustrialization	Feb 25 - 27 2019	Anna University
22	9916001090	Praseetha	Metamorphosis from Academia to Bioindustrialization	Feb 25 - 27 2019	Anna University
23	9916001154	S Janani	Metamorphosis from Academia to Bioindustrialization	Feb 25 - 27 2019	Anna University
24	9916001023	A Bhuvaneshwari	Metamorphosis from Academia to Bioindustrialization	Feb 25 - 27 2019	Anna University
25	9916001151	Sarah Afreen	Metamorphosis from Academia to Bioindustrialization	Feb 25 - 27 2019	Anna University
26	9916001101	Ramya Krishnaveni	Metamorphosis from Academia to Bioindustrialization	Feb 25 - 27 2019	Anna University
27	9916001147	Yuva Sri	Biochemistry and Therapeutics of Diabetes and Cancer	Feb 28 - March 1 2019	Loyala College, Chennai
28	9916001129	Sriga Shan	Biochemistry and Therapeutics of Diabetes and Cancer	Feb 28 - March 1 2019	Loyala College, Chennai
29	9916001102	S A Ramya	Biochemistry and Therapeutics of Diabetes and Cancer	Feb 28 - March 1 2019	Loyala College, Chennai
30	9916001062	M Lingeswari	Biochemistry and Therapeutics of Diabetes and Cancer	Feb 28 - March 1 2019	Loyala College, Chennai
31	9916102003	R Raja Rajeswari	Biochemistry and Therapeutics of Diabetes and Cancer	Feb 28 - March 1 2019	Loyala College, Chennai

ACADEMIC YEAR: 2017-18

S.No	Register Number	Name of The Students	Event Name (Seminar, Workshop, Conference)	Date of The Event	Name of The Organization
1	9915001014	Clayton Fernando	International Conference on Energy and Environment	March 9-10 2018	NIT Calicut
2	9915001004	Anand Gurusawmy	International Conference on Energy and Environment	March 9-10 2018	NIT Calicut
3	9915001025	Gowtham Palani Sawy	International Conference on Energy And Environment	March 9-10 2018	NIT Calicut

4	9916102003	Rajeswari C	International Conference on Energy and Environment	March 9-10 2018	NIT Calicut
5	9915001030	Jayashilpa	Biotechnology for Sustainable Development	March 16-18 2018	Arunai Engineering College
6	9915001010	Athulya Sankar	Biotechnology for Sustainable Development	March 16-18 2018	Arunai Engineering College
7	9919001003	G Iswarya	Biotechnology for Sustainable Development	March 16-18 2018	Arunai Engineering College
8	9915001047	K S Lavanya	Biotechnology for Sustainable Development	March 16-18 2018	Arunai Engineering College
9	9915001036	Kalaseeswari	Biotechnology For Sustainable Development	March 16-18 2018	Arunai Engineering College
10	9915001034	Jehina Baby Davidraj	International Conference on Energy And Environment	March 9-10 2018	NIT Calicut
11	9915001005	Anantha Priya Subramanian	International Conference on Energy And Environment	March 9-10 2018	NIT Calicut
12	9916001105	Roobamathi	Furture Prospects of Biotechnology In India	Feb 28 - March 1 2018	Adhiyamaan Engineering College
13	9916001134	V Swathi	Furture Prospects of Biotechnology In India	Feb 28 - March 1 2018	Adhiyamaan Engineering College
14	9916001071	R Mirthula	Furture Prospects of Biotechnology In India	Feb 28 - March 1 2018	Adhiyamaan Engineering College
15	9916001122	P Sophie	Furture Prospects of Biotechnology In India	Feb 28 - March 1 2018	Adhiyamaan Engineering College
16	9916001115	A S Shamini	Furture Prospects of Biotechnology In India	Feb 28 - March 1 2018	Adhiyamaan Engineering College
17	9915001143	Sivaranjini	Adavnced Functional Materials for Energy Environment and Biomedical Applications	Dec 11-12 2017	Madurai Kamaraj University
18	9915001153	U Pavithra	Adavnced Functional Materials for Energy Environment and Biomedical Applications	Dec 11-12 2017	Madurai Kamaraj University
19	9916102003	Raja Rajeshwari	Synfora 2017	Sep 16-17 2017	Rajalakshmi Engeering College
20	9916001010	S V Akshaya	Synfora 2017	Sep 16-17 2017	Rajalakshmi Engeering College

21	9916001102	S A Ramya	Synfora 2017	Sep 16-17 2017	Rajalakshmi Engineering College
22	9916001104	Revathi G	Synfora 2017	Sep 16-17 2017	Rajalakshmi Engineering College
23	9916001086	Pooja Vaishnavi	Integrated Biotechnological Tools and Concepts	March 1 - 2 2018	SRM University
24	9916001151	Sarah Afreen	Integrated Biotechnological Tools and Concepts	March 1 - 2 2018	SRM University
25	9916001100	Ramalakshmi	Integrated Biotechnological Tools and Concepts	March 1 - 2 2018	SRM University
26	9916001101	Ramya Krishnaveni	Integrated Biotechnological Tools and Concepts	March 1 - 2 2018	SRM University
27	9916001162	Uma Maheswari	Integrated Biotechnological Tools and Concepts	March 1 - 2 2018	SRM University
28	9916001157	Harshi	Integrated Biotechnological Tools and Concepts	March 1 - 2 2018	SRM University
29	9916001163	Prakash	Integrated Biotechnological Tools and Concepts	March 1 - 2 2018	SRM University
30	9916001054	Karthik	Integrated Biotechnological Tools and Concepts	March 1 - 2 2018	SRM University
31	9916001030	Darshan	Integrated Biotechnological Tools and Concepts	March 1 - 2 2018	SRM University
32	9916001067	Manoj Kumar	Integrated Biotechnological Tools and Concepts	March 1 - 2 2018	SRM University
33	9916001053	Kamal Raj	Integrated Biotechnological Tools and Concepts	March 1 - 2 2018	SRM University
34	9916001157	Harshita	Integrated Biotechnological Tools and Concepts	March 1 - 2 2018	SRM University
35	9916001087	Poornima Devi B	National Conference on Bioprocess Issues Challenges and Opportunities	Sep 21-22 2017	Mepco Schelenk Engineering College
36	9913001009	Bhuvaneswari R	National Conference on Bioprocess Issues Challenges and Opportunities	Sep 21-22 2017	Mepco Schelenk Engineering College
37	9916001137	Tvareta T	National Conference on Bioprocess Issues Challenges and Opportunities	Sep 21-22 2017	Mepco Schelenk Engineering College
38	9916001069	Maria Agnes Roganzia	National Conference on Bioprocess Issues Challenges and Opportunities	Sep 21-22 2017	Mepco Schelenk Engineering College
39	9916001011	Angelin Jenit	National Conference on Bioprocess Issues Challenges and Opportunities	Sep 21-22 2017	Mepco Schelenk Engineering College
40	9916001032	Dhana Pradeeba	Biotechnology Towards Sustainable Future	Feb 1 -2 2018	PSR Engineering College
41	9916001010	V Akshaya	Biotechnology Towards Sustainable Future	Feb 1 -2 2018	PSR Engineering College
42	9916001043	Immanuel David	Biotechnology Towards	Feb 1 -2	PSR Engineering

			Sustainable Future	2018	College
43	9916001102	S A Ramya	Biotechnology Towards Sustainable Future	Feb 1 -2 2018	PSR Engineering College
44	9916001132	T Suguna	Biotechnology Towards Sustainable Future	Feb 1 -2 2018	PSR Engineering College
45	9916001132	T Suguna	National Conference on Bioprocess Issues Challenges and Opportunities	Sep 21-22 2017	Mepco Schelenk Engineering College
51	9916001043	Immanuel David	Hands-on Training Programme for Analysis of Fatty Acids Using GC And MS	Sep 27-28 2018	Sathyabama University
52	9916001072	Mogul Almaaz	Hands-on Training Programme for Analysis of Fatty Acids Using GC And MS	Sep 27-28 2018	Sathyabama University
53	9916001032	Dhana Pradeeba	Hands-on Training Programme for Analysis of Fatty Acids Using GC And MS	Sep 27-28 2018	Sathyabama University
54	9916001015	R Atchaya	Hands-on Training Programme for Analysis of Fatty Acids Using GC And MS	Sep 27-28 2018	Sathyabama University
55	9916001013	T Arun Lakshmi	Hands-on Training Programme for Analysis of Fatty Acids Using GC And MS	Sep 27-28 2018	Sathyabama University
56	9915001020	Ezhil Arasan	Nano Fabrication And Characterization Studies	March 15-17 2018	Karunya University
57	9915001009	Ashiq Iklaik Khan	Nano Fabrication and Characterization Studies	March 15-17 2018	Karunya University
58	9915001138	Venkata Sai Giridhar Reddy	Nano Fabrication and Characterization Studies	March 15-17 2018	Karunya University
59	9915001126	Aarthi B	Nano Fabrication and Characterization Studies	March 15-17 2018	Karunya University
60	9915001024	Gowsalaya R	Nano Fabrication and Characterization Studies	March 15-17 2018	Karunya University
61	9915001126	Aarthi B	Nano Fabrication and Characterization Studies	March 15-17 2018	Karunya University
62	9915001019	P Elakkiya	Cancer Immunology and Immunotherapy	Sep 21-22 2017	Saiva Bhanu Kshatriya College

63	9915001016	S Dharani	Cancer Immunology and Immunotherapy	Sep 21-22 2017	Saiva Bhanu Kshatriya College
64	9915001011	G Balasaraswathi	Cancer Immunology and Immunotherapy	Sep 21-22 2017	Saiva Bhanu Kshatriya College
65	9915001024	Gowsalaya R	Cancer Immunology and Immunotherapy	Sep 21-22 2017	Saiva Bhanu Kshatriya College
66	9915001126	Arthi P	Cancer Immunology and Immunotherapy	Sep 21-22 2017	Saiva Bhanu Kshatriya College
67	9915001126	Aarthi B	Cancer Immunology and Immunotherapy	Sep 21-22 2017	Saiva Bhanu Kshatriya College
68	9915001148	S Velunatchiar	Cancer Immunology and Immunotherapy	Sep 21-22 2017	Saiva Bhanu Kshatriya College
69	9915001061	S Nievtha	Cancer Immunology and Immunotherapy	Sep 21-22 2017	Saiva Bhanu Kshatriya College
70	9915001020	Ezhil Arasan	Cancer Immunology and Immunotherapy	Sep 21-22 2017	Saiva Bhanu Kshatriya College
71	9915001009	Ashiq Ilahi Khan	Cancer Immunology and Immunotherapy	Sep 21-22 2017	Saiva Bhanu Kshatriya College
72	9915001090	Sudar Balakrishnan	Biotechnology Towards Sustainable Future	Feb 1-2 2018	PSR Engineering College
73	9915001100	B Vignesh	Biotechnology Towards Sustainable Future	Feb 1-2 2018	PSR Engineering College
74	9915001070	S Praveen Kumar	Biotechnology Towards Sustainable Future	Feb 1-2 2018	PSR Engineering College
75	9915001066	Pradeep Kumar	Biotechnology Towards Sustainable Future	Feb 1-2 2018	PSR Engineering College
76	9915001092	Sundara Pandian	Biotechnology Towards Sustainable Future	Feb 1-2 2018	PSR Engineering College
77	9916102003	Rajeshwari C T	Energy Environment and Global Challenges	March 9-10 2018	NIT Calicut
78	9916001104	G Revathi	Emerging Trends in Bioscience	Feb 27-28 2018	MMES Womens Arts and Science College
79	9916001087	B Poornima Devi	Emerging Trends in Bioscience	Feb 27-28 2018	MMES Womens Arts and Science College

CRITERION 5	Faculty Information and Contributions	200
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The Department has adequate faculty members to cater to the needs of the student community in the UG program. The faculty members of the Department of Biotechnology possess either a doctoral degree or a Masters' degree. Of the 27 faculty members, 21 hold PhD degree and among the rest, 4 have enrolled for PhD degree in our department. Few of the faculty members have completed their PhD abroad and seven of them have post-doctoral experience in universities in USA, UK, Israel, Poland and Taiwan and possess several years of teaching experience. They are also involved actively in research in their respective areas of interest within the department, thereby enhancing and updating their knowledge and expertise.

The Department has adequate faculty members to meet the needs of the UG program's student community. The faculty's technical expertise covers all core competencies in the interdisciplinary field of Biotechnology. The Detailed faculty qualifications and other details are in Table B.5.

Table B.5

CAY (2021–2022) = 27

		Qualification									Academic Research				
S. No.	Name of the faculty member	Degree (Highest Degree)	University	Year of attaining higher qualification	Association with the institution	Designation	Date on which designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years	Currently Associated (Y/N) Date of Leaving (In case Currently Associated is (“No”))	Nature of Association (Regular/Contract)
1	Dr. K. Sundar	Ph.D.	Madurai Kamaraj University,	1992	KARE	Professor	01.07. 2008	27.06. 2007	Biotechnology	Infection and Immunity	92	Yes	No	Y	Regular

			Madurai.												
2	Dr. T. Kathiresan	Ph.D.	Bharathiar University, Coimbatore.	1999	KARE	Professor	01.07. 2011	01.07. 2011	Biotechnology	Proteomics, Nanobiotechnol ogy	39	Yes	No	Y	Regular
3	Dr. K. Palanichelvam	Ph.D.	Madurai Kamaraj University, Madurai.	1996	KARE	Professor	01.07. 2016	01.07. 2011	Biotechnology	Plant Molecular Biology	27	Yes	No	Y	Regular
4	Dr. V. Pandiyarajan	Ph.D.	Madurai Kamaraj University, Madurai.	2005	KARE	Professor	28.08. 2019	28.08. 2019	Biotechnology	Medicinal Plants	5	No	No	Y	Regular
5	Dr. A. Muthukumaran	Ph.D.	Manonmaniam Sundaranar University, Tirunelveli.	2008	KARE	Professor	01.06. 2017	22.07. 2009	Biotechnology	Nano- and Animal Biotechnology	27	Yes	No	Y	Regular
6	Dr. B. Vanavil	Ph.D.	National Institute of Technology- Trichy.	2014	KARE	Associate Professor	15.06. 2015	15.06. 2015	Biotechnology	Bioprocess Technology	20	Yes	No	Y	Regular
7	Dr. S. Shantkriti	Ph.D.	Bharathidasan University, Trichy.	2018	KARE	Associate Professor	25.06. 2018	25.06. 2018	Biotechnology	Environmental Technology	29	No	No	Y	Regular
8	Dr. Nidhin Sreekumar	Ph.D.	National Institute of Technology, Calicut.	2018	KARE	Associate Professor	25.06. 2018	25.06. 2018	Biotechnology	Environmental Technology	23	No	No	Y	Regular
9	Dr. Naresh Kumar Sharma	Ph.D.	Indian Institute of Technology, Madras.	2014	KARE	Associate Professor	01.08. 2014	01.08. 2014	Biotechnology	Environmental Biotechnology	22	Yes	No	Y	Regular
10	Dr. K. K. Vasumathi	Ph.D.	National Institute of Technology, Trichy.	2014	KARE	Associate Professor	12.06. 2017	12.06. 2017	Biotechnology	Algal Biotechnology	14	No	No	Y	Regular

11	Dr. Sankarganesh Arunachalam	Ph.D.	Chonbuk National University, Jeonju, South Korea.	2012	KARE	Associate Professor	01.07. 2016	19.05. 2016	Biotechnology	Cardiovascular and Adverse Drug Reactions	41	Yes	No	Y	Regular
12	Dr. J. Kanimozhi	Ph.D.	National Institute of Technology Calicut	2018	KARE	Associate Professor	17.06. 2019	17.06. 2019	Biotechnology	Biochemical Engineering	14	No	No	Y	Regular
13	Dr. L. Muthulakshmi	Ph.D.	Kalasalingam Academy of Research and Education.	2017	KARE	Associate Professor	01.06. 2017	11.06. 2007	Biotechnology	Biomaterials	21	No	No	Y	Regular
14	Dr. S. Ram Kumar Pandian	Ph.D.	Kalasalingam Academy of Research and Education.	2016	KARE	Associate Professor	01.06. 2017	01.07. 2015	Biotechnology	Innate Immunity and Inflammation	21	No	No	Y	Regular
15	Dr. S. Sheik Asraf	Ph.D.	Madurai Kamaraj University, Madurai.	2013	KARE	Associate Professor	01.06. 2017	14.07. 2014	Biotechnology	Genomics	20	No	No	Y	Regular
16	Dr. V. Deepak	Ph.D.	Kalasalingam Academy of Research and Education.	2016	KARE	Associate Professor	01.06. 2016	01.06. 2016	Biotechnology	Cell Biology	25	No	No	Y	Regular
17	Dr. K. Selvaraj	Ph.D.	Jadavpur university, Kolkata	2015	KARE	Assistant Professor	NA	13.10. 2014	Biotechnology	Drug Design & Drug Delivery	78	Yes	No	Y	Regular
18	Dr. K. Jyothi	Ph.D.	Bharathidasan University, Trichy.	2013	KARE	Assistant Professor	NA	01.06. 2017	Biotechnology	Biochemistry	13	No	No	Y	Regular
19	Mrs. J. Christina Rosy	M. Tech	Kalasalingam Academy of Research and Education.	2011	KARE	Assistant Professor	NA	01.07. 2011	Biotechnology	Bioinformatics & Microbiology	7	No	No	Y	Regular

20	Dr. R. Seenivasagan	Ph.D.	Periyar University	2015	KARE	Assistant Professor	NA	19.06. 2017	Biotechnology	Environmental Biotechnology	21	No	No	Y	Regular
21	Dr. D. Senthil Kumar	Ph.D.	VIT University	2016	KARE	Assistant Professor	NA	01.06. 2017	Biotechnology	Proteomics	7	No	No	Y	Regular
22	Ms. P. Ramya	M. Tech	Mepco Schlenk Engineering College, Sivakasi.	2013	KARE	Assistant Professor	NA	01.06. 2016	Biotechnology	Bioprocess Technology	2	No	No	Y	Regular
23	Ms. P. Priya	M. Tech	Kalasalingam Academy of Research and Education.	2013	KARE	Assistant Professor	NA	01.06. 2016	Biotechnology	Microbiology	3	No	No	Y	Regular
24	Mr. S. J. Kabilan	M. Tech	Kumaraguru College of Technology, Coimbatore.	2018	KARE	Assistant Professor	NA	25.06. 2018	Biotechnology	Drug Design and Bioactive Metabolites	3	No	No	Y	Regular
25	Dr. V. Kannan	Ph.D.	University of West of England, Bristol, UK	2017	KARE	Assistant Professor	NA	03.06. 2019	Biotechnology	Transgenic Technology	5	No	No	Y	Regular
26	Ms. S. Selva Vinothika	M. Tech	Kalasalingam Academy of Research and Education.	2018	KARE	Assistant Professor	NA	01.07. 2021	Biotechnology	Proteomics, Cancer Biology	2	No	No	Y	Regular
27	Ms. B. Poornima	M. Tech	Kalasalingam Academy of Research and Education.	2021	KARE	Assistant Professor	NA	01.07. 2021	Biotechnology	Animal Biotechnology	2	No	No	Y	Regular

CAY m1 (2020–2021) = 27

S. No.	Name of the faculty member	Qualification			Association with the institution	Designation	Date on which designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is “No”)	Nature of Association (Regular/Contract)
		Degree (Highest Degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
1	Dr. K. Sundar	Ph.D.	Madurai Kamaraj University, Madurai.	1992	KARE	Professor	01.07.2008	27.06.2007	Biotechnology	Infection and Immunity	92	Yes	No	Y	Regular
2	Dr. T. Kathiresan	Ph.D.	Bharathiar University, Coimbatore.	1999	KARE	Professor	01.07.2011	01.07.2011	Biotechnology	Proteomics, Nanobiotechnology	35	Yes	No	Y	Regular
3	Dr. K. Palanichelvam	Ph.D.	Madurai Kamaraj University, Madurai.	1996	KARE	Professor	01.07.2016	01.07.2011	Biotechnology	Plant Molecular Biology	27	Yes	No	Y	Regular
4	Dr. V. Pandiyarajan	Ph.D.	Madurai Kamaraj University, Madurai.	2005	KARE	Professor	28.08.2019	28.08.2019	Biotechnology	Medicinal Plants	5	No	No	Y	Regular
5	Dr. A. Muthukumar	Ph.D.	Manonmaniam Sundaranar University, Tirunelveli.	2008	KARE	Professor	01.06.2017	22.07.2009	Biotechnology	Nano- and Animal Biotechnology	27	Yes	No	Y	Regular

6	Dr. B. Vanavil	Ph.D.	National Institute of Technology-Trichy.	2014	KARE	Associate Professor	15.06.2015	15.06.2015	Biotechnology	Bioprocess Technology	20	Yes	No	Y	Regular
7	Dr. S. Shantkriti	Ph.D.	Bharathidasan University, Trichy.	2018	KARE	Associate Professor	25.06.2018	25.06.2018	Biotechnology	Environmental Technology	24	No	No	Y	Regular
8	Dr. Nidhin Sreekumar	Ph.D.	National Institute of Technology, Calicut.	2018	KARE	Associate Professor	25.06.2018	25.06.2018	Biotechnology	Environmental Technology	23	No	No	Y	Regular
9	Dr. Naresh Kumar Sharma	Ph.D.	Indian Institute of Technology, Madras.	2014	KARE	Associate Professor	01.08.2014	01.08.2014	Biotechnology	Environmental Biotechnology	22	Yes	No	Y	Regular
10	Dr. K. K. Vasumathi	Ph.D.	National Institute of Technology, Trichy.	2014	KARE	Associate Professor	12.06.2017	12.06.2017	Biotechnology	Algal Biotechnology	14	No	No	Y	Regular
11	Dr. Sankarganesh Arunachalam	Ph.D.	Chonbuk National University, Jeonju, South Korea.	2012	KARE	Associate Professor	01.07.2016	19.05.2016	Biotechnology	Cardiovascular and Adverse Drug Reactions	41	Yes	No	Y	Regular
12	Dr. J. Kanimozhi	Ph.D.	National Institute of Technology Calicut	2018	KARE	Associate Professor	17.06.2019	17.06.2019	Biotechnology	Biochemical Engineering	14	No	No	Y	Regular
13	Dr. L.	Ph.D.	Kalasalingam Academy of	2017	KARE	Associate	01.06.2	11.06.	Biotechnology	Biomaterials	21	No	No	Y	Regular

	Muthulakshmi		Research and Education.			Professor	017	2007	gy						
14	Dr. S. Ram Kumar Pandian	Ph.D.	Kalasalingam Academy of Research and Education.	2016	KARE	Associate Professor	01.06.2017	01.07.2015	Biotechnolo gy	Innate Immunity and Inflammation	21	No	No	Y	Regular
15	Dr. S. Sheik Asraf	Ph.D.	Madurai Kamaraj University, Madurai.	2013	KARE	Associate Professor	01.06.2017	14.07.2014	Biotechnolo gy	Genomics	20	No	No	Y	Regular
16	Dr. V. Deepak	Ph.D.	Kalasalingam Academy of Research and Education.	2016	KARE	Associate Professor	01.06.2016	01.06.2016	Biotechnolo gy	Cell Biology	25	No	No	Y	Regular
17	Dr. K. Selvaraj	Ph.D.	Jadavpur University, Kolkata.	2015	KARE	Assistant Professor	NA	13.10.2014	Biotechnolo gy	Drug Design and Drug Delivery	78	Yes	No	Y	Regular
18	Dr. K. Jyothi	Ph.D.	Bharathidasan University, Trichy.	2013	KARE	Assistant Professor	NA	01.06.2017	Biotechnolo gy	Biochemistry	13	No	No	Y	Regular
19	Mrs. J. Christina Rosy	M. Tech	Kalasalingam Academy of Research and Education.	2011	KARE	Assistant Professor	NA	01.07.2011	Biotechnolo gy	Bioinformatics & Microbiology	7	No	No	Y	Regular
20	Dr. G. Nadana Raja Vadivu	Ph.D.	Kalasalingam Academy of Research and Education.	2021	KARE	Assistant Professor	NA	01.01.2010	Biotechnolo gy	Plant Biotechnology	7	No	Yes	N 30.06.2021	Regular
21	Dr. D. Sankar	Ph.D.	Bharathidasan	2015	KARE	Assistant	NA	25.06.	Biotechnolo gy	Animal	32	No	No	N	Regular

	Ganesh		n University, Trichy.			Professor		2018	gy	Biotechnology				30.06.2021	
22	Dr. R. Seenivasagan	Ph.D.	Periyar University	2015	KARE	Assistant Professor	NA	19.06.2017	Biotechnolo gy	Environmental Biotechnology	21	No	No	Y	Regular
23	Dr. D. Senthil Kumar	Ph.D.	VIT University	2016	KARE	Assistant Professor	NA	01.06.2017	Biotechnolo gy	Proteomics	7	No	No	Y	Regular
24	Ms. P. Ramya	M. Tech	Mepco Schlenk Engineering College, Sivakasi.	2013	KARE	Assistant Professor	NA	01.06.2016	Biotechnolo gy	Bioprocess Technology	2	No	No	Y	Regular
25	Ms. P. Priya	M. Tech	Kalasalingam Academy of Research and Education.	2013	KARE	Assistant Professor	NA	01.06.2016	Biotechnolo gy	Microbiology	3	No	No	Y	Regular
26	Mr. S. J. Kabilan	M. Tech	Kumaraguru College of Technology, Coimbatore.	2018	KARE	Assistant Professor	NA	25.06.2018	Biotechnolo gy	Drug Design and Bioactive Metabolites	3	No	No	Y	Regular
27	Dr. V. Kannan	Ph.D.	University of West of England, Bristol, UK	2017	KARE	Assistant Professor	NA	03.06.2019	Biotechnolo gy	Transgenic Technology	5	No	No	Y	Regular

CAYm2 (2019–2020) = 27

S. No.	Name of the faculty member	Qualification			Association with the institution	Designation	Date on which designated as Professor/ Associate Professor	Date of Joining the Institution	Department	Specialization	Academic Research			Currently Associated (Y/N) Date of Leaving (In case Currently Associated is ("No"))	Nature of Association (Regular/Contract)
		Degree (Highest Degree)	University	Year of attaining higher qualification							Research Paper Publications	Ph.D. Guidance	Faculty Receiving Ph.D. during the Assessment Years		
1	Dr. K.Sundar	Ph.D.	Madurai Kamaraj University, Madurai.	1992	KARE	Professor	01.07.2008	27.06.2007	Biotechnology	Infection and Immunity	92	Yes	No	Y	Regular
2	Dr. T. Kathiresan	Ph.D.	Bharathiar University, Coimbatore.	1999	KARE	Professor	01.07.2011	01.07.2011	Biotechnology	Proteomics, Nanobiotechnology	35	Yes	No	Y	Regular
3	Dr. K. Palanichelvam	Ph.D.	Madurai Kamaraj University, Madurai.	1996	KARE	Professor	01.07.2016	01.07.2011	Biotechnology	Plant Molecular Biology	27	Yes	No	Y	Regular
4	Dr. V.Pandiyarajan	Ph.D.	Madurai Kamaraj University, Madurai.	2005	KARE	Professor	28.08.2019	28.08.2019	Biotechnology	Medicinal Plants	5	No	No	Y	Regular
5	Dr. A. Muthukumaran	Ph.D.	Manonmaniam Sundaranar University, Tirunelveli.	2008	KARE	Professor	01.06.2017	22.07.2009	Biotechnology	Nano- and Animal Biotechnology	27	Yes	No	Y	Regular

6	Dr. B. Vanavil	Ph.D.	National Institute of Technology-Trichy.	2014	KARE	Associate Professor	15.06.2015	15.06.2015	Biotechnol ogy	Bioprocess Technology	20	Yes	No	Y	Regular
7	Dr. S. Shantkriti	Ph.D.	Bharathidasan University, Trichy.	2018	KARE	Associate Professor	25.06.2018	25.06.2018	Biotechnol ogy	Environmental Technology	24	No	No	Y	Regular
8	Dr. Nidhin Sreekumar	Ph.D.	National Institute of Technology, Calicut.	2018	KARE	Associate Professor	25.06.2018	25.06.2018	Biotechnol ogy	Environmental Technology	23	No	No	Y	Regular
9	Dr. Naresh Kumar Sharma	Ph.D.	Indian Institute of Technology, Madras.	2014	KARE	Associate Professor	01.08.2014	01.08.2014	Biotechnol ogy	Environmental Biotechnology	22	Yes	No	Y	Regular
10	Dr. K. K. Vasumathi	Ph.D.	National Institute of Technology, Trichy.	2014	KARE	Associate Professor	12.06.2017	12.06.2017	Biotechnol ogy	Algal Biotechnology	14	No	No	Y	Regular
11	Dr. Sankarganesh Arunachalam	Ph.D.	Chonbuk National University, Jeonju, South Korea.	2012	KARE	Associate Professor	01.07.2016	19.05.2016	Biotechnol ogy	Cardiovascular and Adverse Drug Reactions	41	Yes	No	Y	Regular
12	Dr. J. Kanimozhi	Ph.D.	National Institute of Technology Calicut	2018	KARE	Associate Professor	17.06.2019	17.06.2019	Biotechnol ogy	Biochemical Engineering	14	No	No	Y	Regular
13	Dr. L. Muthulakshmi	Ph.D.	Kalasalingam Academy of Research and	2017	KARE	Associate Professor	01.06.2017	11.06.2007	Biotechnol ogy	Biomaterials	21	No	No	Y	Regular

			Education.												
14	Dr. S. Ram Kumar Pandian	Ph.D.	Kalasalingam Academy of Research and Education.	2016	KARE	Associate Professor	01.06.2017	01.07.2015	Biotechnol ogy	Innate Immunity and Inflammation	21	No	No	Y	Regular
15	Dr. S. Sheik Asraf	Ph.D.	Madurai Kamaraj University, Madurai.	2013	KARE	Associate Professor	01.06.2017	14.07.2014	Biotechnol ogy	Genomics	20	No	No	Y	Regular
16	Dr. V. Deepak	Ph.D.	Kalasalingam Academy of Research and Education.	2016	KARE	Associate Professor	01.06.2016	01.06.2016	Biotechnol ogy	Cell Biology	25	No	No	Y	Regular
17	Dr. K. Selvaraj	Ph.D.	Jadavpur University, Kolkata.	2015	KARE	Assistant Professor	NA	13.10.2014	Biotechnol ogy	Drug Design and Drug Delivery	78	Yes	No	Y	Regular
18	Dr. K. Jyothi	Ph.D.	Bharathidasan University, Trichy.	2013	KARE	Assistant Professor	NA	01.06.2017	Biotechnol ogy	Biochemistry	13	No	No	Y	Regular
19	Mrs. J. Christina Rosy	M. Tech	Kalasalingam Academy of Research and Education.	2011	KARE	Assistant Professor	NA	01.07.2011	Biotechnol ogy	Bioinformatics & Microbiology	7	No	No	Y	Regular
20	Ms. G. Nadana Raja Vadivu	M. Tech	Anna University	2009	KARE	Assistant Professor	NA	01.01.2010	Biotechnol ogy	Plant Biotechnology	7	No	Yes	Y	Regular
21	Dr. D. Sankar Ganesh	Ph.D.	Bharathidasan University, Trichy.	2015	KARE	Assistant Professor	NA	25.06.2018	Biotechnol ogy	Animal Biotechnology	32	No	No	Y	Regular
22	Dr. R.	Ph.D.	Periyar	2015	KARE	Assistant	NA	19.06.	Biotechnol	Environmental	21	No	No	Y	Regular

	Seenivasagan		University			Professor		2017	ogy	Biotechnology					
23	Dr. D. Senthil Kumar	Ph.D.	VIT University	2016	KARE	Assistant Professor	NA	01.06. 2017	Biotechnol ogy	Proteomics	7	No	No	Y	Regular
24	Ms. P. Ramya	M. Tech	Mepco Schlenk Engineering College, Sivakasi.	2013	KARE	Assistant Professor	NA	01.06. 2016	Biotechnol ogy	Bioprocess Technology	2	No	No	Y	Regular
25	Ms. P. Priya	M. Tech	Kalasalingam Academy of Research and Education.	2013	KARE	Assistant Professor	NA	01.06. 2016	Biotechnol ogy	Microbiology	3	No	No	Y	Regular
26	Mr. S. J. Kabilan	M. Tech	Kumaraguru College of Engineering, Coimbatore.	2018	KARE	Assistant Professor	NA	25.06. 2018	Biotechnol ogy	Drug Design and Bioactive Metabolites	3	No	No	Y	Regular
27	Dr. V. Kannan	Ph.D.	University of West of England, Bristol, UK	2017	KARE	Assistant Professor	NA	03.06. 2019	Biotechnol ogy	Transgenic Technology	5	No	No	Y	Regular

5.1. Student-Faculty Ratio (SFR) (20)

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

S=Number of Students in the Department=UG1+UG2+UG3+PG1+PG2

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

Student Faculty Ratio (SFR)= S/ F

Year	CAY (2021-22)	CAYm1 (2020-21)	CAYm2 (2019-20)
u1.1(No. of Students in UG 2nd Year)	120	120	120
u1.2 (No. of Students in UG 3rd Year)	120	120	120
u1.3 (No. of Students in UG 4th Year)	120	120	120
UG1(u1.1+u1.2+u1.3)	360	360	360
p1.1	12	12	12
p1.2	12	12	12
PG1(p1.1+ p1.2)	24	24	24
Total No. of Students in the Department (S)	384	384	384
No. of Faculty in the Department (F)	27	27	27
Student Faculty Ratio (SFR)=S/F	384/27=14.22	384/27=14.22	384/27=14.22
Average SFR = (SFR1+SFR2+SFR3)/3	(14.22+14.22+14.22)/3 =14.22		

TableB.5.1

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

	Total number of regular faculty in the department	Total number of contractual faculty in the department
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CAY	27	NIL
CAYm1	27	NIL
CAYm2	27	NIL

Table5.1.1

5.2. Faculty Cadre Proportion (20)

F1: Number of Professors required = $1/9 \times$ Number of Faculty required to comply with 20:1 Student-Faculty ratio based on no. of students (N) as per 5.1

$$= 1/9 \times (384/20) = 1/9 \times 19.2 = 2.133$$

F2: Number of Associate Professors required = $2/9 \times$ Number of Faculty required to comply with 20:1 Student-Faculty ratio based on no. of students (N) as per 5.1

$$= 2/9 \times (384/20) = 2/9 \times 19.2 = 4.266$$

F3: Number of Assistant Professors required = $6/9 \times$ Number of Faculty required to comply with 20:1 Student-Faculty ratio based on no. of students (N) as per 5.1

$$= 6/9 \times (384/20) = 6/9 \times 19.2 = 12.8$$

Year	Professors		Associate Professors		Assistant Professors	
	Required F1	Available	Required F2	Available	Required F3	Available
CAY (2021-22)	2.133	5	4.266	11	12.8	11
CAYm1 (2020-21)	2.133	5	4.266	11	12.8	11
CAYm2 (2019-20)	2.133	5	4.266	11	12.8	11
Average Numbers	RF1=2.133	AF1=5	RF2=4.266	AF2=11	RF3=12.8	AF3=11

Cadre Ratio Marks = $((AF1/RF1) + (AF2/RF2 \times 0.6) + (AF3/RF3 \times 0.4)) \times 10$

$$= ((5/2.133) + (11/4.266 \times 0.6) + (11/12.8 \times 0.4)) \times 10$$

$$= ((2.344) + (2.578 \times 0.6) + (0.859 \times 0.4)) \times 10$$

$$= ((2.344) + (1.547) + (0.343)) \times 10 = \mathbf{42.34}$$

List of Professors

CAY (2021-22)

S. No.	Name of faculty member	Qualification	Designation	Date of Joining the institution	No of years of experience
1.	Dr. K. Sundar	Ph.D.	Professor	27.06.2007	15
2.	Dr. T. Kathiresan	Ph.D.	Professor	01.07.2011	11
3.	Dr. K. Palanichelvam	Ph.D.	Professor	01.07.2011	11
4.	Dr. V. Pandiyarajan	Ph.D.	Professor	28.08.2019	3
5.	Dr. A. Muthukumaran	Ph.D.	Professor	22.07.2009	13

List of Professors

CAYm1 (2020-21)

S. No.	Name of faculty member	Qualification	Designation	Date of Joining the institution	No of years of experience
1.	Dr. K. Sundar	Ph.D.	Professor	27.06.2007	15
2.	Dr. T. Kathiresan	Ph.D.	Professor	01.07.2011	11
3.	Dr. K. Palanichelvam	Ph.D.	Professor	01.07.2011	11

4.	Dr. V. Pandiyarajan	Ph.D.	Professor	28.08.2019	3
5.	Dr. A. Muthukumaran	Ph.D.	Professor	22.07.2009	13

List of Professors

CAYm2 (2019-20)

S. No.	Name of faculty member	Qualification	Designation	Date of Joining the institution	No of years of experience
1.	Dr. K. Sundar	Ph.D.	Professor	27.06.2007	15
2.	Dr. T. Kathiresan	Ph.D.	Professor	01.07.2011	11
3.	Dr. K. Palanichelvam	Ph.D.	Professor	01.07.2011	11
4.	Dr. V. Pandiyarajan	Ph.D.	Professor	28.08.2019	3
5.	Dr. A. Muthukumaran	Ph.D.	Professor	22.07.2009	13

List of Associate Professors

CAY (2021-22)

S. No.	Name of faculty member	Qualification	Designation	Date of Joining the institution	No of years of experience
1.	Dr. B. Vanavil	Ph.D.	Associate Professor	15.06.2015	7

2.	Dr. S. Shantkriti	Ph.D.	Associate Professor	25.06.2018	4
3.	Dr. Nidhin Sreekumar	Ph.D.	Associate Professor	25.06.2018	4
4.	Dr. Naresh Kumar Sharma	Ph.D.	Associate Professor	01.08.2014	8
5.	Dr. K. K. Vasumathi	Ph.D.	Associate Professor	12.06.2017	5
6.	Dr. Sankarganesh Arunachalam	Ph.D.	Associate Professor	19.05.2016	6
7.	Dr. J. Kanimozhi	Ph.D.	Associate Professor	17.06.2019	3
8.	Dr. L. Muthulakshmi	Ph.D.	Associate Professor	11.06.2007	15
9.	Dr. S. Ram Kumar Pandian	Ph.D.	Associate Professor	01.07.2015	7
10.	Dr. S. Sheik Asraf	Ph.D.	Associate Professor	14.07.2014	8
11.	Dr. V. Deepak	Ph.D.	Associate Professor	01.06.2016	6

List of Associate Professors

CAYm1 (2020-21)

S. No.	Name of faculty member	Qualification	Designation	Date of Joining the institution	No of years of experience
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1.	Dr. B. Vanavil	Ph.D.	Associate Professor	15.06.2015	7
2.	Dr. S. Shantkriti	Ph.D.	Associate Professor	25.06.2018	4
3.	Dr. Nidhin Sreekumar	Ph.D.	Associate Professor	25.06.2018	4
4.	Dr. Naresh Kumar Sharma	Ph.D.	Associate Professor	01.08.2014	8
5.	Dr. K. K. Vasumathi	Ph.D.	Associate Professor	12.06.2017	5
6.	Dr. Sankarganesh Arunachalam	Ph.D.	Associate Professor	19.05.2016	6
7.	Dr. J. Kanimozhi	Ph.D.	Associate Professor	17.06.2019	3
8.	Dr. L. Muthulakshmi	Ph.D.	Associate Professor	11.06.2007	15
9.	Dr. S. Ram Kumar Pandian	Ph.D.	Associate Professor	01.07.2015	7
10.	Dr. S. Sheik Asraf	Ph.D.	Associate Professor	14.07.2014	8
11.	Dr. V. Deepak	Ph.D.	Associate Professor	01.06.2016	6

List of Associate Professors

CAYm2 (2019-20)

S. No.	Name of faculty member	Qualification	Designation	Date of Joining the institution	No of years of experience
1.	Dr. B. Vanavil	Ph.D.	Associate Professor	15.06.2015	7
2.	Dr. S. Shantkriti	Ph.D.	Associate Professor	25.06.2018	4
3.	Dr. Nidhin Sreekumar	Ph.D.	Associate Professor	25.06.2018	4
4.	Dr. Naresh Kumar Sharma	Ph.D.	Associate Professor	01.08.2014	8
5.	Dr. K. K. Vasumathi	Ph.D.	Associate Professor	12.06.2017	5
6.	Dr. Sankarganesh Arunachalam	Ph.D.	Associate Professor	19.05.2016	6
7.	Dr. J. Kanimozhi	Ph.D.	Associate Professor	17.06.2019	3
8.	Dr. L. Muthulakshmi	Ph.D.	Associate Professor	11.06.2007	15
9.	Dr. S. Ram Kumar Pandian	Ph.D.	Associate Professor	01.07.2015	7
10.	Dr. S. Sheik Asraf	Ph.D.	Associate Professor	14.07.2014	8
11.	Dr. V. Deepak	Ph.D.	Associate Professor	01.06.2016	6

List of Assistant Professors

CAY (2021-22)

S. No.	Name of faculty member	Qualification	Designation	Date of Joining the institution	No of years of experience
1.	Dr. K. Selvaraj	Ph.D.	Assistant Professor	13.10.2014	8
2.	Dr. K. Jyothi	Ph.D.	Assistant Professor	01.06.2017	5
3.	Mrs. J. Christina Rosy	M. Tech	Assistant Professor	01.07. 2011	11
4.	Dr. R. Seenivasagan	Ph.D.	Assistant Professor	19.06.2017	5
5.	Dr. D. Senthil Kumar	Ph.D.	Assistant Professor	01.06.2017	5
6.	Ms. P. Ramya	M. Tech	Assistant Professor	01.06. 2016	6
7.	Ms. P. Priya	M. Tech	Assistant Professor	01.06. 2016	6
8.	Mr. S. J. Kabilan	M. Tech	Assistant Professor	25.06. 2018	4
9.	Dr. V. Kannan	Ph.D.	Assistant Professor	03.06.2019	3
10.	S. Selva Vinothika	M. Tech	Assistant Professor	01.07. 2021	1
11.	R. Anandhalakshmi	M. Tech	Assistant Professor	01.07. 2021	1

List of Assistant Professors

CAYm1 (2020-21)

S. No.	Name of faculty member	Qualification	Designation	Date of Joining the institution	No of years of experience
1.	Dr. K. Selvaraj	Ph.D.	Assistant Professor	13.10.2014	8
2.	Dr. K. Jyothi	Ph.D.	Assistant Professor	01.06.2017	5
3.	Mrs. J. Christina Rosy	M. Tech	Assistant Professor	01.07. 2011	11
4.	Dr. G. Nadana Raja Vadivu	Ph.D.	Assistant Professor	01.01. 2010	12
5.	Dr. D. Sankar Ganesh	Ph.D.	Assistant Professor	25.06.2018	4
6.	Dr. R. Seenivasagan	Ph.D.	Assistant Professor	19.06.2017	5
7.	Dr. D. Senthil Kumar	Ph.D.	Assistant Professor	01.06.2017	5
8.	Ms. P. Ramya	M. Tech	Assistant Professor	01.06. 2016	6
9.	Ms. P. Priya	M. Tech	Assistant Professor	01.06. 2016	6
10.	Mr. S. J. Kabilan	M. Tech	Assistant Professor	25.06. 2018	4

11.	Dr. V. Kannan	Ph.D.	Assistant Professor	03.06.2019	3
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List of Assistant Professors

CAYm2 (2019-20)

S. No.	Name of faculty member	Qualification	Designation	Date of Joining the institution	No of years of experience
1.	Dr. K. Selvaraj	Ph.D.	Assistant Professor	13.10.2014	8
2.	Dr. K. Jyothi	Ph.D.	Assistant Professor	01.06.2017	5
3.	Mrs. J. Christina Rosy	M. Tech	Assistant Professor	01.07. 2011	11
4.	Dr. G. Nadana Raja Vadivu	Ph.D.	Assistant Professor	01.01. 2010	12
5.	Dr. D. Sankar Ganesh	Ph.D.	Assistant Professor	25.06.2018	4
6.	Dr. R. Seenivasagan	Ph.D.	Assistant Professor	19.06.2017	5
7.	Dr. D. Senthil Kumar	Ph.D.	Assistant Professor	01.06.2017	5
8.	Ms. P. Ramya	M. Tech	Assistant Professor	01.06. 2016	6
9.	Ms. P. Priya	M. Tech	Assistant	01.06. 2016	6

			Professor		
10.	Mr. S. J. Kabilan	M. Tech	Assistant Professor	25.06. 2018	4
11.	Dr. V. Kannan	Ph.D.	Assistant Professor	03.06.2019	3

5.3. Faculty Qualification (20)

$FQ = 2.0 \times [(10X + 4Y)/F]$ where x is no. of regular faculty with Ph.D., Y is no. of regular faculty with M. Tech., F is no. of regular faculty required to comply 20:1 Faculty Student ratio (no. of faculty and no. of students required are to be calculated as per 5.1)

	X	Y	F	$FQ=2.0x[(10X+4Y)/F]$
CAY	21	6	19.2	$2.0x[(10X21+4X6)/19.2]= 24.375$
CAYm1	23	4	19.2	$2.0x[(10X23+4X4)/19.2]=25.625$
CAYm2	22	5	19.2	$2.0x[(10X22+4X5)/19.2]=25$
Average Assessment				25

Table B.5.3

List of Faculty with PhD

CAY (2021–2022) = 27

S. No.	Name of the faculty member	Degree (Highest Degree)	University	Year of attaining higher qualification	Designation
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1	Dr. K. Sundar	Ph.D.	Madurai Kamaraj University, Madurai.	1992	Professor
2	Dr. T. Kathiresan	Ph.D.	Bharathiar University, Coimbatore.	1999	Professor
3	Dr. K. Palanichelvam	Ph.D.	Madurai Kamaraj University, Madurai.	1996	Professor
4	Dr. V. Pandiyarajan	Ph.D.	Madurai Kamaraj University, Madurai.	2005	Professor
5	Dr. A. Muthukumaran	Ph.D.	Manonmaniam Sundaranar University, Tirunelveli.	2008	Professor
6	Dr. B. Vanavil	Ph.D.	National Institute of Technology-Trichy.	2014	Associate Professor
7	Dr. S. Shantkriti	Ph.D.	Bharathidasan University, Trichy.	2018	Associate Professor
8	Dr. Nidhin Sreekumar	Ph.D.	National Institute of Technology, Calicut.	2018	Associate Professor
9	Dr. Naresh Kumar Sharma	Ph.D.	Indian Institute of Technology, Madras.	2014	Associate Professor
10	Dr. K. K. Vasumathi	Ph.D.	National Institute of Technology, Trichy.	2014	Associate Professor
11	Dr. Sankarganesh Arunachalam	Ph.D.	Chonbuk National University, Jeonju, South Korea.	2012	Associate Professor
12	Dr. J. Kanimozhi	Ph.D.	National Institute of Technology Calicut	2018	Associate Professor
13	Dr. L. Muthulakshmi	Ph.D.	Kalasalingam University.	2017	Associate Professor
14	Dr. S. Ram Kumar	Ph.D.	Kalasalingam University.	2016	Associate

	Pandian				Professor
15	Dr. S. Sheik Asraf	Ph.D.	Madurai Kamaraj University, Madurai.	2013	Associate Professor
16	Dr. V. Deepak	Ph.D.	Kalasalingam University.	2016	Associate Professor
17	Dr. K. Selvaraj	Ph.D.	Jadavpur university, Kolkata	2015	Assistant Professor
18	Dr. K. Jyothi	Ph.D.	Bharathidasan University, Trichy.	2013	Assistant Professor
19	Dr. R. Seenivasagan	Ph.D.	Periyar University	2015	Assistant Professor
20	Dr. D. Senthil Kumar	Ph.D.	VIT University	2016	Assistant Professor
21	Dr. V. Kannan	Ph.D.	University of West of England, Bristol, UK	2017	Assistant Professor

List of Faculty with PhD

CAY m1 (2020–2021)

S. No.	Name of the faculty member	Degree (Highest Degree)	University	Year of attaining higher qualification	Designation
1	Dr. K. Sundar	Ph.D.	Madurai Kamaraj University, Madurai.	1992	Professor
2	Dr. T. Kathiresan	Ph.D.	Bharathiar University, Coimbatore.	1999	Professor
3	Dr. K. Palanichelvam	Ph.D.	Madurai Kamaraj University, Madurai.	1996	Professor

4	Dr. V. Pandiyarajan	Ph.D.	Madurai Kamaraj University, Madurai.	2005	Professor
5	Dr. A. Muthukumaran	Ph.D.	Manonmaniam Sundaranar University, Tirunelveli.	2008	Professor
6	Dr. B. Vanavil	Ph.D.	National Institute of Technology-Trichy.	2014	Associate Professor
7	Dr. S. Shantkriti	Ph.D.	Bharathidasan University, Trichy.	2018	Associate Professor
8	Dr. Nidhin Sreekumar	Ph.D.	National Institute of Technology, Calicut.	2018	Associate Professor
9	Dr. Naresh Kumar Sharma	Ph.D.	Indian Institute of Technology, Madras.	2014	Associate Professor
10	Dr. K. K. Vasumathi	Ph.D.	National Institute of Technology, Trichy.	2014	Associate Professor
11	Dr. Sankarganesh Arunachalam	Ph.D.	Chonbuk National University, Jeonju, South Korea.	2012	Associate Professor
12	Dr. J. Kanimozhi	Ph.D.	National Institute of Technology Calicut	2018	Associate Professor
13	Dr. L. Muthulakshmi	Ph.D.	Kalasalingam University.	2017	Associate Professor
14	Dr. S. Ram Kumar Pandian	Ph.D.	Kalasalingam University.	2016	Associate Professor
15	Dr. S. Sheik Asraf	Ph.D.	Madurai Kamaraj University, Madurai.	2013	Associate Professor
16	Dr. V. Deepak	Ph.D.	Kalasalingam University.	2016	Associate Professor
17	Dr. K. Selvaraj	Ph.D.	Jadavpur University, Kolkata.	2015	Assistant Professor
18	Dr. K. Jyothi	Ph.D.	Bharathidasan University, Trichy.	2013	Assistant Professor
19	Dr. D. Sankar Ganesh	Ph.D.	Bharathidasan University, Trichy.	2015	Assistant Professor
20	Dr. R. Seenivasagan	Ph.D.	Periyar University	2015	Assistant Professor
21	Dr. D. Senthil Kumar	Ph.D.	VIT University	2016	Assistant Professor
22	Dr. V. Kannan	Ph.D.	University of West of England, Bristol, UK	2017	Assistant Professor

23	Dr. G. Nadana Raja Vadivu	Ph.D.	Kalasalingam Academy of Research and Education.	2021	Assistant Professor
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List of Faculty with PhD

CAYm2 (2019–2020)

S. No.	Name of the faculty member	Qualification			Designation
		Degree (Highest Degree)	University	Year of attaining higher qualification	
1	Dr. K.Sundar	Ph.D.	Madurai Kamaraj University, Madurai.	1992	Professor
2	Dr. T. Kathiresan	Ph.D.	Bharathiar University, Coimbatore.	1999	Professor
3	Dr. K. Palanichelvam	Ph.D.	Madurai Kamaraj University, Madurai.	1996	Professor
4	Dr. V.Pandiyarajan	Ph.D.	Madurai Kamaraj University, Madurai.	2005	Professor
5	Dr. A. Muthukumaran	Ph.D.	Manonmaniam Sundaranar University, Tirunelveli.	2008	Professor
6	Dr. B. Vanavil	Ph.D.	National Institute of Technology-Trichy.	2014	Associate Professor
7	Dr. S. Shantkriti	Ph.D.	Bharathidasan University, Trichy.	2018	Associate Professor
8	Dr. Nidhin Sreekumar	Ph.D.	National Institute of	2018	Associate

			Technology, Calicut.		Professor
9	Dr. Naresh Kumar Sharma	Ph.D.	Indian Institute of Technology, Madras.	2014	Associate Professor
10	Dr. K. K. Vasumathi	Ph.D.	National Institute of Technology, Trichy.	2014	Associate Professor
11	Dr. Sankarganesh Arunachalam	Ph.D.	Chonbuk National University, Jeonju, South Korea.	2012	Associate Professor
12	Dr. J. Kanimozhi	Ph.D.	National Institute of Technology Calicut	2018	Associate Professor
13	Dr. L. Muthulakshmi	Ph.D.	Kalasalingam University.	2017	Associate Professor
14	Dr. S. Ram Kumar Pandian	Ph.D.	Kalasalingam University.	2016	Associate Professor
15	Dr. S. Sheik Asraf	Ph.D.	Madurai Kamaraj University, Madurai.	2013	Associate Professor
16	Dr. V. Deepak	Ph.D.	Kalasalingam University.	2016	Associate Professor
17	Dr. K. Selvaraj	Ph.D.	Jadavpur University, Kolkata.	2015	Assistant Professor
18	Dr. K. Jyothi	Ph.D.	Bharathidasan University, Trichy.	2013	Assistant Professor
19	Dr. D. Sankar Ganesh	Ph.D.	Bharathidasan University, Trichy.	2015	Assistant Professor
20	Dr. R. Seenivasagan	Ph.D.	Periyar University	2015	Assistant Professor
21	Dr. D. Senthil Kumar	Ph.D.	VIT University	2016	Assistant Professor

22	Dr. V. Kannan	Ph.D.	University of West of England, Bristol, UK	2017	Assistant Professor
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5.4. Faculty Retention (10)

No. of regular faculty members in

CAY m1= 27 CAY = 27

Average % of faculty retained = 92.59 %

Year-wise Faculty Retained

CAY (2021-22)	CAYm1 (2020-21)	CAYm2 (2019-20)
Dr. K. Sundar	Dr. K. Sundar	Dr. K. Sundar
Dr. T. Kathiresan	Dr. T. Kathiresan	Dr. T. Kathiresan
Dr. K. Palanichelvam	Dr. K. Palanichelvam	Dr. K. Palanichelvam
Dr. V. Pandiyarajan	Dr. V. Pandiyarajan	Dr. V. Pandiyarajan
Dr. A. Muthukumaran	Dr. A. Muthukumaran	Dr. A. Muthukumaran
Dr. B. Vanavil	Dr. B. Vanavil	Dr. B. Vanavil
Dr. S. Shantkriti	Dr. S. Shantkriti	Dr. S. Shantkriti
Dr. Nidhin Sreekumar	Dr. Nidhin Sreekumar	Dr. Nidhin Sreekumar
Dr. Naresh Kumar Sharma	Dr. Naresh Kumar Sharma	Dr. Naresh Kumar Sharma
Dr. K. K. Vasumathi	Dr. K. K. Vasumathi	Dr. K. K. Vasumathi
Dr. Sankarganesh Arunachalam	Dr. Sankarganesh Arunachalam	Dr. Sankarganesh Arunachalam
Dr. J. Kanimozhi	Dr. J. Kanimozhi	Dr. J. Kanimozhi
Dr. L. Muthulakshmi	Dr. L. Muthulakshmi	Dr. L. Muthulakshmi
Dr. S. Ram Kumar Pandian	Dr. S. Ram Kumar Pandian	Dr. S. Ram Kumar Pandian
Dr. S. Sheik Asraf	Dr. S. Sheik Asraf	Dr. S. Sheik Asraf
Dr. V. Deepak	Dr. V. Deepak	Dr. V. Deepak
Dr. K. Selvaraj	Dr. K. Selvaraj	Dr. K. Selvaraj

Dr. K. Jyothi	Dr. K. Jyothi	Dr. K. Jyothi
Mrs. J. Christina Rosy	Mrs. J. Christina Rosy	Mrs. J. Christina Rosy
-	Dr. G. Nadana Raja Vadivu	Ms. G. Nadana Raja Vadivu
-	Dr. D. Sankar Ganesh	Dr. D. Sankar Ganesh
Dr. R. Seenivasagan	Dr. R. Seenivasagan	Dr. R. Seenivasagan
Dr. D. Senthil Kumar	Dr. D. Senthil Kumar	Dr. D. Senthil Kumar
Ms. P. Ramya	Ms. P. Ramya	Ms. P. Ramya
Ms. P. Priya	Ms. P. Priya	Ms. P. Priya
Mr. S. J. Kabilan	Mr. S. J. Kabilan	Mr. S. J. Kabilan
Dr. V. Kannan	Dr. V. Kannan	Dr. V. Kannan
Ms. S. Selva Vinothika	-	-
Ms. R. Anandhalakshmi	-	-

Item (% of faculty retained during the period of assessment keeping CAYm2 as base year)	Marks
>= 90% of required Faculty members retained during the period of assessment keeping CAYm2 as base year	10
>=75% of required Faculty members retained during the period of assessment keeping CAYm2 as base year	08
>= 60% of required Faculty members retained during the period of assessment keeping CAYm2 as base year	06
>= 50% of required Faculty members retained during the period of assessment keeping CAYm2 as base year	04
< 50% of required Faculty members retained during the period of assessment keeping CAYm2 as base year	0

Table B.5.4

5.5. Faculty competencies in correlation to Program Specific Criteria (10)

The Department of Biotechnology being inter-disciplinary comprises of faculty members with expertise in

Molecular Biology, Bioprocess Technology and Enzyme Engineering, Computational Biology, Inflammation and Autoimmunity and Environmental Technology.

Faculty members impart their domain specific knowledge to students and help them in their academic pursuits as well as encourage them for participation in various events like workshops for acquiring new skills and conferences to present their project work.

Faculty members regularly publish their research work in renowned national/international journals and books, and received funding from various government agencies and through consultancy work.

The program specific criteria are correlated with the competency of faculty members through their specialization in terms of their degree, research work, publications, patents, FDP, workshops, conferences attended, and products developed.

Name of the faculty	Relevant Area of Specialization	Publications	Course development	H-Index
Dr. K. Sundar	Infection and Immunity	92	a. Microbiology b. Immunology c. Molecular pathogenesis d. Vaccinology	20
Dr. T. Kathiresan	Proteomics, Nanobiotechnology	35	a. Proteomics b. Nanobiotechnology c. Cancer biology d. Recombinant Protein Production	11
Dr. V. Pandiyarajan	Medicinal Plants	5	a. Plant Biotechnology	1
Dr. K. Palanichelvam	Plant Molecular Biology	27	a. Plant Biotechnology b. RNAi Technology	12
Dr. A. Muthukumaran	Nano- and Animal Biotechnology	27	a. Nanobiotechnology b. Animal Biotechnology c. Healthcare Biotechnology	7
Dr. B. Vanavil	Bioprocess Technology	20	a. Bioprocess Principles b. Biochemical Engineering	8
Dr. S. Shantkriti	Environmental Technology	24	a. Environmental Microbiology b. Environmental biotechnology	8
Dr. Nidhin Sreekumar	Environmental Technology	23	a. Bioenergy b. Bioresource Technology	6
Dr. Naresh Kumar Sharma	Environmental Biotechnology	22	a. Biological Waste	7

			Water Treatment b. Downstream Processing c. Bioseparations: Principles and Applications	
Dr. K. K. Vasumathi	Algal Biotechnology	14	a. Biological Waste Water Treatment b. Bioenergy c. Molecular Diagnostics and Therapeutics	4
Dr. Sankarganesh Arunachalam	Cardiovascular and Adverse Drug Reactions	41	a. Cell Biology and Genetics b. Molecular Biology c. Radiation biology	13
Dr. J. Kanimozhi	Biochemical Engineering	14	a. Bioprocess Principles b. Biochemical Engineering	4
Dr. L. Muthulakshmi	Biomaterials	21	a. Principles of Biochemistry b. Bioenergetics and Metabolism c. Enzyme Technology	8
Dr. S. Ram Kumar Pandian	Innate Immunity and Inflammation	21	a. Genetic Engineering b. Immunology c. Stem Cell Technology	10
Dr. S. Sheik Asraf	Genomics	20	a. Functional Genomics b. Bioinformatics c. Genomics and Proteomics	3
Dr. V. Deepak	Cell Biology	25	a. Cell Biology and Genetics b. Molecular Biology c. Cancer Biology	15
Dr. K. Selvaraj	Drug Design and Drug Delivery	78	a. Drug Design and Development b. Structural Biology c. Plant Bioinformatics	12
Dr. K. Jyothi	Biochemistry	13	a. Principles of Biochemistry b. Bioenergetics and Metabolism	2
Mrs. J. Christina Rosy	Bioinformatics & Microbiology	7	a. Bioinformatics b. Microbiology c. Systems Biology	1
Ms. G. Nadana Raja Vadivu	Plant Biotechnology	7	a. Plant Biotechnology b. Protein Science and	4

			c. Metabolic Engineering	
Dr. D. Sankar Ganesh	Animal Biotechnology	32	a. Animal Biotechnology b. Cancer Biology	11
Dr. R. Seenivasagan	Environmental Biotechnology	21	a. Environmental Biotechnology b. Environmental Microbiology	6
Dr. D. Senthil Kumar	Proteomics	7	a. Functional Genomics b. Protein Science and Engineering	1
Ms. P. Ramya	Bioprocess Technology	2	a. Biochemical Engineering b. Industrial Biotechnology c. Bioprocess Instrumentation and Control	0
Ms. P. Priya	Microbiology	3	a. Exploring the microbial world b. Human diseases and prevention	0
Mr. S. J. Kabilan	Drug Design and Bioactive Metabolites	3	a. Drug Design and Development b. Systems Biology c. Clinical Trials and Management	0
Dr. V. Kannan	Transgenic Technology	5	a. Genetic Engineering b. RNAi Technology	1

5.6. Innovations by the Faculty in Teaching and Learning (10)

Faculty members engage in the following actions to improve the teaching-learning process:

1. Faculty members are using classic chalk and blackboard teaching methods as well as use ICT tools such as Power Point Presentation, animation videos, IMPARTUS video capturing facility, audio-visual teaching, virtual laboratories, flipped classroom, project-based learning (PBL), video lectures, online quizzes, gamified-teaching learning process and other interactive activities.
2. Faculty members enrich students by providing high-quality study materials via Google classroom (LMS tools), websites, handouts, etc. Students are advised to watch NPTEL lecture videos and visit other websites related to course topic to further their understanding of the subject.
3. The course file, which includes the syllabus, capturing facility course plan, and evaluation system, is

distributed to students well in advance of the start of class by the course teacher.

4. Faculty provides innovative assignments such as creation of poster, models, memes, animation videos etc.

5. In classrooms and other student learning spaces, modern teaching tools such as LCD/LED projectors, Internet-enabled computer systems, and Wi-Fi-enabled laptops are commonly used.

6. A centralized Wi-Fi system allows students to access the internet in order to gain relevant knowledge.

7. The university library is a major resource for self-education. The university library not only has a large number of books to suit students' syllabus-related needs, but it also has a large number of books by prominent national and international authors on a wide range of themes that students can use to sharpen and widen their knowledge.

8. The library also has a variety of magazines and periodicals pertaining to many disciplines of science and technology that students can access easily. The library also has subscriptions to a variety of online and print periodicals, which are made available to students.

9. The library has a computer lab with Internet connectivity, which students frequently use to access a variety of e-materials and e-journals for their own growth.

10. In addition to the central library, students can use the departmental library to access books and reference materials.

11. The department also hosts lectures, seminars, and webinars offered by industry and academic professionals to broaden students' understanding of industry technologies.

12. For their general growth, students are also invited to engage in different technical events, quizzes, personal conversations, personality development workshops, and other activities organized by the department.

13. The Training and Placement cell holds soft skill classes for various departments on a regular basis, depending on availability and demand, in order to improve students' communication skills, grooming, and body language in preparation for the professional world.

14. To catch up with the advanced level of knowledge and abilities, faculty members are urged to participate in short term courses, faculty development programmes and seminars, MOOC courses on diverse areas.

15. To broaden their knowledge, the faculties have presented papers at national and international conferences and published articles in national and international journals and books.

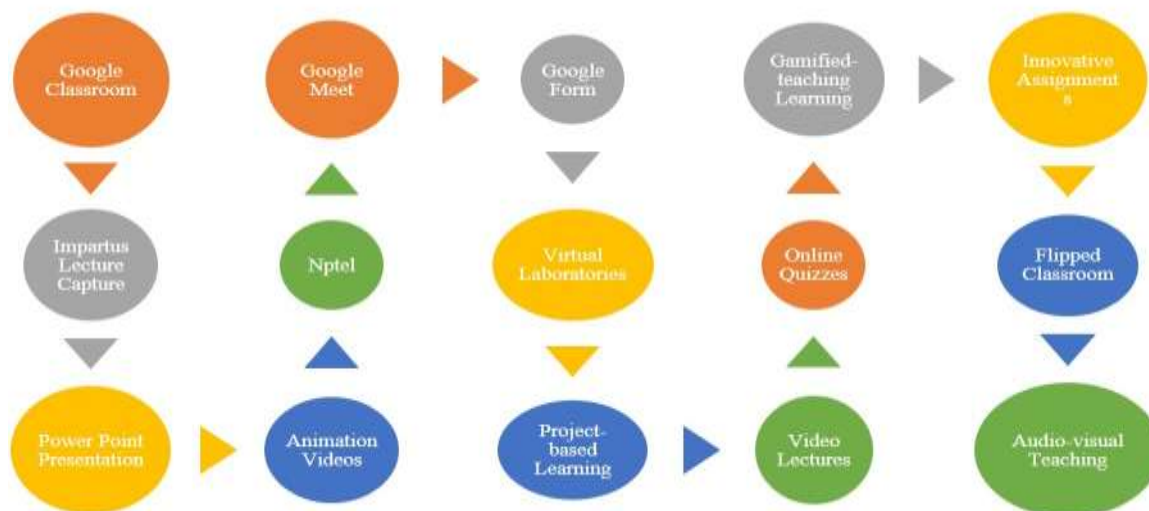


Fig. 5.6.1. ICT tools used for innovative teaching-learning process

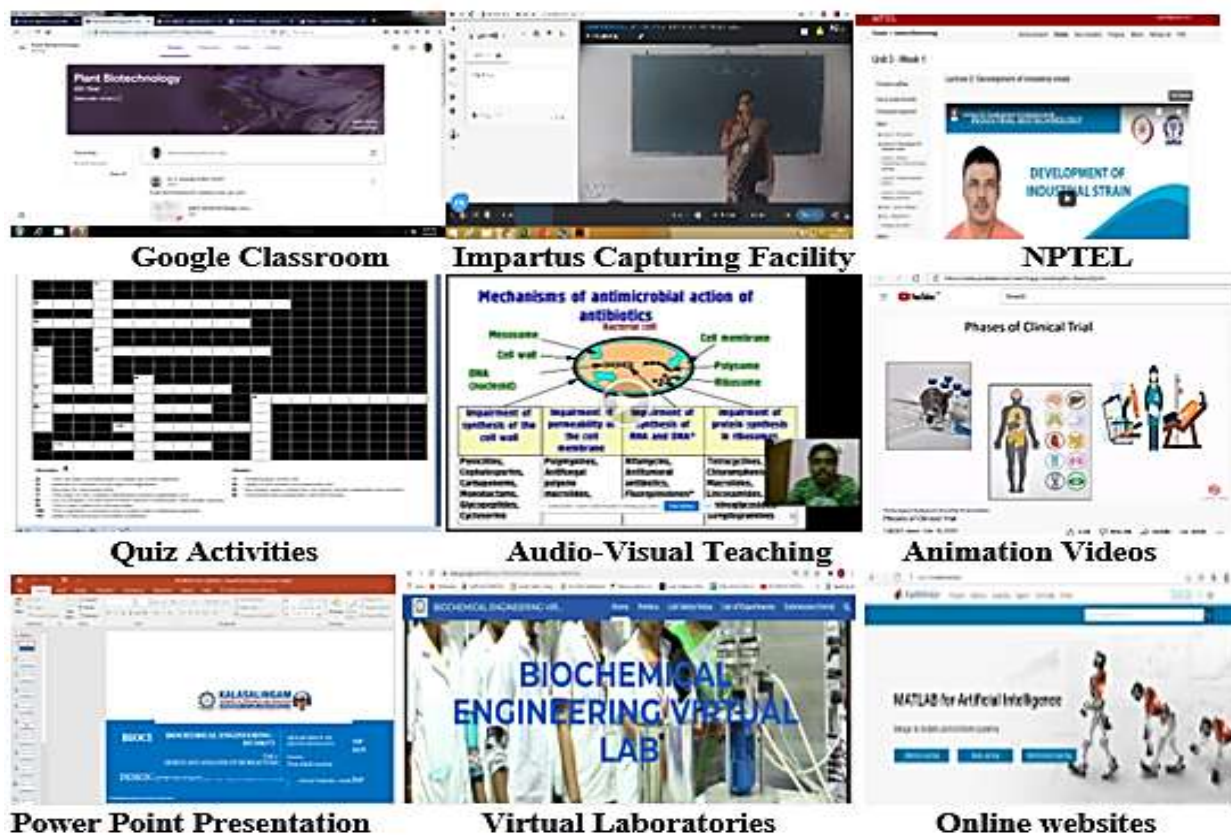


Fig. 5.6.2. Proofs of ICT tools used for in teaching-learning

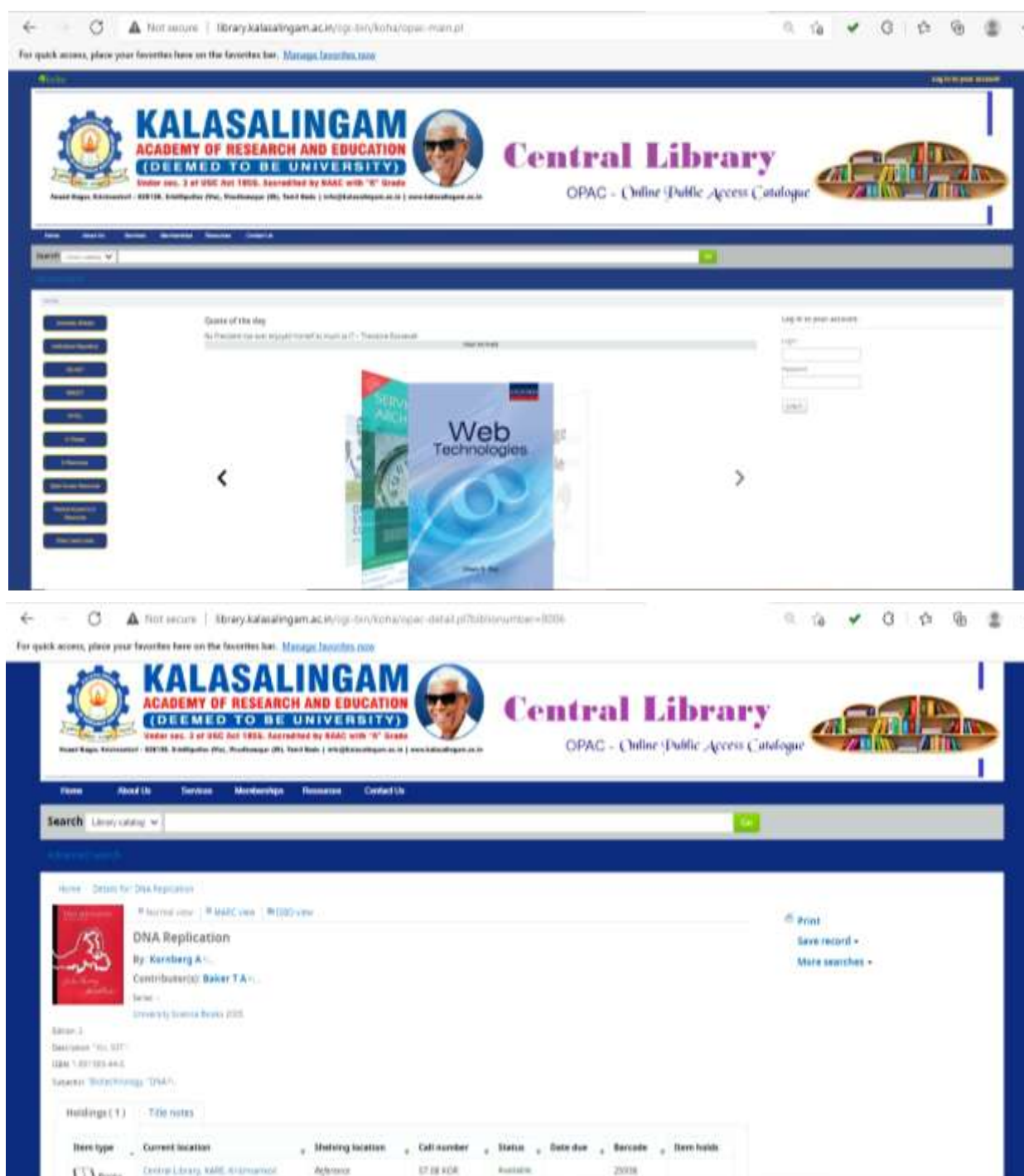


Fig. 5.6.3. KOHA (Virtual Library)

ICT tools used by faculty:

S. No.	Name of the faculty	Qualification	Designation	Innovations in teaching-learning
1.	Dr. K. Sundar	Ph.D.	Professor	Google classroom, PowerPoint Presentations

S. No.	Name of the faculty	Qualification	Designation	Innovations in teaching-learning
2.	Dr. T. Kathiresan	Ph.D.	Professor	Google classroom, PowerPoint Presentations
3.	Dr. V. Pandiyarajan	Ph.D.	Professor	Google classroom, PowerPoint Presentations
4.	Dr. K. Palanichelvam	Ph.D.	Professor	Google classroom, PowerPoint Presentations
5.	Dr. A. Muthukumaran	Ph.D.	Professor	Google classroom, PowerPoint Presentations
6.	Dr. B. Vanavil	Ph.D.	Associate Professor	Google classroom, PowerPoint Presentations
7.	Dr. S. Shantkriti	Ph.D.	Associate Professor	Google classroom, PowerPoint Presentations, LMS
8.	Dr. Nidhin Sreekumar	Ph.D.	Associate Professor	Google classroom, PowerPoint Presentations
9.	Dr. Naresh Kumar Sharma	Ph.D.	Associate Professor	Google classroom, PowerPoint Presentations, LMS, Flipped classroom
10.	Dr. K. K. Vasumathi	Ph.D.	Associate Professor	Google classroom, PowerPoint Presentations
11.	Dr. Sankarganesh Arunachalam	Ph.D.	Associate Professor	Google classroom, PowerPoint Presentations
12.	Dr. J. Kanimozhi	Ph.D.	Associate Professor	Google classroom, PowerPoint Presentations
13.	Dr. L. Muthulakshmi	Ph.D.	Associate Professor	Google classroom, PowerPoint Presentations
14.	Dr. S. Ram Kumar Pandian	Ph.D.	Associate Professor	Google classroom, PowerPoint Presentations, Videos
15.	Dr. S. Sheik Asraf	Ph.D.	Associate Professor	Google classroom, PowerPoint Presentations
16.	Dr. V. Deepak	Ph.D.	Associate Professor	Google classroom, PowerPoint Presentations
17.	Dr. K. Selvaraj	Ph.D.	Assistant Professor	Google classroom, PowerPoint Presentations
18.	Dr. K. Jyothi	Ph.D.	Assistant Professor	Google classroom, PowerPoint Presentations
19.	Mrs. J. Christina Rosy	M. Tech	Assistant Professor	Google classroom, PowerPoint Presentations
20.	Dr. G. Nadana Raja Vadivu	Ph.D.	Assistant Professor	Google classroom, PowerPoint Presentations
21.	Dr. D. Sankar Ganesh	Ph.D.	Assistant Professor	Google classroom, PowerPoint Presentations
22.	Dr. R. Seenivasagan	Ph.D.	Assistant Professor	Google classroom, PowerPoint Presentations
23.	Dr. D. Senthil Kumar	Ph.D.	Assistant Professor	Google classroom, PowerPoint Presentations
24.	Ms. P. Ramya	M. Tech	Assistant	Google classroom, PowerPoint Presentations

S. No.	Name of the faculty	Qualification	Designation	Innovations in teaching-learning
			Professor	
25.	Ms. P. Priya	M. Tech	Assistant Professor	Google classroom, PowerPoint Presentations, LMS
26.	Mr. S. J. Kabilan	M. Tech	Assistant Professor	Google classroom, PowerPoint Presentations, LMS, Videos
27.	Dr. V. Kannan	Ph.D.	Assistant Professor	Google classroom, PowerPoint Presentations
28.	S. Selva Vinothika	M. Tech	Assistant Professor	Google classroom, PowerPoint Presentations
29.	R. Anandhalakshmi	M. Tech	Assistant Professor	Google classroom, PowerPoint Presentations

5.7. Faculty as participants in Faculty development/training activities/STTPs (15)

The Biotechnology department's faculty members are expected to participate in a variety of Professional Development programmes and other training activities organized by Professional Societies, other Institutions, and Research Centers.

Name of the Faculty	Max. 5 per Faculty		
	CAY (2021– 2022)	CAY m1 (2020– 2021)	CAYm2 (2019– 2020)
Dr. V. Deepak	-	-	5
Dr. K. Sundar	3	0	3
Dr. L. Muthulakshmi	3	5	5
Dr. S. Shantkriti	5	5	5
Dr. Nidhin Sreekumar	-	-	-
Dr. K. K. Vasumathi	4	-	5
Dr. D. Sankarganesh	-	-	5
Dr. B. Vanavil	5	5	5
Dr. K. Selvaraj	4	-	5
Dr. S. Ram Kumar Pandian	5	5	5

Dr. S. Sheik Asraf	5	5	5
Ms. G. Nadana Raja Vadivu	-	-	5
Ms. P. Ramya	-	-	-
Ms. P. Priya	5	5	-
Dr. Naresh Kumar Sharma	5	5	5
Dr. K. Jyothi	5	3	5
Mrs. J. Christina Rosy	-	-	-
Dr. Sankarganesh Arunachalam	5	5	-
Dr. J. Kanimozhi	-	-	5
Mr. S. J. Kabilan	5	5	5
Sum	59	48	73
RF=Number of Faculty required to comply with 20:1 Student-Faculty ratio as per 5.1	19.2	19.2	19.2
Assessment= $3 \times (\text{Sum} / 0.5\text{RF})$ (Marks limited to 15)	18.4375	15	22.8125
Average assessment over last three years (Marks limited to 15) =	18.75		

Table B.5.7

5.7. Faculty as participants in Faculty development/training activities/STTPs

S. No.	Year	Faculty Name	Details of FDP	Date(s)
1	2021-2022	Dr. S. Shantkriti	Five days online FDP on “Emerging Trends and Challenges in Higher Education and Research” organized by IQAC of Prince Shri Venkateshwara Arts and Science College, Gowrivakkam, Chennai.	18-22nd April, 2022
2	2021-2022	Dr. S. Shantkriti	5-day online FDP on the theme “Inculcating Universal Human Values in Technical Education” organized by All India Council for Technical Education (AICTE)	2-6th August, 2021

3	2021-2022	Dr. S. Shantkriti	Faculty Enrichment Program on “Cutting Edge Science in Cellular and Molecular Biomedicine” organized by AIMMSCR, Amity University, Noida, UP	27-31st July, 2021
4	2020-2021	Dr. S. Shantkriti	AICTE sponsored Online QIP-Short Term Course on “Bioenergy: A hope for Future for Global Energy Security” organized by Department of Chemistry and Mechanical Engineering, IIT (BHU) Varanasi	1-6th March, 2021
5	2020-2021	Dr. S. Shantkriti	Five-day Faculty Development Program on “Engineering Education Research” organized by Centre for Learning Technologies, Kalasalingam Academy of Research and Education, Krishnankoil, Tamil Nadu	19-23rd January, 2021
6	2020-2021	Dr. S. Shantkriti	Five-day International Online Faculty Development Program on “Current Perspectives in Proteogenomics” organized by Department of Biotechnology, Vignan’s Foundation for Science, Technology & Research, Guntur, Andhra Pradesh	20-24th July, 2020
7	2020-2021	Dr. S. Shantkriti	One Week National Level Online Faculty Development Programme and hands on training in “R Language”, organized by PG & Research Dept. of Mathematics, Auxilium College (Autonomous), Vellore, Tamil Nadu, in collaboration with Spoken-Tutorial Project, IIT Bombay	13-20th May, 2020
8	2020-2021	Dr. S. Shantkriti	Two Weeks Faculty Development Programme on “Managing Online Classes and Co-Creating MOOCS” organized by Teaching Learning Centre, Ramanujan College, University of Delhi and sponsored by MHRD, PMMM National Mission On Teachers and Teaching	20th April-6th May, 2020
9	2019-2020	Dr. S. Shantkriti	Faculty Development Program on “Funding Hacks for Research Grants” by Dept. of Biotechnology, SBCE, Kalasalingam Academy of Research and Education, Krishnankoil, Tamil Nadu	1-5th July, 2019

10	2021-2022	Dr. B.Vanavil	Five days virtual short-term training programme (STTP) on “Advanced Characterization Techniques for Chemical Scaffolds (ACTCS-2021)”, organized by Department of Chemistry, Sardar Vallabhbhai National Institute of Technology (SVNIT), Surat, Gujarat	21-25, September 2021
11	2021-2022	Dr. B.Vanavil	Online Faculty Development Program on Application of Artificial Intelligence and Machine Learning in Bioinformatics, NIT-Warangal	15-25, March 2022
12	2020-2021	Dr. B.Vanavil	One week online FDP on Recent Trends in Computer Simulations for Applications in Biotechnology: Teaching and Learning strategies, Department of Biotechnology in association with Teaching-Learning Centre National Institute of Technology- Warangal	17-21, August 2020
13	2019-2020	Dr. B.Vanavil	FDP entitled "Gearing up for Research & Research Writing" by Dept. of Biotechnology, SBCE, Kalasalingam Academy of Research and Education, Krishnankoil, Tamil Nadu	20-26 May, 2020
14	2019-2020	Dr. B.Vanavil	Faculty Training on "Project Proposal Writing" organized by Office of Faculty Affairs & Centre for Learning Technology, Kalasalingam Academy of Research and Education, Krishnankoil, Tamil Nadu	May 25- 26, 2020
15	2019-2020	Dr. B.Vanavil	Indo-Australia Workshop On Nanomaterials For Applications In Agriculture, Energy And Environment, National Institute of Technology Tiruchirappalli	23, January 2020
16	2021-2022	Dr. S. Sheik Asraf	Fdp On Expanding Horizon Of Downstream Processing, Kalasalingam Academy Of Research And Education (Deemed To Be University)	4 -8 /JULY /2022
17	2020-2021	Dr. S. Sheik Asraf	Faculty Development Program On Problem Solving Using Computer Programming, Kalasalingam Academy Of Research And Education (Deemed To Be University)	26 JULY- 6 AUGUST/2021

18	2019-2020	Dr. S. Sheik Asraf	Faculty Development Program On Prospects On Biochemical Engineering: Basics And Beyond, Kalasalingam Academy Of Research And Education (Deemed To Be University),	01-07/JUNE/2020
19	2019-2020	Dr. S. Sheik Asraf	Faculty Development Program On Digital Tools For Learning, Kalasalingam Academy Of Research And Education (Deemed To Be University)	15-20/JUNE/2020
20	2019-2020	Dr. S. Sheik Asraf	Faculty Development Program On Gearing Up For Research And Research Writing, Kalasalingam Academy Of Research And Education (Deemed To Be University)	20-26/MAY/2020
21	2019-2020	Dr. S. Sheik Asraf	Faculty Training On Project Proposal Writing, Kalasalingam Academy Of Research And Education (Deemed To Be University)	25-26/MAY/2020
22	2019-2020	Dr. S. Sheik Asraf	Faculty Development Program On Prospects In Plant And Algal Biotechnology, Kalasalingam Academy of Research And Education (Deemed To Be University)	06-12/DECEMBER/2019
23	2019-2020	Dr. S. Sheik Asraf	Funding Hacks For Research Grants, Kalasalingam Academy Of Research And Education (Deemed To Be University)	1-5/JULY/2019
24	2021-2022	Dr.L.Muthulakshmi	Fdp On "Expanding Horizon Of Downstream Processing" Kalasalingam Academy Of Research And Education	4 -8 /JULY /2022
25	2021-2022	Dr.L.Muthulakshmi	Faculty Development Programme on "Tools and Techniques in Characterization of Compounds"CSIR-CIKRI, Karaikudi	17-21 January 2022
26	2021-2022	Dr.L.Muthulakshmi	International Workshop on "Microalgal Technology", St.Maries college Tuticorin	16-18 February 2022

27	2021-2022	Dr.L.Muthulakshmi	Faculty development Programme on "Printed and Flexible Electronics"., VIT,Chennai.	27-29 June 2022
28	2020-2021	Dr.L.Muthulakshmi	ATAL Sponsered one week faculty development Programme on, Novel Biomaterial for future Application”.Ramaiah Institute of Technology-Bangalore.	12-17 July 2021
29	2020-2021	Dr.L.Muthulakshmi	one week faculty development Programme on, “Innovation,Incubation,and Entrenuership”,SPMVV College, Tirupathi.	5-9 July 2021
30	2020-2021	Dr.L.Muthulakshmi	one week faculty development Programme on “Applications of Computers in Biology”, Golgostia University,Noida.	6-10 June2021
31	2019-2020	Dr.L.Muthulakshmi	MHRD-IQAC Sponsered faculty development Programme on “Recent trends in Biomedical Engineering and Research Perspectives”Dr.N.G.P Institute of Technology, Coimbatore	26-30 April 2020
32	2019-2020	Dr Naresh Kumar Sharma	Faculty Development Program On Prospects On Biochemical Engineering: Basics And Beyond, Kalasalingam Academy Of Research And Education (Deemed To Be University),	01-07/JUNE/2020
33	2021-2022	Dr Naresh Kumar Sharma	Fdp On "Expanding Horizon Of Downstream Processing" Kalasalingam Academy Of Research And Education	4 -8 /JULY /2022
34	2021-2022	Mr. S. J. Kabilan	Fdp On Expanding Horizon Of Downstream Processing	4 -8 /JULY /2022
35	2020-2021	Mr. S. J. Kabilan	Faculty Development Program On Problem Solving Using Computer Programming, Kalasalingam Academy Of Research And Education (Deemed To Be University)	26 JULY- 6 AUGUST/2021

36	2019-2020	Mr. S. J. Kabilan	Faculty Development Program On Gearing Up For Research And Research Writing, Kalasalingam Academy Of Research And Education (Deemed To Be University)	20-26/MAY/2020
37	2019-2020	Mr. S. J. Kabilan	Faculty Development Program On Prospects In Plant And Algal Biotechnology, Kalasalingam Academy of Research And Education (Deemed To Be University)	06-12/DECEMBER/2019
38	2019-2020	Mr. S. J. Kabilan	Funding Hacks For Research Grants, Kalasalingam Academy Of Research And Education (Deemed To Be University)	1-5/JULY/2019
39	2021-2022	Dr.K.Jyothi	One week FDP on Research Prospects and Progress in Biological Science. SRM Institute of Science and Technology	4-10 July 2022
40	2020-2021	Dr.K.Jyothi	Sustainable Development and Research opportunities in Food and Chemical Engineering. Hindusthan College of Engineering and Technology.	5-11 October 2020
41	2019-2020	Dr.K.Jyothi	7 Days FDP on Academic Leadership, Teaching and learning methods, Research plan, Patents.SNMV College of Arts and Science. Coimbatore	8-15 June 2020
42	2019-2020	Dr. K.Jyothi	Two Days FTP on Project Proposal Writing, CLT , KARE	25-26 May 2020
43	2019-2020	Dr. K.Jyothi	One week FDP on Digital Tools for Learning, CLT, KARE	15-20 June 2020
44	2021-2022	Ms.P.Priya	Fdp On "Expanding Horizon Of Downstream Processing" Kalasalingam Academy Of Research And Education	4 -8 /JULY /2022
45	2019-2020	Ms.P.Priya	Faculty Development Program On Gearing Up For Research And Research Writing, Kalasalingam Academy Of Research And Education (Deemed To Be University)	20-26/MAY/2020

46	2019-2020	Ms.P.Priya	Faculty Development Program On Prospects In Plant And Algal Biotechnology, Kalasalingam Academy of Research And Education (Deemed To Be University)	06-12/DECEMBER/2019
47	2019-2020	Ms.P.Priya	Funding Hacks For Research Grants, Kalasalingam Academy Of Research And Education (Deemed To Be University)	1-5/JULY/2019

Outside Campus

Faculty Participation

S. No	Year	Faculty Name	Details of Contribution	Date(s)
1	2021-2022	Dr. S. Shantkriti	Elected fellow of Young Academy of India (YAI)	20 Sept, 2021
2	2021-2022	Dr Naresh Kumar Sharma	Nineth International Conference on Transformations in Engineering Education	7 -9 Jan 2022
3	2021-2022	Dr. S.Sheik Asraf	International Conference on Transformations in Engineering Education Virtual	7 -9 January 2022
4	2020-2021	Dr. S.Sheik Asraf	Eighth International Conference on Transformations in Engineering Education	8 - 10, January 2021
5	2021-2022	S J Kabilan	Ninth International Conference on Transformations in Engineering Education	7 -9 January 2022
6	2020-2021	S J Kabilan	Eighth International Conference on Transformations in Engineering Education	8 - 10, January 2021

Outside Campus

Faculty Awards and Recognition

S. No	Faculty Name	Details of Awards	Date(s)
1	Dr. S. Shantkriti	InRes Young Scientist Award 2021 by Institute for Researchers (InRes), India	25 Oct, 2021

2	Dr. S. Shantkriti	Indo Asian – Best Researcher Award 2021 in Environmental Biotechnology by IMRF Institute of Higher Education & Research, India	5 Oct, 2021
3	Dr. S. Shantkriti	Dr. Sarvepalli Radhakrishnan Best Teacher Award 2021 in Environmental Microbiology by Centre for Professional Advancement, India	5 Sept, 2021
4	Dr. S. Shantkriti	SFRF Summer Faculty Research Fellow Programme by Indian Institute of Technology, Delhi	14 May -28 Jun, 2019
5	Dr. B.Vanavil	Topic Coordinator, Microbial Factories: Strategies and Applications, Frontiers in Microbiology	March 30, 2022
6	Dr. B.Vanavil	Mentor for Funded Project by Tamilnadu State Council for Science and Technology under Student Project Scheme	2021-2022
7	Dr. B.Vanavil	Mentorship under the CSIR-Summer Research Training Programme, Council of Scientific and Industrial Research, North East Institute of Science and Technology, Jorhat, Assam.	June-August, 2020
8	Dr. S. Sheik Asraf	Mentor for Indo Universal Collaboration for Engineering Education (IUCEE) National Education Policy mini course on "Leadership and Sustainability"	19 January-13 April, 2022
9	Dr.L.Muthulakshmi	Mentor for Indo Universal Collaboration for Engineering Education (IUCEE)"Project Oriented Problem Based Learning"	Aug- Dec- 2021
10	Dr Naresh Kumar Sharma	Mentor for Indo Universal Collaboration for Engineering Education (IUCEE)"Clean and Green Campus"	8 Jan 2022
11	Mr S J Kabilan	Best Paper Award: Eighth International Conference on Transformations in Engineering Education	8 - 10, January, 2021

Outside Campus

Faculty Contribution as External Expert, Invited Speaker, Resource Person, etc

S. No	Year	Faculty Name	Details of Contribution	Date(s)
1	2021-	Dr. S. Shantkriti	Faculty Coordinator for the "MANAV Scientific Reading and	Sept-Oct 2021

	2022		Comprehension Self-Assessment Module (for students)” by Project MANAV– The Human Atlas Initiative	
2	2021-2022	Dr. S. Shantkriti	Keynote speaker at 5th International Conference on Environment and Disasters (ICED 2021) by Zhengzhou Excellent Young Scholars Science and Technology Co., Ltd., China	22-23 Jul, 2021
3	2020-2021	Dr. S. Shantkriti	Board of Studies member for B. Sc. & M. Sc. Microbiology, Thiagarajar College, Madurai	23 Jul, 2020
4	2019-2020	Dr. B.Vanavil	External Examiner for conducting End Semester practical Examinations for Bioprocess Laboratory-15BT551 and 15MB352-Advanced Molecular Biology and Genetic Engineering Laboratory	17 October, 2019
5	2020-2021	Dr. S. Sheik Asraf	Resource Person from KARE for " Study In India Virtual Expo"	11-15 June, 2021
6	2021-2022	Dr.L.Muthulakshmi	Resource Person State level Virtual Workshop on “Nanotechnology: Recent trends and future perspectives”	22.03.2022
7	2020-2021	Dr.L.Muthulakshmi	Resource Person Association Inaguration,delivered lectured “ Scope and Applications of Nanobiotechnology,	06.06.2021
8	2020-2021	Dr Naresh Kumar Sharma	Invited Speaker Virtual Faculty Development Programme on " Research Trends in Water Resources and Environmental Engineering	August 6, 2020
9	2021-2022	Mr S J Kabilan	Resource person for 3 Days Workshop on ""Basic Bioinformatics Tools and Techniques” organized by Department of Chemistry / Biochemistry, RAMAIAH College of Arts, Science & Commerce In collaboration with Karnataka Science and Technology Academy (KSTA)	30th, 31st, May and 1st June 2022

Inside Campus

Faculty Contribution as Organizer, Invited Speaker, Resource Person, etc

S. No	Year	Faculty Name	Details of Contribution	Date(s)
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1	2021-2022	Dr. S. Shantkriti	Session Chair on theme: Innovations in microbiology for sustainable life at 2nd National conference on "Innovations in bio & chemical engineering for sustainable life" by Dept. of Biotechnology, KARE	20 May, 2021
2	2021-2022	Dr. B.Vanavil	Session chair for National Conference on “Innovations in Biotechnology for Sustainable Life” organized by Department of Biotechnology, KARE	23, April 2022
3	2021-2022	Dr. B.Vanavil	Guest Lecture on "Bioreactors in Animal Cell Culture" organized by Department of Biomedical Engineering, KARE	18 December 2021
4	2020-2021	Dr. B.Vanavil	Session Chair on the theme "Innovations in Bioprocess Technology for Sustainable Life" in Second National Conference on 'INNOVATIONS IN BIO AND CHEMICAL ENGINEERING FOR SUSTAINABLE LIFE" , SBCE, Kalasalingam Academy of Research and Education	20 May, 2021
5	2020-2021	Dr. B.Vanavil	Organized Webinar on “Technology for Effective Presentation”	8 August, 2020
6	2020-2021	Dr. B.Vanavil	Session Chair on the theme "Innovations in Bioprocess Technology for Sustainable Life" in Second National Conference on 'INNOVATIONS IN BIO AND CHEMICAL ENGINEERING FOR SUSTAINABLE LIFE" , SBCE, Kalasalingam Academy of Research and Education	8 June, 2020
7	2020-2021	Dr. B.Vanavil	Coordinator for FDP on Biochemical Engineering: Basics and Beyond, Kalasalingam Academy of Research and Education	1 June 2020-07 June 2020
8	2019-2020	Dr. B.Vanavil	Organized "Workshop on “Bread, Butter and Biotechnology”, Kalasalingam Academy of Research and Education	May 13, 2020-May 14, 2020
9	2019-2020	Dr. B.Vanavil	Organized "Indo - US Workshop on “Extremophiles in Biotechnology”, KARE	Nov 27, 2019-Nov 28, 2019
10	2019-2020	Dr. S. Sheik Asraf	Organized Workshop on Protein and Genome Informatics	May 15, 2020
11	2020-	Dr. S. Sheik Asraf	Organized Workshop on Metagenomics	June 29, 2020

	2021			
12	2020-2021	Dr. S. Sheik Asraf	Organized Bionexus 2020	August 10, 2020
13	2020-2021	Dr. S. Sheik Asraf	Organized Webinar on Evergreen Hero – Gandhi Ji	October 02, 2020
14	2020-2021	Dr. S. Sheik Asraf	Organized National Youth Day 2021	January 12, 2021
15	2021-2022	Dr. S. Sheik Asraf	Organized Community Service Project EXPO	November 26, 2021
16	2020-2021	Dr Naresh Kumar Sharma	Invited Speaker Virtual Faculty Development Programme on "Research Trends in Water Resources and Environmental Engineering"	August 6, 2020
17	2019-2020	Mr S J Kabilan	Organizing Secretary for Two - Day Virtual Conference on "Innovations in Bio & chemical Engineering for sustainable life"	June 8 & 9, 2020
18	2020-2021	Mr S J Kabilan	Organized VIRTUAL WORKSHOP ON "RECENT TRENDS IN FUNCTIONAL PROTEOMICS"	JULY 6 & 7, 2020
19	2020-2021	Mr S J Kabilan	VIRTUAL INTERNATIONAL CONFERENCE ON "INNOVATIONS IN INTERDISCIPLINARY RESEARCH"(VICIIDR)	JUNE 23 & 24, 2020
20	2021-2022	Dr. K.Jyothi	Organized One Day Workshop on Lab Safety and Management	20 April 2022
21	2019-2020	Dr. K.Jyothi	Organized Two Days Virtual Workshop on Biotechniques for Extraction of Metabolites from Plant and Algal Sources	11-12 May 2020

Inside Campus

Faculty Participation in various events

S. No	Year	Faculty Name	Details of Contribution	Date(s)
1	2020-	Dr. S. Shantkriti	First prize for Poetry (English) event at International Women's	6 Mar, 2021

	2021		Day celebration	
2	2020-2021	Dr. S. Shantkriti	First prize for Singing (Hindi/English) event at International Women's Day celebration	7 Mar, 2021
3	2020-2021	Dr. S. Shantkriti	Second prize for Art from Waste event at International Women's Day celebration	8 Mar, 2021
4	2021-2022	Dr Naresh Kumar Sharma	Participated in Five day Faculty Development Programme titled "Expanding Horizon of Downstream Processing"	4 July 2022 - 8 July 2022

5.8. Research and Development (75)

5.8.1. Academic Research (20)

S. No.	Name of the faculty	Qualification	Designation	Specialization	H-Index	No of Research Publications			No. of Ph.D. completed under their guidance	No. of Ph.D. ongoing under their guidance
						SCI	Scopus	UGC CARE/ others		
1.	Dr. K. Sundar	Ph.D.	Professor	Infectious and Inflammatory diseases	20	88	04		8	6
2.	Dr. T. Kathiresan	Ph.D.	Professor	Proteomics, Nanobiotechnology	11	35	02		3	5
3.	Dr. V. Pandiyarajan	Ph.D.	Professor	Medicinal Plants	1	5				
4.	Dr. K. Palanichelvam	Ph.D.	Professor	Plant Molecular Biology	12	25	2		1	1
5.	Dr. A. Muthukumaran	Ph.D.	Professor	Nano- and Animal Biotechnology	10	24	3		4	3
6.	Dr. B. Vanavil	Ph.D.	Associate Professor	Bioprocess Technology	8	11	4	7	0	2
7.	Dr. S. Shantkriti	Ph.D.	Associate Professor	Environmental Technology	8	6	4	17	0	0

S. No.	Name of the faculty	Qualification	Designation	Specialization	H-Index	No of Research Publications			No. of Ph.D. completed under their guidance	No. of Ph.D. ongoing under their guidance
						SCI	Scopus	UGC CARE/ others		
8.	Dr. Nidhin Sreekumar	Ph.D.	Associate Professor	Environmental Technology	6	6	3		0	0
9.	Dr. Naresh Kumar Sharma	Ph.D.	Associate Professor	Environmental Biotechnology	7	20	2	10	0	2
10.	Dr. K. K. Vasumathi	Ph.D.	Associate Professor	Algal Biotechnology	4	10	4		0	1
11.	Dr. Sankarganesh Arunachalam	Ph.D.	Associate Professor	Cardiovascular and Adverse Drug Reactions	13	37	5		1	1
12.	Dr. J. Kanimozhi	Ph.D.	Associate Professor	Biochemical Engineering	4	10	4		0	0
13.	Dr. L. Muthulakshmi	Ph.D.	Associate Professor	Biomaterials	8	19	2		0	1
14.	Dr. S. Ram Kumar Pandian	Ph.D.	Associate Professor	Innate Immunity and Inflammation	20	30	4		0	1
15.	Dr. S. Sheik Asraf	Ph.D.	Associate Professor	Genomics	3	1	6	13	0	0
16.	Dr. V. Deepak	Ph.D.	Associate Professor	Cell Biology	15	25	0		0	0
17.	Dr. K. Selvaraj	Ph.D.	Assistant Professor	Drug Design and Drug Delivery	14	70	8		0	3
18.	Dr. K. Jyothi	Ph.D.	Assistant Professor	Biochemistry	2		6	5	0	0
19.	Mrs. J. Christina Rosy	M. Tech	Assistant Professor	Bioinformatics & Microbiology	1	4	3		0	0
20.	Dr. G. Nadana Raja Vadivu	Ph.D.	Assistant Professor	Plant Biotechnology	4	4	3		0	0

S. No.	Name of the faculty	Qualification	Designation	Specialization	H-Index	No of Research Publications			No. of Ph.D. completed under their guidance	No. of Ph.D. ongoing under their guidance
						SCI	Scopus	UGC CARE/ others		
21.	Dr. D. Sankar Ganesh	Ph.D.	Assistant Professor	Animal Biotechnology	11	28	4		0	0
22.	Dr. R. Seenivasagan	Ph.D.	Assistant Professor	Environmental Biotechnology	6	21	0		0	0
23.	Dr. D. Senthil Kumar	Ph.D.	Assistant Professor	Proteomics	1	7	0		0	0
24.	Ms. P. Ramya	M. Tech	Assistant Professor	Bioprocess Technology	0	0	2		0	0
25.	Ms. P. Priya	M. Tech	Assistant Professor	Microbiology	0		1		0	0
26.	Mr. S. J. Kabilan	M. Tech	Assistant Professor	Drug Design and Bioactive Metabolites	0	3	2		0	0
27.	Dr. V. Kannan	Ph.D.	Assistant Professor	Transgenic Technology	1	2	3		0	0
28.	S. Selva Vinothika	M. Tech	Assistant Professor	Proteomics, Cancer Biology	0	0	0		0	0
29.	R. Anandhalakshmi	M. Tech	Assistant Professor	Animal Biotechnology	0	0	0		0	0

Publications

In their areas of expertise, faculty members have 139 publications in the past 3 years. Students are also encouraged to present their discoveries at national and international conferences and to publish in national and international journals. The following is the list of publications for the last three years:

Academic Year	CAY (2021–2022)	CAY m1 (2020–2021)	CAYm2 (2019–2020)
No of Publications	53	40	46

Faculty publication details along with DoIs and Publication Citation Details

S. No.	Name of the faculty member	Paper details	DoI	Citation
1	Dr. S. Shantkriti	Shantkriti Srinivasan*, Senthil Kumar Sadasivam (2021): Biodegradation of textile azo dyes by textile effluent non-adapted and adapted <i>Aeromonas hydrophila</i> . <i>Environmental Research</i> . 194: 110643.	10.1016/j.envres.2020.110643	21
2	Dr. S. Shantkriti	Kannan V., Anandan R., Sudalaimani D.K., Srinivasan S., Athiappan M (2021): Antibacterial and antioxidant activity of metabolites from bioconverted Docosahexaenoic Acid using gut bacteria. <i>Research Square</i> , 1-15.	10.21203/rs.3.rs-674393/v1	0
3	Dr. S. Shantkriti	Seshan Gunalan S., Somarathinam K., Bhattacharya J., Srinivasan S., Jaimohan S. M., Manoharan R., Ramachandran S., Kanagaraj S., Kothandan G. 2020. Understanding the dual mechanism of bioactive peptides targeting the enzymes involved in Renin Angiotensin System (RAS): an in-silico approach. <i>Journal of Biomolecular Structure and Dynamics</i> . 38 (17): 5044-5061.	10.1080/07391102.2019.1695668	3
4	Dr. S. Shantkriti	Neepa Pandhi, Shantkriti Srinivasan (2020): Marine bacteria: a storehouse of novel compounds for biodegradation. In: Shah M (Eds.), <i>Microbial bioremediation & biodegradation</i> . Springer, Singapore, pp. 485-503. (ISBN: 978-981-15-1811-9)	10.1007/978-981-15-1812-6_19	1
5	Dr. S. Shantkriti	Shantkriti Srinivasan*, Kanyaga Parameswari M, Siranjeevi Nagaraj (2020): Latest innovations in bacterial degradation of textile azo dyes. In: Shah MP, Rodriguez-Couto S, Sengor SS (Eds.), <i>Emerging technologies in environmental bioremediation</i> . Elsevier, pp. 285-309. (ISBN: 978-0-12-819860-5) (Scopus)	10.1016/B978-0-12-819860-5.00012-2	6

6	Dr. S. Shantkriti	Murugan Athiappan, Shantkriti Srinivasan, Rubavathi Anandan, Janani Rajaram (2020): Novel process of ellagic acid synthesis from waste generated from mango pulp processing industries. In: Shah MP, Rodriguez-Couto S, Sengor SS (Eds.), Emerging technologies in environmental bioremediation. Elsevier, pp. 443-454. (ISBN: 978-0-12-819860-5). (Scopus)	10.1016/B978-0-12-819860-5.00020-1	1
7	Dr. S. Shantkriti	Nidhin Sreekumar, Aswathy Udayan, Shantkriti Srinivasan* (2020): Algal bioremediation of heavy metals. In: Shah MP (Ed), Removal of toxic pollutants through microbiological and tertiary treatment. Elsevier, pp. 279-307. (ISBN: 978-0-12-821014-7)	10.1016/B978-0-12-821014-7.00011-3	4
8	Dr. S. Shantkriti	Kanagasabai Somarathinam, Saravanan Velautham, Rajakumar Perumal, Saravanan Kandasamy, Shantkriti Srinivasan, E. Gayathri, Gudan Kothandan, S. Usharani (2019): Synthesis, X-ray crystal structure and DFT calculations of 2',4'-dihydro-10H-spiro[anthracene-9,3'-benzo[b][1,4]thiazin]-10-amine and 1,3,5 -triindolyl benzene. Chemical Data Collections. 21:100227. (Scopus)	10.1016/j.cdc.2019.100227	4
9	Dr. S. Shantkriti	Shantkriti Srinivasan*, Senthil Kumar Sadasivam, Seshan Gunalan, Gnanendra Shanmugam, Gudan Kothandan (2019): Application of docking and active site analysis for enzyme linked bioremediation of textile dyes. Environmental Pollution. 248: 599-608. (SCI IF: 5.714)	10.1016/j.envpol.2019.02.080	44
10	Dr. S. Shantkriti	M. Kannan, D. Mubarakali, B. Thiyonila, M. Krishnan, B. Padmanaban, S. Shantkriti (2019): Insect gut as a bioresource for potential enzymes- an unexploited area for industrial Biotechnology. Biocatalysis and Agricultural Biotechnology. 18: 101010. (Scopus)	10.1016/j.bcab.2019.01.048	14

11	Dr. S. Shantkriti	Shantkriti Srinivasan*. Biodegradation of textile azo dye, Remazol Yellow RR using non-autochthonous bacteria <i>Lysinibacillus sphaericus</i> MTCC 9523, supported by docking. In: Proceedings of the International Conference on Biodiversity & Sustainable Resource Management (ICBSRM); 2018 Mar 12-13; Chennai. Centre for Environmental Sciences & Centre for Water Resources Management, University of Madras; 2018. pp. 242-255. (ISBN print: 978-93-83071-08-1)	-	6
12	Dr. S. Shantkriti	Hussain Al Ssadh†, Shantkriti Srinivasan†, Inamul Hasan Madar, Ashvini Desai, Alaa Omran Almagrabi, Iftikhar Aslam Tayubi (2018): Apoptotic induction by <i>Cassia fistula</i> leaf extracts against human hepatocarcinoma cell lines. International Journal of Scientific Innovations. 5 (1): 84-93. (Google Scholar)	10.32594/IJSI_20180501	0
13	Dr. S. Shantkriti	Shantkriti Srinivasan*, Senthil Kumar Sadasivam (2018): Exploring bacterial systems for docking and aerobic-microaerophilic biodegradation of textile azo dye. Journal of Water Process Engineering. 22: 180-191. (SCIE IF: 3.173)	10.1016/j.jwpe.2018.02.004	54
14	Dr. S. Shantkriti	Berchmans Thiyonila, Naveen Paulin Reneeta, Mani Kannan, Srinivasan Shantkriti, Muthukalingan Krishnan (2018): Dung beetle gut microbes: diversity, metabolic and immunity related roles in host system. International Journal of Scientific Innovations. 4(3): 77-83. (Google Scholar)	10.32594/IJSI_20180403	8
15	Dr. Naresh Kumar Sharma	Khalid Sayed, Lavania Baloo and Naresh Kumar Sharma. Bioremediation of total petroleum hydrocarbons (Tph) by bioaugmentation and biostimulation in water with floating oil spill containment booms as bioreactor basin. International Journal of Environmental Research and Public Health, 2021, 18(5), pp. 1–27, 2226	https://doi.org/10.3390/ijerph18052226	23
16	Dr. Naresh Kumar Sharma	Sharma, N.K., Arivalagan, A.R. Algae or bacteria-the future of biological wastewater treatment. Handbook of Advanced Approaches Towards Pollution Prevention and Control, 2021, 2, pp. 217–247	https://doi.org/10.1016/B978-0-12-822134-1.00008-7	3

17	Dr. Naresh Kumar Sharma	Babu, A.R., Sharma, N.K., Manickam, M. Carbon dissipation from surgical cotton production wastewater using macroalgae, microalgae, and activated sludge microbes. Environmental Science and Pollution Research, , 2021	https://doi.org/10.1007/s11356-021-17345-1	1
18	Dr. Naresh Kumar Sharma	Prakash, A.C., Sharma, N.K., Vanitha, S. Macro algae based adsorption for treatment of cotton processing wastewater. IOP Conference Series: Materials Science and Engineering, 2020, 872(1), 012186	https://doi.org/10.1088/1757-899X/872/1/012186	0
19	Dr. Naresh Kumar Sharma	Karthika Arumugam, Swaminathan Meenkashisundaram, Naresh Kumar Sharma. Photocatalysis for Wastewater Treatment with Special Emphasis on Plastic Degradation. Handbook of Nanomaterials and Nanocomposites for Energy and Environmental Applications, pp 1-21	https://doi.org/10.1007/978-3-030-11155-7_41-1	2
20	Dr. Naresh Kumar Sharma	Sharma, N.K., Suganya, K. , Sivapragasam, C., Matheswaran, M. Genetic Programming Modeling for Pollutant Removal from Aerobic Bioreactor Treating Industrial Wastewater. IEEE International Conference on Intelligent Techniques in Control, Optimization and Signal Processing, INCOS 2019, 2019, 8951364	10.1109/INCOS45849.2019.8951364	0
21	Dr. Naresh Kumar Sharma	Arumugam, K., Roy, A., Sabreen, T. , Sharma, N.K., Swaminathan, M. Antibacterial and photocatalytic properties of the engineered nanoparticles against infectious pathogens. Materials Today: Proceedings, 2019, 15, pp. 669–676	https://doi.org/10.1016/j.matpr.2019.04.136	2
22	Dr. Naresh Kumar Sharma	Swaminathan, M., Sharma, N.K. Antimicrobial activity of the engineered nanoparticles used as coating agents. Handbook of Ecomaterials, 2019, 1, pp. 549–563	10.1007/978-3-319-68255-6_1	11

23	Dr. Naresh Kumar Sharma	Muttu Pandian P., Matheswaran M., Vanitha S., Sivapragasam C., Naresh K. Sharma. acroalgae and Activated Sludge Microbes in Treatment of Crepe Cotton Effluent. International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-9, Issue-2S2, December 2019	10.35940/ijitee.B1168.1292S219	0
24	Dr. Naresh Kumar Sharma	K.Suganya, C.Sivapragasam, Naresh K Sharma, S.Vanitha. Current Trends on Oil Sludge Characterization, Toxicity and Treatment Systems. International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8, Issue-4S2, December 2019	:10.35940/ijrte.D1004.1284S219	0
25	Dr. Naresh Kumar Sharma	Naresh K Sharma, C.Sivapragasam, S.Vanitha , K.Ganeshmoorthy, S.Dilipkumar S.Saivishnu, A.M.Muhil. Ingenious Method Towards Sustainable Decentralized Solid Waste Management. International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8, Issue-4S2, December 2019	10.35940/ijrte.D1143.1284S219	0
26	Dr. Naresh Kumar Sharma	Naresh Kumar Sharma, Balakrishnan A, Karthika A, Thirumalai K, Swaminathan M. Activity of Engineered Nano-Semiconductor Oxides against Gram Positive and Gram Negative Bacteria. International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8, Issue-4S2, December 2019	10.35940/ijrte.D1136.1284S219	0
27	Dr. Naresh Kumar Sharma	Karthika A, Karthike R, Swaminathan M, Naresh Kumar Sharma. Assessing the Degradation of Organics in Surgical Cotton Processing Wastewater by Mixed Microbial Culture and Photo-Catalysis. International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8 Issue-4S2, December 2019	10.35940/ijrte.D1152.1284S219	0

28	Dr. Naresh Kumar Sharma	Arunajanani, V., Naresh Kumar Sharma, N.K., Hariram, N., ... Chitradevi, K. , Sheik Asraf, S. Outcome based project for betterment of rural community. Journal of Engineering Education Transformations, 2021, 34(Special Issue), pp. 263–270	10.16920/jeet/2021/v34i0/157153	1
29	Dr. S. Sheik Asraf	Ganapathy Nadana Raja Vadivu, S Sheik Asraf and Karuppaiah Palanichelvam. Association of <i>Alcaligenes faecalis</i> strain in juvenile earthworms, from cocoons of <i>Eudrilu eugeniae</i> . International Journal of Innovative Technology and Exploring Engineering. 9 no.2S2. 688-692. 2019.	10.35940/ijitee.B1166.1292S219	1
30	Dr. S. Sheik Asraf	S Sheik Asraf, N Shobi, R Soundarya and M Udaya Kumar. Culture Dependent Examination of Commercially Available Bar Chocolates. International Journal of Recent Technology and Engineering. 8 no.4S2.745-748.2019.	10.35940/ijrte.D1135.1284S219	-
31	Dr. S. Sheik Asraf	S Sheik Asraf, V.Priyanga, P.S. Bhuvaneshwaran and M. Devanand. Bacterial culture dependent effect on mobile phone's surface. International Journal of Recent Technology and Engineering. 8 no.4S2. 999-1002. 2019.	10.35940/ijrte.D1144.1284S219	-
32	Dr. S. Sheik Asraf	S Sheik Asraf and K. Jyothi. Influence of Antibiotics on Gut Microbiota and Stroke – A Mini Review. International Journal for Research in Applied Science & Engineering Technology. Volume 8 Issue VI. 1358-1359 June 2020.	http://doi.org/10.22214/ijraset.2020.6219	-
33	Dr. S. Sheik Asraf	Jyothi Kanagaraj , S. Sheik Asraf. Usage of Plant Extractsin Treating Obesity - A Mini Review. International Journal for Research in Applied Science & Engineering Technology. Volume 8 Issue VI. 2167-2169. June 2020.	http://doi.org/10.22214/ijraset.2020.6354	-

34	Dr. S. Sheik Asraf	Arunajanani, V., Naresh Kumar Sharma, N. Hariram, G. Vishnuvarthanan, S. Reginold Jebitta, T. Arunprasath, K. Chitradevi and S. Sheik Asraf. Outcome based project for betterment of rural community. Journal of Engineering Education Transformations Volume 34 Special issue. 263-270. January 2021.	https://dx.doi.org/10.16920/jeeet/2021/v34i0/157153	-
35	Dr. S. Sheik Asraf	S. Sheik Asraf. Strategies for Production of Ethanol and Value Added Products from Agriculture Wastes. International Journal for Research in Applied Science & Engineering Technology. Volume 9 Issue V. 669- 670. May 2021	https://doi.org/10.22214/ijras.et.2021.33329	-
36	Dr. S. Sheik Asraf	S. Sheik Asraf, A. Sivakkani , M. Sneha and N. Ramar. In silico Analysis Of Antibiotic Resistant Determinants In The Genome Of Streptomyces clavuligerus ATCC 27064 Journal of Huazhong University of Science and Technology. Volume 50 Issue III 1-9. March 2021.		-
37	Dr. S. Sheik Asraf	S. Sheik Asraf, P. Pavithra, R. Muneeswari, Athira Rajan, S. Ramya, V. Jaya Surya. Bacterial Colonization in Computer Keyboards Poses Health Hazard. International Journal of Recent Technology and Engineering. Volume- 10 Issue-5, 1-3 January 2022.	https://doi.org/10.35940/ijrte.f8547.0110522	-
38	Dr. S. Sheik Asraf	S. Sheik Asraf, A. Sivakkanni, M. Sneha, S. Janani, P. Jashin and A. Martina Jemimal. In Silico Based Bioinformatics Project During the COVID-19 Lockdown Period: An Alternative to Wet Lab Study. Journal of Engineering Education Transformations Volume 35 Issue 3. 82-87. January 2022.	https://dx.doi.org/10.16920/jeeet/2022/v35i3/22090	-
39	Dr. B. Vanavil	B. Vanavil and A. Seshagiri Rao, Dual substrate fermentation using palm oil and glucose for production of eco-friendly biosurfactants using <i>P. aeruginosa</i> , Indian Journal of Chemical Technology, 25, 101-105, 2018.	10.56042/ijct.v25i1.14004	5

40	Dr. B.Vanavil	S. Monika, S.H. Ponlakshmi, K. Sundar and B. Vanavil, Biological Synthesis of Gallium Nanoparticles using Extracts of <i>Andrographis paniculata</i> , International Journal of Engineering Science, Advanced Computing and Bio-Technology, 8 (4), 208- 222, 2017.	10.26674/ijesacbt/2017/49244	2
41	Dr. B.Vanavil	V. Anitha, K. Abinaya, S. Prakash, A. Seshagiri Rao and B. Vanavil, <i>Bacillus cereus</i> KLUVAA mediated biocement production using hard water and urea, Chemical and Biochemical Engineering Quarterly, 32 (2), 257-266, 2018.	https://doi.org/10.1016/j.ijbiomac.2020.02.332	15
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181	Dr. S. Ram Kumar Pandian	Baskararaj, S., Panneerselvam, T., Govindaraj, S., Arunachalam, S., Parasuraman, P., Pandian, S.R.K., Sankaranarayanan, M., Mohan, U.P., Palanisamy, P., Ravishankar, V. and Kunjiappan, S., 2020. Formulation and characterization of folate receptor-targeted PEGylated liposome encapsulating bioactive compounds from <i>Kappaphycus alvarezii</i> for cancer therapy. 3 Biotech, 10(3), pp.1-18.	10.1007/s13205-020-2132-7	
182	Dr. S. Ram Kumar Pandian	Kunjiappan, S., Theivendren, P., Pavadai, P., Govindaraj, S., Sankaranarayanan, M., Somasundaram, B., Arunachalam, S., Ram Kumar Pandian, S. and Ammunje, D.N., 2020. Design and in silico modeling of Indoloquinoxaline incorporated keratin nanoparticles for modulation of glucose metabolism in 3T3- L1 adipocytes. Biotechnology Progress, 36(1), p.e2904.	10.1002/btpr.2904	
183	Dr. S. Ram Kumar Pandian	Kunjiappan, S., Pavadai, P., Vellaichamy, S., Ram Kumar Pandian, S., Ravishankar, V., Palanisamy, P., Govindaraj, S., Srinivasan, G., Premanand, A., Sankaranarayanan, M. and Theivendren, P., 2021. Surface receptor- mediated targeted drug delivery systems for enhanced cancer treatment: A state- of- the- art review. Drug Development Research, 82(3), pp.309-340.	10.1002/ddr.21758	
184	Dr. S. Ram Kumar Pandian	Deepak, V., Sundar, W.A., Pandian, S.R.K., Sivasubramaniam, S.D., Hariharan, N. and Sundar, K., 2021. Exopolysaccharides from <i>Lactobacillus acidophilus</i> modulates the antioxidant status of 1, 2– dimethyl hydrazine-induced colon cancer rat model. 3 Biotech, 11(5), pp.1-9.	10.1007/s13205-021-02784-x	
185	Dr. S. Ram Kumar Pandian	Palanisamy, P., Pavadai, P., Arunachalam, S., Pandian, S.R.K., Ravishankar, V., Govindaraj, S., Somasundaram, B., Panneerselvam, T. and Kunjiappan, S., 2021. Removal of water and their soluble materials from fuels using <i>Moringa oleifera</i> loaded keratin-co-sodium acrylate hydrogel. Journal of Porous Materials, 28(2), pp.515-527.	10.1007/s10934-020-01015-7	

186	Dr. S. Ram Kumar Pandian	Pandian, S.R.K., Pavadai, P., Vellaisamy, S., Ravishankar, V., Palanisamy, P., Sundar, L.M., Chandramohan, V., Sankaranarayanan, M., Panneerselvam, T. and Kunjiappan, S., 2021. Formulation and evaluation of rutin-loaded solid lipid nanoparticles for the treatment of brain tumor. Naunyn-Schmiedeberg's Archives of Pharmacology, 394(4), pp.735-749.	10.1007/s00210-020-02015-9	
187	Dr. S. Ram Kumar Pandian	Pandian, S., Kunjiappan, S., Ravishankar, V. and Sundarapandian, V., 2021. Synthesis of quercetin-functionalized silver nanoparticles by rapid one-pot approach. BioTechnologia, 102(1), pp.75-84.	10.5114/bta.2021.103764	
188	Dr. S. Ram Kumar Pandian	Pandian, S.R.K., Rencilin, C.F., Sundar, K., 2021. Emerging nanomaterials for cancer immunotherapy. Exploration in Medicine, 2, p. 208-31.	10.37349/emed.2021.00043	
189	Dr. S. Ram Kumar Pandian	Pandian, S.R.K., Panneerselvam, T., Pavadai, P., Govindaraj, S., Ravishankar, V., Palanisamy, P., Sampath, M., Sankaranarayanan, M. and Kunjiappan, S., 2021. Nano based approach for the treatment of Neglected tropical diseases. Frontiers in Nanotechnology, 3, p.49.	10.3389/fnano.2021.665274	

Ph.D. Guidance

The faculty members guide other scholars and faculty members in their PhD work by imparting their technical knowledge and research expertise. The supervisors and scholars working under them are enlisted below:

S. No.	Name of the Supervisor	Designation	No. of Ph.D. Scholars completed till August 2022	No. of Scholars under guidance
1.	Dr. K. Sundar	Professor	Dr. Vinothapoosan Dr. Livingston Dr. S. Ram Kumar Pandian Dr. V. Deepak Dr. R. Haribalaganesh	Mrs. J. Christina Rosy Ms. P. Priya Ms. Sakthi Chandra Vadhana Mr. T. Esakimuthu Mr. S. J. Kabilan

			Dr. Kasimani Dr. Ajitha Dr. M. Manikandan	Mr. M. Cibe Chakravarthy
2.	Dr. H. Nellaiah	Professor	Dr. William Arpudha Sundar	
3.	Dr. T. Kathiresan	Professor & Head	Dr. B. Karthikeyan Dr. L. Harini Dr. L. Muthulakshmi	Mr. T. M. Viswanathan Ms. K. Chitradevi Mr. A.S. Azar Zochedh Ms. S. Sureba Mr. K. Kaliraj
4.	Dr. K. Palanichelvam	Professor	Dr. Nadana Raja Vadivu	Mr. C. Rajesh
5.	Dr. A. Muthukumaran	Associate Professor	Dr. K. Kalishwaralal Dr. S. Chandramohan Dr. Rajeshwari Uppala Mrs. S. Jeya Bharathi	Mr. S. Naveenkumar Mrs. Lekshmi R Babu
6.	Dr. Naresh Kumar Sharma	Associate Professor		Mrs. Rajanandini Meher Ms. S. Karthiga
7.	Dr. B. Vanavil	Associate Professor		Mrs. P. Ramya Mrs. P. Ezhilarasi
8.	Dr. Sankarganesh Arunachalam	Associate Professor	Ms. Uma Priya	Ms. R. Sumathi

9.	Dr. S. Ram Kumar Pandian	Associate Professor		Ms. M. Vijayalakshmi
10.	Dr. K. Selvaraj	Assistant Professor		Mr. K. Arjunkumar Mr. Chandirasekar Mr. SenthilKumar Ms. Rajrajeshwari

Faculty receiving Ph.D. during assessment period

S. No	Name of the Faculty	Title of the thesis	Supervisor Name
1	Dr. G. Nadana Raja Vadivu	Analysis of coelomic fluid from earthworm and assessment of its potential in plant growth of <i>Vigna radiata</i> (L.) R. Wilczek and <i>Oryza sativa</i> L.	Dr. K. Palanichelvam

Ph.D. guided /Ph.D. awarded during the assessment period

Ph.D. guided 23

Ph.D. awarded 01

5.8.2. Sponsored Research

Department of Biotechnology is equipped with various research laboratories to work on projects. Research and projects are undertaken often based on the funds from various agencies. It is expected that the research will result in research publications of high quality or a deliverable end product beneficial to our society. List of various projects is enlisted below:

S.	Principal	Title of Project	Funding	Amount	Period
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No	Investigator		agency	(Rs.) (Lakhs)	From	To
1.	Dr. T. Kathiresan	Mechanistic investigation on EMT targeted nanotherapeutics for drug-resistant triple-negative breast cancer cells	DBT	58.74	March, 2022	February, 2025
2.	Dr. A. Muthukumaran	Evaluation of biocompatible Collagen-Chitosan–Selenium Nanoparticles (SeNPs) scaffold for cardiac tissue engineering applications in wistar rats	ICMR	17.00	April, 2020	March, 2023
3.	Dr. K. Sundar	Developing an extract of Sida cordifolia as a therapy for epilepsy	DBT	24.32	October, 2020	September, 2022
4.	Dr. B. Vanavil	Unraveling the role of carbon sources on biological activity of curdlan produced by novel marine bacteria	DST–WOS	26.40	June, 2019	Present
5.	Dr. Naresh Kumar Sharma	Self-sustaining photo bio-catalytic reactors with concomitant biofuel harvesting from crepe cotton wastewater	DST–SERB	15.00	November, 2018	Present
6.	Dr. K. Sundar	Use of recombinant bacteriophage as a novel delivery vehicle for viral	DST–SERB	45.00	June, 2018	Present

		CTL epitopes				
7.	Dr. Sankarganesh Arunachalam	Elucidating the role of PPAR alpha in the development of doxorubicin-induced cardiomyopathy	DST-SERB	13.00	June, 2018	Present
8.	Dr. A. Muthukumaran	A smart alginate-pectin-selenium nanoparticle scaffold and its applications in cardiac tissue engineering	DST-SERB	19.00	June, 2018	Present
9.	Dr. Sankarganesh Arunachalam	Unravelling the physiological mechanism of meditation mediated (PRANAHUTI) benefits on cardiovascular risk	DST-Sathyam	40.00	June, 2018	Present
Total (Rs. in Lakhs)				258.46		

List of Research projects Completed in the department along with the outcome

S. No.	Name of the faculty	Qualification	Designation	Name of the Project Title	Name of the Funding Agency	Outcome of the Projects* (Publications, Products, Ph.D. Produced)
30.	Dr. K. Sundar	Ph.D.	Professor	Genome-wide mapping of murine specific Dengue T-cell epitopes: computational prediction, identification and use as candidate vaccines	DST-SERB	SCI Publications

S. No.	Name of the faculty	Qualification	Designation	Name of the Project Title	Name of the Funding Agency	Outcome of the Projects* (Publications, Products, Ph.D. Produced)
31.	Dr. T. Kathiresan	Ph.D.	Professor	Molecular functional characterization of mitochondrial BK channel in mouse cochlear hair cell	DST–SERB	SCI Publications
32.	Dr. Sankarganesh Arunachalam	Ph.D.	Associate Professor	Elucidation of mechanism of Adriamycin mediated male reproductive toxicity and recovery by restoration of epididymal adipose tissue	DST–SERB	SCI Publications

5.8.3. Development activities

The department conducts various developmental activities such as product development, value added courses, community service projects, and also has well equipped research laboratories, and instructional materials. Few of our developmental activities are listed below:

Product development: Under the Community service project students are encouraged to develop a product that helps in solving the problems of their local community, farmers, women, children etc. Some faculty and students have been able to develop their products and incubated their companies in our university incubation centers. The details of the products developed are as follows:

S. No.	Product Name	Application
1.	Bio-fertilizer of Phosphate solubilizing microorganism (PSMs) from soil	Higher plant growth, productiveness and sustainability of soil for various vegetables with reference to beans plantation.

2.	<i>Rhizobium</i> bio-fertilizer from groundnut plant	Bio-enhancer, bio-fertilizer, and biocontrol agent and increased non-legume production in present agriculture system
3.	Bio control agent pf2	Bio-control of Onion pink disease and Cardamom wilt disease in onion and cardamom plantations.
4.	Vermiwash	Effective in maintaining the soil fertility

Research laboratories

The faculty at the Department of Biotechnology helps in enhancing the practical skills of students by offering opportunities for students to work in their research projects. The research laboratories are well-equipped and are available for training the UG students. Details of all the laboratories are as follows:

In addition to this, faculty with projects is provided with individual research laboratories. Some of the laboratories are mentioned below:

S. No.	Name of the PI	Laboratory Name	Major Equipments
1.	Dr. K. Sundar	Molecular Immunology Laboratory	Ultra Low temperature freezer Centrifuge Spectrophotometer Lyophilizer Microfiltration / Ultrafiltration Unit Micro Plate reader Inverted Phase Contrast Microscope Analytical balance - Shimadzu -20°C Deep Freezer Class-II Biohazard Safety cabinet Galaxy B CO2 incubator MilliQ water purification system Nucleofector Device II Multi well fluorescence & Luminescence reader Micro Centrifuge

			Chem doc imager Fluorescence microscope Binocular microscope Thermocycler
2.	Dr. T. Kathiresan	Proteomics Research Laboratory	Dissection microscope Isoelectric focusing unit (IEF) SDS-PAGE apparatus sypro rubi 600 Submarine for DNA gel electrophoresis Power pack SE-600 Semi dry western blot apparatus Wet Western blot apparatus Centrifuge (thermoscientific) Deep freezer (Sanyo) Speedvac Concentrator
3.	Dr. K. Palanichelvam	Plant Molecular Biology Laboratory	Refrigerator Plant tissue culture rack Green House Laminar Air Flow unit pH Meter Weighing Balance Gel apparatus and Power Pack Vacuum pump
4.	Dr. A. Muthukumaran	Zebrafish Developmental Biology Laboratory	Microtome
5.	Dr. Sankarganesh	Center for Cardiovascular and Adverse Drug Reactions	Real-Time PCR Ultra Low Freezer (-80°C)

	Arunachalam		Freezer (-20°C) ELISA Reader Western Blotting Apparatus High speed Cooling Centrifuge Laminar Air Flow Unit Cooling Incubator Water bath with shaker Class II Biosafety Cabinet CO2 incubator Inverted Fluorescent Microscope Gel electrophoresis Unit Mini Centrifuge
6.	Dr. S. Sheikh Ashraf	Enzyme Biotechnology Laboratory	Incubator Shaker Microscope with camera Electronic Balance Agarose gel electrophoresis unit (Maxi) SDS-PAGE apparatus with powerpack Western Blot apparatus (Dry) High speed centrifuge Tabletop centrifuge for microcentrifuge tubes Laminar Air Flow unit Deep freezer (-20)

Patents

The outcome of these laboratories-based research work is noteworthy publications by students and faculty members along with some patents being filed and published.

S. No.	Faculty Name	Patent Title	Application Number	Date	Status Filed/Published
1.	Jayakumar P, Shasi Anand S, Sundar K, Christina Rosy J, Ram Kumar Pandian S, Priya P	Temperature monitoring and image capturing kit for CO ₂ incubator	201941045093	15/11/2019	Published
2.	Jayakumar P, Shasi Anand S, Vishnuvarthanan G, Muthukumaran A, Naresh Kumar Sharma, Kabilan S J	Audible digital conical flask for visually impaired	201941045096	15/11/2019	Published
3.	Jayakumar P, Shasi Anand S, Jeyaprabakaran M, Kathiresan T , Sakthi Chandra Vadhana M, Shalini M	Audible digital measuring spoon for visually impaired	201941045098	15/11/2019	Published
4.	Jayakumar P, Shasi Anand S, Vanavil B, Sheik Asraf S , Sakthivel S, Ramya P	Audible medicine indicator	201941045094	15/11/2019	Published
6	Shantkriti Srinivasan , Mariya Sneha Rani	Method for preparing phyco-	202141061312	28/12/2021	Published

	Joseph, Neelaveni Velusamy, Pavithra Petchimuthu	vermicompost for double fertilizer treatment of chili plants			
7	B. Vanavil , V.Subharaga, Sumathi.S. Nair, A. Martina Jemimal, S. Jency Emi Carolin	Bacteria encapsulated alginate beads for plant growth enhancement	202141058381	15/12/2021	Published
8	L. Muthulakshmi , D.Sakthivel, Thayaagharan S	Low-cost protein rich animal feed from silkworm pupae waste	202141058753	16/12/2021	Published
9	Sankarganesh Arunachalam , Uma Priya Mohan	Method for ripening fruits	202241000952	07/01/2022	Published
10	Ritika Kalyani J, Subiksha N, Rupa, T. Kathiresan	Mosquito repellant incense and method of preparing the same	202141059778	21/12/2021	Published

5.8.4. Consultancy

Department has domain specific faculty members who are involved in various consultancy projects. Details of the work done is given as below:

S. No.	Faculty Name	Title of the project	Funding Agency	Amount (in L)	Duration
1	Dr.L. Muthulakshmi	Efficient Water Treatment Solution	S A Anandan Spinning Mills Pvt. Ltd.	4.75	2021-2022 (1 Year)
2	Dr. Sankarganesh Arunachalam	Behavioral Analysis of Pigs	HatsunAgro Products Pvt. Ltd.	2.0	2021-2022 (1 Year)
3	Dr.K. Sundar	Alternative for Covid-19 Treatment	Mylan Laboratories	4.5	2021-2022 (1 Year)
4	Dr.S. R. K. Pandian	Treatment of Neglected Tropical Diseases	Aravind Research Foundation	2.25	2021-2022 (1 Year)
5	Dr.A. Muthukumaran	Natural Process for Treatment of Dyes	Nachiar Fabrics Pvt. Ltd.	3.5	2021-2022 (1 Year)
6	Dr. K. Palanichelvam	Propagation of endangered medicinal plants	Aravindh Herbals Labs (P) Ltd	1.00	2019-2020 (1 year)
7	Dr. B. Vanavil	Establishment of organic roof garden	Kala Constructions, Chennai	2.25	2018-2020 (2 years)
8	Dr. A. Muthukumaran	Induced breeding and larval rearing techniques in ornamental fishes	Covelong Fisheries and Farms, Kovalam	2.50	2018-2020 (2 years)
9	Dr. T. Kathiresan	Drug screening and identification of inhibitor molecules for breast cancer	Madurai City hospital, Madurai	3.25	2018-2020 (2 years)

10	Ms. P. Priya and Ms. P. Ramya	Establishment of mushroom cultivation facility	Sri Ramesh Prasad Farms, Virudhunagar	0.6	2018-2019 (1 year)
11	Dr. K. Palanichelvam and Ms. G. Nadana Raja Vadivu	Production of vermicompost	Sri Ramesh Prasad Farms, Virudhunagar	0.65	2018-2019 (1 year)
12	Dr. K. Selvaraj	Analytical services for pharmaceutical industries	Modern Surgicals, Rajapalayam	2.00	2018-2019 (1 year)
Total (Rs. in Lakhs)				29.25	

5.9. Faculty Performance Appraisal and Development System (FPADS) (10)

A. Notified performance appraisal and development system; Appraisal Parameters; Awareness

Faculty Performance Appraisal form (self) is collected from each faculty members mainly focuses on major areas like Teaching learning and evaluation activities, Co-curricular activities, profession related activities, Research and consultancy related contributions.



Faculty Performance Appraisal

Teaching, Learning and Evaluation Activities:

This parameter endorses the faculty to complete 100% syllabus, conduct seminar/Workshop/Seminar and tutorial classes.

This also encourages the faculty to emphasizes on Innovative teaching learning methodologies and assessments that can be used by the faculty in imparting knowledge/Skills to the students.

The faculty contribution towards the development of E-Content/MOOCs for the courses is also a criterion used for self-evaluation to test their teaching competency.

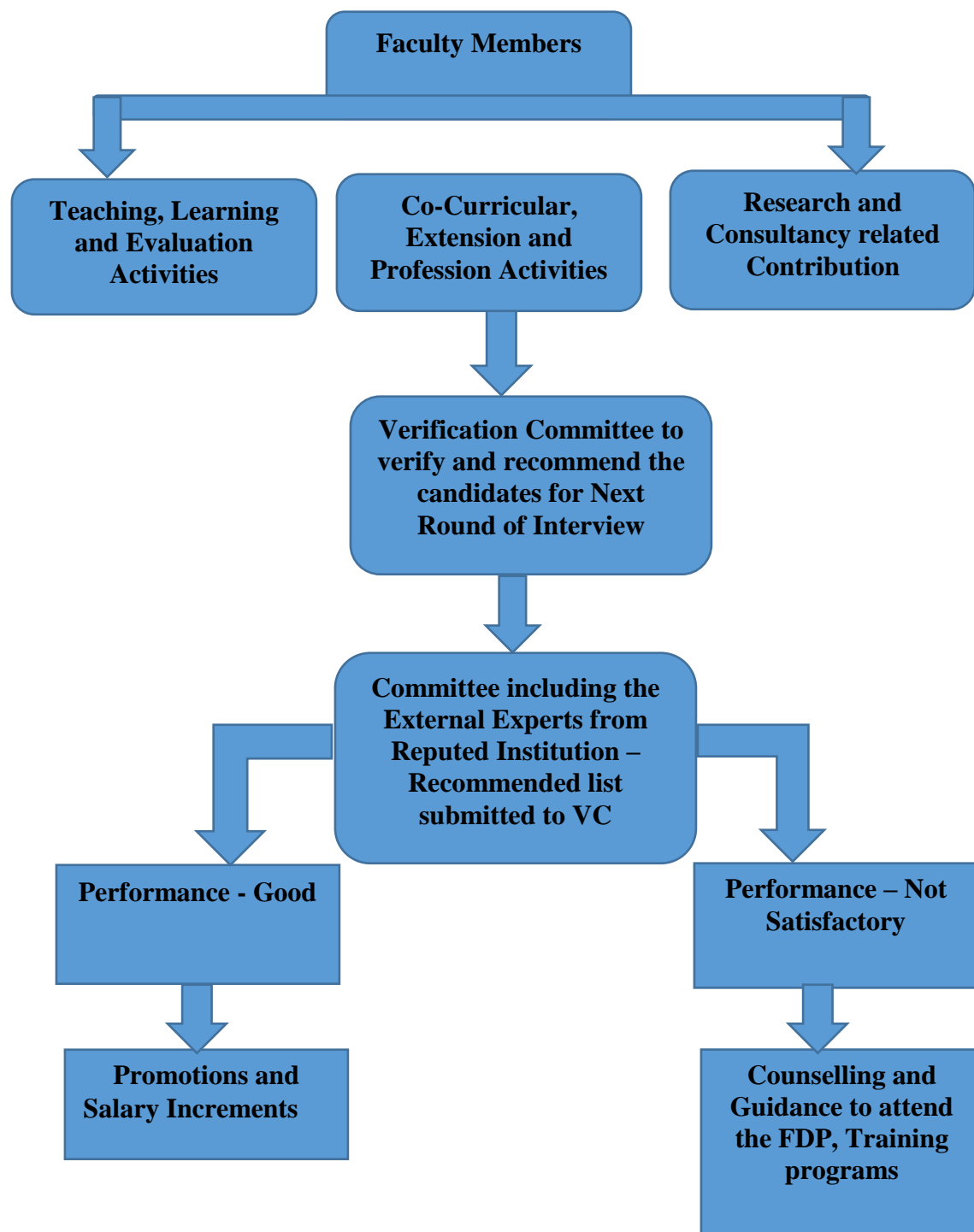
Co-curricular, Extension and Profession Activities:

Faculty interaction with outside world can be measured by looking into parameters like Orientation Course /Refresher Courses/ Research Methodology/Workshops/ Syllabus Up-gradation Workshop/ Soft Skills development Programmes/Teaching-Learning-Evaluation/ Technology Programmes, Faculty Development Programs, seminars attended by the faculty.

Faculty contribution as session chair, judge, reviewer, editorial board member of journals/Conferences, invited lectures/ Resource Person/Paper presentation in Seminars/ Conference is also a criterion used for self-evaluation.

Research and consultancy related contributions:

- To promote quality research publications, more weightage is given to SCI and Scopus indexed journals in comparison with other journals.
- In addition to this, to promote quality research, more weightage is given to IEEE, Elsevier and springer conferences in comparison with other international conferences.
- Faculty members are encouraged to author books, book chapters (National and International Publisher) and knowledge-based volumes.
- This parameter also gives lot of Importance to sponsored research projects from government and non-Government agencies. The weightage of marks has varied in accordance with the amount mobilized.
- To motivate the faculty for applying national and international patent and technology transfer Maximum marks is being allotted which includes applying as well as sanctioning.
- Faculty members are also expected to provide consultancy services to the industry by providing real time solution.



Faculty Performance System followed

B. Implementation, Transparency and Effectiveness

- Each faculty is supposed to submit the self-assessment cum performance appraisal form duly filled bi-annually (in the month of June and December) as a systematic procedure.

- A committee comprising of the senior faculty is constituted to evaluate and recommend the candidates for promotion, as per the Career Advancement notification issued by the Vice Chancellor.
- Based on the details filled in the form and upon producing the corresponding evidences, the committee evaluates the performance of the faculty and may/may not recommend the faculty to the next level of interview for promotion under the Career Advancement Scheme (CAS).
- Shortlisted faculty members are meant to appear before the screening committee which consist of external expert from reputed institution and make a brief presentation which includes the present research standing and future plan towards teaching and research for 10 minutes.
- Based on the presentation by the faculty members, suitable actions are taken. Best faculty members are awarded with the promotion, increment in salary and those who needs improvements are counselled and guided appropriately to improve their performances in forthcoming semester.
- The entire process is based on the guidelines suggested by the UGC on promotion and assessment.

Case study: Dr. Sureshababu Ram Kumar Pandian

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION
(Deemed to be University)
Anand Nagar: Krishnankoil 626 126.

PBAS Application under CAS

PART-A

GENERAL INFORMATION AND ACADEMIC BACKGROUND

1. Name (In block letters)	: Dr. S. Ram Kumar Pandian
2. Father's name	: Suresh Babu R
3. Mother's name	: Usharani S
4. Date and Place of birth	: June 09, 1985 and Usilampatti
5. Sex	: Male
6. Marital status	: Married
7. PAN/ Aadhar number	: 9518 9989 4423
8. Name of the post & date of joining services	: Assistant Professor-III (Senior) February 01, 2017
9. Date of confirmation of services	: February 01, 2017
10. Department	: Biotechnology
11. Current Designation and Grade pay level	: Assistant Professor-III (Senior) Basic-26214, GP-8000, DA-26214
12. Date of last promotion	: Not applicable
13. The position for which you are an applicant under CAS	: Associate Professor (Level 1)
14. Date of eligibility for promotion	: February 01, 2021
15. Address for correspondence with Pin code	: 1A/29A, VRN rice mill back street, Dhanya nagar, Srivilliputhur-626125, Virudhunagar Dist.
16. Permanent address with pin code	: 16/33, Sankaramoorthi pillai street, Usilampatti-625532, Madurai Dist.
17. Telephone no	: +91 9003440063
18. Email	: srkpandian@gmail.com
19. Field of specialization under the Subject/ discipline	: Immunology, Genetic Engineering, Animal Biotechnology

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Faculty promotion application form

PERFORMANCE APPRAISAL FOR FACULTY

For the Period from January 2020 to December 2020

(To be Filled by the Teacher)

Part A: General Information and Academic Background

1. General Information

- Name (in Block Letters) :
- Father's Name :
- Mother's Name :
- Date and Place of Birth :
- Date of appointment to the present post :
- Mobile No. :
- E mail :
- Aadhar and PAN Number :

2. Academic Background

Examination / Degree	Title of the Degree	Name of the Board / University	Year of Passing	% of Marks
High School/ Sec. or Equivalent				
Graduation				
Post-Graduation				
M. Phil				
PhD				
Post Doc				
Whether Qualified (GATE, NET, SLET, SET, etc)	(If yes details, include subject name, year and month of passing)			

4. Pedagogy used in the Teaching/ Learning (to include digital pedagogy and proof shall be an attachment)

Course Code	Course Name	Year/ Sem	Type pedagogy

5. Contribution in R2021 Curricula and Syllabus Development

Cours e Name	Foundation / Core Courses	15 Week Course Plan	Syllabu s (Yes/ No)	Practical Component (Yes/ No)	X Component (Yes/ No)	Assessme nt Pattern (Yes/ No)

6. Question Paper Setting

Course Code	Course Name	UG/PG/PhD (PhD- Descriptive type)	No of MCQs generated (for new course)	No. of MCQs generated (to update the existing questions)

7. Summer term courses

Course Code	Course Name	Year / Semester	No. of Students	No. of Hours/ Week

8. Attended Orientation/ Refresher Courses/ MOOC Courses (proof shall be attached)

Name of the Course	University/ Institution/ Online	Course Duration	Date	Sponsoring Agency (AICTE, ATAL, NITTE, GATE/ Courses, etc.)

Part B: Teaching and Learning Activities

1. Name of the courses handled

Course Code	Course Name	UG/PG /Year/Sem	No. of Students	No of Hours per Week as in Timetable	No. of Classes handled (Online/ Offline)	X component Course (yes/no)

Total No. Theory Courses for UG	Total No. Theory Courses for PG	Total No. Practical Courses for UG	Total No. Practical Courses for PG	Total of Theory courses for Ph.Ds

2. E-Content developed (relevant to the courses taken in the above list and proof shall be an attachment) (To be Verified by HoD/Dean)

Course Code	Course Name	Year/ Sem	PPT for five Units with (Mention the Similarity Level)	Learning for five materials for five units with (Mention the Similarity Level)	Total of Videos/ Total Duration of the Videos

3. MOOC Content developed (all four quadrants and web link shall be given in Table. See for OI/ODL) (To be Verified HoD/Dean)

Course Code	Course Name	Year/ Sem	PPT/Text	Animation /Simulation /Videos	Web Link	Assessment

Part C: Research and Consultancy

1. Research Papers Published (Accepted and Published only. Excluding internal research scholar papers) (To be Verified by HoD/Dean)

Year	Title of Article/ Research Paper	Name of the Journal	Scopus/ SCI/ Web of Science/ UGC/ any other	Accepted and published	Impact Factor

Target given (number varita based on designation) =

Target achieved =

Reason for deviation (if any) =

2. Publication other than research papers (Accepted and Published only)

Year	Books Authored (Complete Book/ Chapter in Book/Research Paper in Book)	Title of Book	Details of the publisher	National/ International	Accepted and published

3. Ph. D Students (Research guide)

Year of Registration	Title of the thesis (for each student)	No. Paper Published (Scopus/ SCI/ Web of Science/ UGC/ any other)	Expected Year of Completion

4. Research projects (Applied, Accepted and status of the proposal)

Year	Title of the project	Funding agency	Amount	Status of the project	Position in the project (PI or Co PI)	Any external Collaborator

Target given :
 No of the project proposal submitted :
 Reason for deviation if any :

5. Patents (Accepted and Published only, proof shall be attached)

Year	Patent/ Policy Number	Title of the Patent	Type of Patent	National/ International

6. Consultancy

Year	Industry approached	Type of consultancy proposed	Status of the proposal	Collaborators with another department/ External agency

7. Awards/ Fellowship

Year	Name of the award	State/ National/ International	Details of the award

8. Conference/ Workshop / Seminars/ Webinars (Student, UGC shall be attached)

Year	Type of Conference/ workshop/ Seminar / Webinar	Paper presented/ Participated / Resource Person	Title of the Research Paper	Date/ Duration (From-To)

Part D: Students Related Activities and Administrative Activities

1. Students related and co-curricular, extension and field-based activities such as Conferences, seminars, workshops, student visits, online events, student online internship, mentorship (NPTEL, Coursera, etc), club activities (organized)

Year	Details of the Activity	Level (Department/ University/ National/ International)	Acted as (Coordinator, Team Member, etc)	Date (From - To)

2. Student Projects/ Community Service Projects/ Proposals/ Papers

Year	Title of the UG/ PG project/ Community Service Project	If project is converted into paper (Title of the paper/ patent)	Name of the Conference/ Journal/ any other

3. Student Project Proposals

Year	Title of the Proposal	Name of the Agency	Amount	Status of the proposal

4. Administrative Responsibilities such as Coordinator/Warden/Head/ Dean/ Director

Year	Details of the Responsibilities	Date (From - To)

Signature of the Faculty

Date:

Sample Faculty Appraisal form

Rubrics for Part A					Rubrics for Part B				
S. No	Categories	3	2	1	S. No	Categories	3	2	1
1.	No. of Course	As per the guidelines given by the Academic Office along with at least one X component course	As per the guidelines given by the Academic Office, in addition, Gate coaching, other training to the students	As per the guidelines given by the Academic Office	1.	Paper Published	As per the target given by the Vice Chancellor office (Fully Completed)	As per the target given by the Vice Chancellor office (One shortage)	As per the target given by the Vice Chancellor office (Two shortage)
2.	E Content Developed	Minimum of two courses with PPT, LM, and Videos (for 5 Units)	At least one courses with PPT, LM, and Videos (for 5 Units)	At least one courses with PPT, and LM, (for 5 Units)	2.	Publication other than Research Papers	Complete Book/Two Book Chapters/ Two Research Paper in Book (International)	Complete Book/Two Book Chapters/ Two Research Paper in Book (National)	One Book Chapter (National)
3.	MOOC Content Developed	Minimum of one course for ODL/OL in all four quadrants and one Course for regular	Minimum of one course for ODL/OL in all four quadrants	Minimum of one course for ODL/OL at least in two quadrants	3.	Ph.D. Students	As per the target given by the Vice Chancellor office (Fully Completed)	As per the target given by the Vice Chancellor office (One shortage)	As per the target given by the Vice Chancellor office (Two shortage)
4.	Pedagogy in Teaching/Learning	Three interactive tools at least in three different units	Two interactive tools at least in three different units	One interactive tool at least in three different units	4.	Research Projects	Ongoing project if any/ sanction project if any (as PI).	Two projects submitted and under review (as PI).	One project submitted and under review/ or as Co PI.
5.	Curriculum and Development	Minimum of two courses in core and one course in foundation/ basic science /arts	Minimum of two course in core course / basic science/arts	Minimum of two course in core course / basic science/arts	5.	Patents	Two published	One published and one under review	One submitted and under review
6.	Question Paper Setting	Minimum of 25 new additional MCQs in each unit for two courses, and one question paper for research scholars	25 new additional MCQs in each unit for two courses	10 new additional MCQs in each unit for one course	6.	Consultancy	No of industry approached more than 3, and at least one is final stage.	No of industry approached more than 2, and at least one is final stage.	No of industry approached more than 2.
7.	Summer Term Courses	Maximum of two theory courses	One theory and one practical course	One theory course	7.	Award/ Fellowship	One award from international agency/ two award from national agency	One award from international agency/ One award from national agency	Applied for awards (National/International)
8.	Attended Orientation/ Refresher Course	Two One Week FDPs, Two workshops, Seminars and Webinars	One Week FDP, Two workshops, Seminars and Webinars	One Week FDP, One workshop, and seminar.	8.	Conference/ Workshop/ Seminar/ Webinar	One International Conference or Two National Conference and one international workshops or seminars	One National Conference and two national workshops or seminars	Two national workshops or seminars

Rubrics for Part C				
S. No	Categories	3	2	1
1.	Student related activities	One National/ International and Two University level activities	One University level activities and One department level	Two department level
2.	Student projects	One UG, PG, and CSP projects and one paper published in conference /journal along with students/ Patent.	One UG/PG, and CSP projects and one paper published in conference /journal along with students/ Patent	One UG/CSP project and one paper published in conference
3.	Students project proposals	Ongoing student project	One project sanctioned along with students	One project submitted and under review.
4.	Administrative responsibilities	Head/ Dean/ Directors/ COE and Dy. Directors and Dy. CoEs	Coordinator/ Club In charges/Student Societies	Coordinator/ Club In charges/Student Societies

Evaluation Sheet by HoD/Dean/ In charge Appointed by Vice Chancellor Office

S. No	Faculty Name	Designation	Part A								Part B								Part C				AP Weightage	Asso. Prof Weightage	Prof Weightage
			1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	=(A*50) +(B*25) +(C*25)	=(A*40) +(B*35) +(C*25)	=(A*30) +(B*45) +(C*25)

Rubrics and evaluation sheet for Faculty Appraisal

5.10. Visiting/Adjunct/Emeritus Faculty etc. (10)

Experts from Industry and academia are invited to provide theoretical and practical advantage to students on the latest technologies in industry. This helps students in their placement and higher studies. Details of visiting faculty members from various industries are listed below:

S. No.	Faculty Name	Course name	Institution	Duration	Interaction
1.	Dr. H. Nellaiah	Biopharmaceutical production: An Industry Perspective	BioZeen, Bangalore (R&D Head)	6.11.2021, 7.11.2021, 14.11.2021 (9AM-6 PM/day) Total = 27 h	Expert lectured 35 students under 1 credit course
2.	Dr. H. Nellaiah	Biopharmaceutical production: An Industry Perspective	BioZeen, Bangalore (R&D Head)	09.03.2022, 10.03.2022, 11.03.2022 (9AM-6 PM/day) Total = 27 h	Expert lectured 30 students under 1 credit course
Total duration for CAY (2021-2022) =				54 h	

3.	Dr. Navanietha Krishnaraj R	Bioelectrochemical Engineering	Department of Chemical and Biological Engineering, South Dakota School of Mines and Technology, Rapid City, SD (Research Professor)	15.11.2020-22.11.2020 Total = 18 h	Expert lectured 30 students under 1 credit course
4.	Dr. S. R. Senthil Kumar	Current Good Manufacturing Practices	Padmasini Lifesciences LLP, Chennai (Founder and CEO)	24.1.2021, 31.1.2021, 07.2.2021, 14.2.2021 (9AM-6 PM/day) Total = 36 h	Expert lectured 46 students under 1 credit course
Total duration for CAY m1 (2020-2021) =				54 h	
5.	Dr. S. R. Senthil Kumar	Current Good Manufacturing Practices	Padmasini Lifesciences LLP, Chennai (Founder and CEO)	18.10.2019-19.10.2019 (9AM-6 PM/day) Total = 18 h	Expert lectured 28 students under 1 credit course
6.	Dr. H. Nellaiah	Biopharmaceutical production: An Industry Perspective	BioZeen, Bangalore (R&D Head)	19.10.2019-20.10.2019 (9AM-6 PM/day) Total = 18 h	Expert lectured 21 students under 1 credit course
7.	Dr. H. Nellaiah	Biopharmaceutical production: An Industry	BioZeen, Bangalore (R&D Head)	07.03.2020-08.03.2020 (9AM-6 PM/day)	Expert lectured 35

		Perspective		Total = 18 h	students under 1 credit course
Total duration for CAYm2 (2019-2020) =				54 h	



Fig. 5.10. Interaction between Visiting Faculty and students

CRITERION 6	FACILITIES AND TECHNICAL SUPPORT	80
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6.1. Adequate and well-equipped laboratories, and Technical Man power

The department has the following laboratories that support the teaching as mandated by the UG Biotechnology curriculum:

S.No.	Name of the Laboratory
1	Biochemistry Lab/Downstream Processing Lab
2	Gas Chromatography Lab
3	Bioprocess Lab
4	Central Instruments Facility
5	Bioinformatics and Computational Biology Lab
6	Autoclave Facility
7	Immunology Lab/Microbiology Lab
8	Cell and Molecular Biology Lab/ Genetic Engineering Lab
9	Proteomics Lab
10	Molecular Immunology Research Lab
11	Zebrafish Developmental Genetic Laboratory
12	Plant Molecular Biology Laboratory
13	Enzyme Biotechnology Laboratory
14	Center for Cardiovascular and Adverse Drug Reactions

Sl. No	Name of the Laboratory	No of Students per - batch	Name of the Equipment	Weekly Utilization Status	Overall Ambience
1	Biochemistry Lab/Downstream Processing Lab	30/Batch	1. pH Meter (2 Nos.) 2. Vertical gel electrophoresis Unit 3. Magnetic Stirrer 4. Sonicator	15 Hours	Good
2	Bioprocess Lab	30/Batch	1. Digisun Colorimeter (5 Nos) 2. Peristaltic Pump 3. Cryostat	15 Hours	Good
3	Central Instruments Facility	30/Batch	1. Remi Model CIS 24 Orbital Shaker 2. Hot air oven 3. Digital Colony counter 4. Water bath Shaker 5. ESCO Vertical Laminar Flow cabinet 6. Combined U.V.Transilluminator 7. Gel Documentation System 8. Shimadzu UV Spectrophotometer UV-1700 9. Bench Top Fermentor (Bioengineering) 10. Sonicator 11. Biologic LP Chromatography	15 Hours	Good

			12. Micro centrifuge 13. High-speed refrigerated centrifuge 14. Incubator cum Shaker 15. Double distillation Unit 16. Circulation water bath 17. Visible spectrophotometer 18. Orbital shaking incubator 19. Heating Mantles 20. Heating Mantles (250 ml) 21. Heating Mantles (1000 ml) 22. Mini Rotary Shaker 23. Cooling Centrifuge (REMI) 24. Cooling microcentrifuge (REMI)		
4.	Bioinformatics and Computational Biology Lab	30/Batch	1. Computers(55 Computers)	15 Hours	Good
5	Autoclave Facility	30/Batch	1. Autoclave vertical 2. Autoclave Horizontal 3. LPG Stove 4. Pressure Cooker for sterilization 5. Sanyo ice maker 6. Water Distillation Unit	15 Hours	Good
6	Immunology Lab/Microbiology Lab	30/Batch	1. Microscope (Monocular) 2. Binocular Microscope 3. Laminar Airflow Unit 4. Incubator	15 Hours	Good
7	Cell and Molecular Biology Lab/ Genetic Engineering Lab	30/Batch	1. Laminar Airflow Unit 2. Refrigerator	15 Hours	Good
8	GC-Lab	4/Batch	1. Gas Chromatography system (Shimadzu) 2. Accessories	15 Hours	Good

The research laboratories support the B. Tech students in their project work.

Availability of adequate and qualified technical supporting staff

S. No	Name of Technical Staff	Designation	Exclusive / Shared work	Date of joining	Qualification	Responsibility
1	Mr. Mariselvam	Lab Technician	Exclusive	27.12.2017	M.Sc.,	Biochemistry and Bioprocess Laboratory
2	Mr. Lakshmanan	Lab Technician	Exclusive	23.04.2010	M.Sc.,	Cell and Molecular Biology & Bioinformatics and Drug Design Laboratory
3	Mr. R. Kalimuthu	Lab Technician	Exclusive	24.08.2018	M.Sc.,	Microbiology & Chemical Engineering Laboratory
4	Ms. G. Ramalakshmi	Clerk	Exclusive	03.03.2021	B.Com.,	Lab Manager, Dept. Office

Details of Faculty members in-charge of Laboratories:

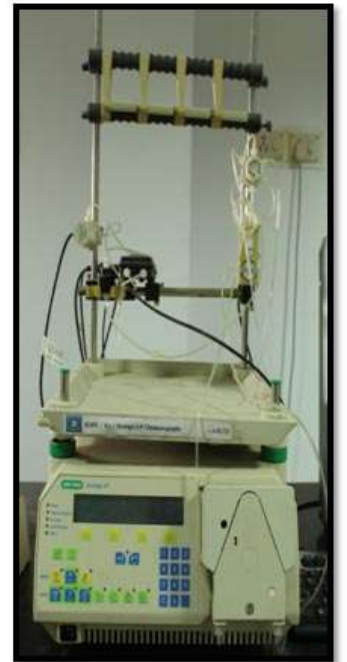
S. No	Name of Technical Staff	Designation	Qualification	Name of the Laboratory
1	Dr. K. Sundar	Professor	Ph.D.	Molecular Immunology Research Lab
2	Dr. T. Kathiresan	Professor	Ph.D.	Proteomics Laboratory & Molecular Biology Laboratory
3	Dr. K. Palanichelvam	Asst. Prof.	Ph.D.	Plant Molecular Biology Laboratory
4	Dr. A. Muthukumaran	Asso. Prof.	Ph.D.	Zebrafish Developmental Genetics Laboratory
5	Dr. B. Vanavil	Asso. Prof.	Ph.D.	Bioprocess Laboratory
6	Dr. S. Ram Kumar Pandian	Asso. Prof.	Ph.D.	Cell and Molecular Biology Lab/ Genetic Engineering Lab
7	Dr. Nareshkumar Sharma	Asso. Prof.	Ph.D.	GC Laboratory
8	Dr. N. Hariram	Asst. Prof.	Ph.D.	Enzyme Biotechnology Laboratory
9	Dr. Sankarganesh Arunachalam	Asso. Prof.	Ph.D.	Center for Cardiovascular and Adverse Drug Reactions
10	Dr. L. Muthulakshmi	Asst. Prof.	Ph.D.	Biochemistry Lab/Downstream Processing Lab
11	Dr. K. Jyothi	Asst. Prof.	Ph.D.	Autoclave Facility
12	Dr. S. Sheik Ashraf	Asst. Prof.	Ph.D.	Bioinformatics and drug Design Laboratory
13	Mr. S. J. Kabilan	Asst. Prof.,	M.Tech.	Central Instrumentation Facility
14	Ms. P. Priya	Asst. Prof.	M.Tech.,	Immunology and Microbiology Laboratory

Details of workshops attended by Technical Staff:

S.No	Name of the technical staff	Workshop attended	Organizing Institute	Duration
1	Mr. Mariselvam	Handling of hazardous chemicals	Kalasalingam Academy of Research and Education	13/07/18
		Self-motivation and stress management		23/03/19
		Laboratory Management		08/05/20
2	Mr. R. Kalimuthu	Handling of hazardous chemicals	Kalasalingam Academy of Research and Education	13/07/18
		Self-motivation and stress management		13/07/18
		Laboratory Management		
3	Mr. Lakshmanan	Handling of hazardous chemicals	Kalasalingam Academy of Research and Education	13/07/18
		Self-motivation and stress management		23/03/19
		Laboratory Management		08/05/20
5	Ms. G. Ramalakshmi	Road Safety Celebration "SURAKSHA'15"	Kalasalingam Academy of Research and Education	12/01/20
		Laboratory Management		08/05/20
		Self-motivation and stress management		23/03/19



Bioinformatics Laboratory



Biochemical Engineering and Downstream Processing Lab



Microbiology and Immunology Laboratory



Cell and Molecular Biology Laboratory



Genetic Engineering Laboratory



Gas Chromatography Laboratory

6.2. Laboratories Maintenance and Overall ambience

- **Adequate, updated, well-equipped labs to meet the curriculum requirements as well as program objectives**

The laboratories are equipped with adequate equipment that are sufficient to conduct the experiments as per the curriculum. Each lab can accommodate a batch of 30 students. The major equipment in the teaching laboratories include a 3L Bioengineering Fermenter, Refrigerated Centrifuges, UV-VIS Spectrophotometers, Orbital Shaker, Ultra-sonicator, -

70°C freezer, Gel-documentation system, microscopes with photomicrographic facility. Besides, the students get access to the equipment in the Research Laboratories such as ELISA reader, Thermocycler, Fluorescence microscope. Laboratory sessions are conducted every week for each course and steps are taken to ensure that the experiments listed out in the curriculum are completed as per schedule.

- **Availability of computing facilities in the department**

As the program of Bioinformatics laboratory in the 4th semester has adequate number of computers available in a separate computer laboratory that is provided with 20 mbps internet connection.

- **Availability of laboratories with technical support during and beyond working hours**

Laboratory facilities are open for the students and faculty during and beyond the working hours. The laboratory timings are extended depending on the requirement of the experiment and the research scholars and technicians (on rotation) are available to help the students. In addition, the laboratories and department library are made available during the night based on the requirements of students.

Maintenance of Laboratory Equipment

- Routine monitoring of equipment is done by the laboratory technicians.
- Separate log book is maintained for all the equipment to monitor the utility.
- Routine evaluation of each of the equipment is done after the completion of the semester.
- Equipment calibration is done at the end of every academic year.
- Complaint Registers are maintained in each of the laboratory to register malfunctioning of equipment.
- Need-based minor repairs are carried out by the lab technicians and faculty members.
- Maintenance of computers is taken care of by service personnel available in the institution.
- Major repairs are outsourced by following the standard procedure of the institute.
- Systematic and routine cleaning, adjustment, or replacement of instrument and equipment parts are performed periodically, daily, weekly and monthly basis.
- Notice board for display of essential information regarding exam schedules, internal communication circulars and laboratory schedule.

Overall Ambience

All laboratories are equipped with state of art equipment to meet the requirements of curriculum.

- Laboratory manuals are prepared and are available in soft and hard copy.
- All laboratories are well equipped.
- Laboratories kept open beyond office hours as and when required with laboratory personnel and a faculty member.
- All laboratories have sufficient natural light, good ventilation with tubes and fan arrangement.

Laboratory Maintenance

- Each of the necessary equipment is available in the laboratories for conducting all the experiments listed in the curriculum.
- The respective lab technicians are taking utmost care for maintaining their lab equipment. The regular Servicing and calibration are done by both internally and externally (if needed) before commencement of the laboratories sessions.
- Each laboratory has at least one faculty to oversee that the laboratory equipment in that lab is properly supporting the course laboratory components served in such labs. The faculty in charge is responsible to provide the details for additional purchase/ replacement and/or new equipment to ensure proper performance of the laboratories.
- First-aid and ambulance services are available throughout the day on call.
- A team of staff of electrical maintenance section take care of operation and maintenance of power generators meant for each block to ensure availability of power supply at the time of power failure.
- Electrical system of the department is maintained by the electrical section.
- Firefighting equipment are kept/placed at reachable place to ensure safety of the stakeholders.
- Unnecessary movement of students to and from the department is monitored and approach towards department by any stranger / parent/ public is restricted by security of the department.
- Fans are provided for effective air circulations in all laboratories and particularly Air Conditioner is provided in Metrology Lab.
- Glass windows for natural lighting

- Adequate space for accommodating students, furniture and movement of the students
- Wide veranda for enabling smooth and fast movement of students.

Details of Faculty members in-charge of Laboratories

Lab Description in the Curriculum	Exclusive use / Shared	Space (Sq.m.)	No of students per Experiment (Batch size)	Number of Equipment	Qualify of Instruments	Laboratory Manuals	Total Cost of the Lab (Rs)
Biochemistry Lab/Downstream Processing Lab	Exclusive	100	15/Batch	5	Excellent	Available	3,10,300
Bioprocess Lab	Exclusive	100	15/Batch	2	Good	Available	13,85,784
Central Instruments Facility	Exclusive	100	15/Batch	24	Good	Available	41,37,464
Bioinformatics Lab	Exclusive	100	15/Batch	55	Good	Available	8,80,000
Microbiology & Immunology Lab	Exclusive	100	15/Batch	4	Good	Available	1,86,300
Cell and Molecular Biology Lab	Exclusive	100	15/Batch	2	Excellent	Available	2,66,600
Gas Chromatography Lab	Exclusive	33	5/Batch	27	Excellent	Available	8,84,700

6.3. Safety Measures in the Laboratory

General safety measures

1. The First aid box and fire extinguisher are placed in the Lab at easily reachable positions.
2. 70% ethanol is kept in sufficient quantities in the laboratory for disinfection.
3. Water tap and sink with disinfection soap is kept in all the laboratories.
4. The students asked not to wear watches, bracelets, ring or bangles in their hand for safety precaution.
5. Dedicated recycle bins with paper covers with different color codes are placed in laboratories wherever applicable.
6. The students are asked to wear only leather shoes before entering their lab.

7. The electrical connection has been checked thoroughly (i.e. properly insulated) before starting each and every experiment.
8. The ambulance van is readily available in the campus for 24X7.
9. The mobile number display board for the ambulance van is mounted on the wall.
10. The instruments are arranged in well placed manner for proper ventilation.
11. Trained Technician takes care of the maintenance of the all equipment.
12. For avoiding fire all the Electric extension boards must be kept away from water source.
13. The students are instructed to switch off the main supply of the instrument before leaving the place.

Laboratory specific safety measures

S. No	Name of the Laboratory	Safety measures
1	Central Instruments Facility	<ol style="list-style-type: none"> 1. The whole laboratory is air-conditioned to provide a dust free environment 2. All the instruments are provided with standard operating procedure. 3. Sink with soap solution and 70% ethanol is provided in the adjoining laboratories.
2	Bioinformatics Lab	<ol style="list-style-type: none"> 1. The electrical connection has been checked thoroughly 2. The Monitor is provided with safety glass to reduce the radiation. 3. There is a thorough check in earth connection.
3	Microbiology & Immunology Lab	<ol style="list-style-type: none"> 1. Laminar air flow units are provided with flame ignitors to prevent any fire accidents. 2. Sink with soap solution and 70% ethanol is provided in the laboratory. 3. Separate containers are kept for discarding used biohazard material, broken glassware and other un-contaminated things.
4	Cell and Molecular Biology Lab	<ol style="list-style-type: none"> 1. Gloves and other personal protective equipment are provided to students wherever applicable. 2. Safety goggles are provided. 3. Gels are discarded with appropriate safety measures.
5	Gas Chromatography Lab	<ol style="list-style-type: none"> 1. Gas valves of cylinders are monitored for the pressure regularly
6	Autoclave Room	<ol style="list-style-type: none"> 1. Electrical connections are routinely checked. 2. At the end of each semester water lines are cleaned in the water distillation unit. 3. Pressure gauges of autoclaves are calibrated at the end of every semester.

6.4. Project Laboratory

The department has six research laboratories which are accessible to the final year UG students when they do their project work. Besides this, students who are working on biomaterials do have access to the state-of-the-art facilities available at the International Research Center. The laboratories specialize in one of the following areas:

- Vaccine development and immunology

- Proteomics
- Plant molecular biology
- Zebrafish model system
- Large scale production of enzymes and characterization
- Evaluating adverse drug reactions

The List of equipment available

- Nucleofector device
- Fluorescence microscope
- Class II Biosafety cabinet
- CO₂ incubator
- Thermal cycler
- Inverted microscope
- Luminescence and fluorescence reader
- ChemDoc Imaging system
- Isoelectric focusing unit
- Western blotting apparatus (Semi-Dry and Wet)
- MilliQ water purification system
- Green House
- Plant tissue culture facility
- Microtome
- Q-PCR

A few sample projects are presented here:

1. Studies on the effect of carbon sources on biological activity of curdlan gum
2. Pyrazole derived compound 4-amino antipyrine loaded liposome nanoparticles induced cell death in breast cancer
3. Biocompatible sodium alginate collagen – selenium nanoparticles biofilm for wound healing applications
4. Screening for siderophore production in uropathogenic *E. coli*
5. Immuno-modulatory effect of PEG-albumin gold nano conjugates
6. Effect of siderophore production on biofilm formation in uropathogenic *E. coli*
7. Studies on extraction, characterization and application of sulphated polysaccharides from seaweeds

8. Folic acid conjugated BCd-albumin carrier for folate receptor targeted delivery of gallic acid for effective anti-Cancer treatment
9. *In silico* validation of computationally predicted murine specific dengue CTL epitopes
10. Studies on the influence of iron on biofilm formation and screening for inhibitors of iron acquisition in *Pseudomonas aeruginosa*
11. *In silico* evaluation of the binding potential of compounds from medicinal plants with Spike Proteins of SARS-CoV and SARS-CoV2
12. Influence of iron restriction on biofilm formation in uropathogenic *Pseudomonas aeruginosa*.
13. Evaluating the effects of Adriamycin on *wnt* signaling pathway and correlating it with cardiac dysfunction *in silico*.

List of Student Publications from the project laboratory

S. No .	Title of Publication	Indexed with/ Impact factor
1.	Mohan, M., Sivakumar, P. , Dilip, G.D., Rosy, J.C., Coico, R. and Sundar, K., 2022. Computational analysis of proteome of Foot-and-mouth disease Virus for the prediction of immunogenic epitopes. <i>Vacunas</i> . (In press) (10.1016/j.vacun.2022.01.001)	Scopus
2.	Ramya Petchimuthu, Angelin Jenit Franklin, Maria Agnes Roganzia Sahayaraj, Abisha Gopalan, Mari Selva Sundari Raju , Vanavil B., Formulation and Examination of Organic Oil and Shampoo from Fish Scales, International Journal of Innovative Technology and Exploring Engineering, 9 (2S2), 683-687, 2019.	
3.	Monika Senthamarai Kannan, Ponlakshmi S. Hari Haran , Krishnan Sundar, Selvaraj Kunjiappan, Vanavil Balakrishnan, Fabrication of anti-bacterial cotton bandage using biologically synthesized nanoparticles for medical applications, Progress in Biomaterials (2022) 11:229–241	I.F 4.878
4.	Pandian, S.R.K., Kunjiappan, S., Pavadai, P., Sundarapandian, V. , Chandramohan, V. and Sundar, K., 2022. Delivery of Ursolic Acid by Polyhydroxybutyrate Nanoparticles for Cancer Therapy: in silico and in vitro Studies. <i>Drug Research</i> , 72(02), pp.72-81.	0.7
5.	Bazeera Ferdhous, P., Aanandhalakshmi, R. , Ramya, P. and Vanavil, B., 2022. Scrutiny of Metal Ion Binding Sites in Different Alginate Lyases through In Silico Analysis. <i>Applied biochemistry and biotechnology</i> , 194, p. 124-147.	2.926
6.	Vanavil, B., Ezhilarasi, P., Aanandhalakshmi, R., Gowtham, P.S. and Sundar, K., 2022. Seaweed Bioprocessing for Production of Biofuels and Biochemicals.	Book

	Zero Waste Biorefinery, pp.345-380.	Chapter
7.	Vijayalakshmi, M., Dhanapradeeba, V. , Selvaraj, K., Sundar, K., Pandian, S.R.K*, 2022. Targeting TLRs with the derivatives of Mimosa pudica: An <i>in silico</i> approach. Biointerface Research in Applied Chemistry, (Accepted).	1.94
8.	Pandian, S. R. K., Kunjiappan, S., Pavadai, P., Sundarapandian, V. , Vivek, C., Sundar, K., 2021. Delivery of Ursolic acid by PHB nanoparticles for cancer therapy: <i>in silico</i> and <i>in vitro</i> studies. Drug Research, 72(2), p.72-81.	0.7
9.	P. Bazeera Ferdhous, P.S. Gowtham, B. Vanavil, Curdlan Sulfate as a Novel Inhibitor for SARS-CoV-2 (COVID – 19): A Molecular Docking Study using Computational Tools (2021) in Rahul Srivastava & Aditya Kumar Singh Pundir (eds.), New Frontiers in Communication and Intelligent Systems, 507–516. Computing & Intelligent Systems, SCRS, India.	Book Chapter
10.	Rencilin, C.F. , Rosy, J.C., Mohan, M., Coico, R. and Sundar, K., 2021. Identification of SARS-CoV-2 CTL epitopes for development of a multivalent subunit vaccine for COVID-19. Infection, Genetics and Evolution, 89, p.104712.	3.342
11.	Pandian, S.R.K., Rencilin, C.F. , Sundar, K., 2021. Emerging nanomaterials for cancer immunotherapy. <i>Exploration in Medicine</i> , 2, p. 208-31.	Scopus
12.	Pandian, S.R.K., Kunjiappan, S., Ravishankar, V. and Sundarapandian, V. , 2021. Synthesis of quercetin-functionalized silver nanoparticles by rapid one- pot approach. BioTechnologia, 102(1), pp.75-84.	0.98
13.	Sharma, N.K. and Arivalagan, A.R. , 2021. Algae or bacteria—the future of biological wastewater treatment. In Handbook of Advanced Approaches Towards Pollution Prevention and Control (pp. 217-247). Elsevier.	Book Chapter
14.	Aanandhalakshmi, R. , Sundar, K., and Vanavil, B., 2021. Bioactive Oligosaccharides: Production, Characterization and Applications, In: Biomolecular Engineering Solutions for Renewable Specialty Chemicals-Microorganisms, Products, and Processes, Wiley. (In Press)	Book Chapter
15.	Kabilan, S. J., Karunya Sri and Anto Theodicta Jefrina , 2021. A Review on Role of Marine Therapeutics against COVID-19. <i>Zeichen Journal</i> , 7(2), p.43.	
16.	Kabilan, S. J., Derina, J. P. D. , Kavyalakshmi, N. B. , Padhmapriya P. , and Sneha M. , 2021. Nutro - Herbal Foods - A Healthy Diet for Better Life: Survey, Formulation, Nutritional and Sensory Analysis. <i>Zeichen Journal</i> , 7(23), p.227.	
17.	Nadana, G.R.V., Rajesh, C., Kavitha, A. , Sivakumar, P., Sridevi, G. and Palanichelvam, K. (2020). Induction of growth and defense mechanism in rice plants towards fungal pathogen by eco-friendly coelomic fluid of earthworm. Environmental Technology & Innovation. 19, 101011.	5.263
18.	Vanavil, B., Selvaraj, K., Aanandhalakshmi, R. , Usha, S.K. and Arumugam, M., 2020. Bioactive and thermostable sulphated polysaccharide from Sargassum swartzii with drug delivery applications. International Journal of Biological Macromolecules, 153, pp.190-200.	6.953

19.	Kabilan, S J., Abarna, R. , and Anto Theodicta Jefrina , 2020. Polyherbal Tea Formulation Using Powerful Indian Herbs Wedelia chinensis, Withania somnifera, Centella asiatica and Emblica officinalis: Analysis of Nutraceutical Properties . <i>Zeichen Journal</i> , 6(22), p.525.	Scopus
20.	Selvaraj, K., Panneerselvam, T., Murugesan, S., Balasubramanian, S., Sarathbabu, S., Sankarganesh, A., Parasuraman, P., Vellaichamy, S., Indhumathy, M., and Suraj, B. (2019). Design, graph theoretical analysis and bioinformatic studies of Proanthocyanidins encapsulated ethyl cellulose nanoparticles for effective anticancer activity. <i>Biomedical Physics & Engineering Express</i> , 5(2): 025004.	1.39
21.	Rajamanikkam, K. , Raja, S. E., Balaji, S. K., Rajavadivu, G. N., Sivasubramaniam, S., & Palanichelvam, K. (2019). Earthworm, a novel in vivo system to validate antimitotic compounds. <i>Turkish Journal of Zoology</i> , 43(2), 153-163.	0.7
22.	Kunjiappan, S., Panneerselvam, T., Govindaraj, S., Parasuraman, P., Baskararaj, S. , Sankaranarayanan, M., Arunachalam, S., Babkiewicz, E., Jeyakumar, A. and Lakshmanan, M., 2019. Design, in silico modelling, and functionality theory of novel folate receptor targeted rutin encapsulated folic acid conjugated keratin nanoparticles for effective cancer treatment. <i>Anti-Cancer Agents in Medicinal Chemistry (Formerly Current Medicinal Chemistry-Anti-Cancer Agents)</i> , 19(16), pp.1966-1982.	2.505
23.	Kunjiappan, S., Theivendran, P., Baskararaj, S. , Sankaranarayanan, B., Palanisamy, P., Saravanan, G., Arunachalam, S., Sankaranarayanan, M., Natarajan, J., Somasundaram, B. and Wadhwani, A., 2019. Modeling a pH-sensitive Zein-co-acrylic acid hybrid hydrogels loaded 5-fluorouracil and rutin for enhanced anticancer efficacy by oral delivery. <i>3 Biotech</i> , 9(5), pp.1-20.	2.406
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Paper Presentations by Students in National and International Conferences

S. No	Details of Presentations	Type
1.	Vijayalakshmi Muniyandi, Selvaraj Kunjiappan, Krishnan Sundar, Ram Kumar Pandian Sureshbabu, In silico and In vitro Elucidation of Bhallataka Compounds on Macrophage Polarization, 5th International Symposium on Bioinformatics, Bezmialem Vakif University, Turkey, December 15-17, 2021	International
2.	P. Nithish, V. Barath, K. Nivethidha and B. Vanavil, Unraveling the role of different substrates on nutritional value of the cultivated mushroom, Pleurotus florida, National Conference on “Innovations in Biotechnology for Sustainable Life” organized by Department of Biotechnology, Kalasalingam Academy of Research and Education, April 23, 2022.	National
3.	P. Bazeera Ferdhous, P. Ezhilarasi and B. Vanavil, Curdlan Gum as a Drug Delivery and Immobilization Agent, National Conference on “Innovations in Biotechnology for Sustainable Life” organized by Department of Biotechnology, Kalasalingam Academy of Research and Education, April 23, 2022.	National
4.	V.R. Hema, P. Ezhilarasi, B. Vanavil, Development of Anti-bacterial Nano Filling Material for Dental Caries, Journal of Scientific Research, 66 (1), 2022	UGC-CARE
5.	Kavitha A, Harsha Dev Mukherjee, Ganapathi Sridevi and K. Palanichelvam, Analysis of rice transcriptome data to identify plant defense pathways induced by the fungal pathogen Rhizoctonia solani upon infection, Second National Conference on Innovations in Bio and Chemical Engineering for Sustainable Life, May 20-21, 2021	National
6.	N. Sankara Gomathi, M. Pooja Vaisnavi, U. Nivas, and S. Sheik Asraf, Study of commercially available potato chips by metagenomic and culture dependent strategy, Second National Conference on Innovations in Bio and Chemical Engineering for Sustainable Life, May 20-21, 2021	National
7.	Jashin P, Janani S, Martina Jemimal A and Sheik Asraf S, In silico analysis of b- lactam antibiotic resistant determinants in the genome of Enterobacter hormaechei Subsp. Hoffmannii OIPH-N069, Second National Conference on Innovations in Bio and Chemical Engineering for Sustainable Life, May 20-21, 2021	National
8.	S. Sheik Asraf, A. Sivakkani, M. Sneha and N. Ramar, In silico analysis of antibiotic resistant determinants in the genome of Streptomyces clavuligerus ATCC 27064, Second National Conference on Innovations in Bio and Chemical Engineering for Sustainable Life, May 20-21, 2021	National
9.	Ramar N, Jashin and S Sheik Asraf, In silico analysis of beta lactam antibiotic resistant determinants in the genome of Enterobacter cloacae Subsp. Cloacea ATCC 13047, Second National Conference on Innovations in Bio and Chemical Engineering for Sustainable Life, May 20-21, 2021	National
10.	Aanandhalakshmi R, Ramya P and Vanavil B, Process optimization for alginate lyase production using Enterobacter tabaci RAU2C, Second National Conference on Innovations in Bio and Chemical Engineering for Sustainable Life, May 20-21, 2021	National
11.	Gowtham P.S and Vanavil B, Sulphated Oligosaccharides as An Alternative Drug for Covid-19 – an In Silico Analysis, Second National Conference on Innovations in Bio and Chemical Engineering for Sustainable Life, May 20-21, 2021	National

12.	Karthigaiselvi J, Dilaksha Mary V, Anushiya Mary C and Vanavil B, In silico characterization of seaweed polysaccharides degrading enzymes, Second National Conference on “Innovations in Bio and Chemical Engineering for Sustainable Life, May 20-21, 2021	National
13.	Subharaga V, Suriyalakshmi K, Ramya P and Vanavil B, Production of alginate lyase using <i>Enterobacter tabaci</i> RAU2C through solid state fermentation of brown seaweeds, Second National Conference on “Innovations in Bio and Chemical Engineering for Sustainable Life, May 20-21, 2021	National
14.	Ammu, M, Catherine, J, Hari Nivashini, K, Vigneshwaran, R, and Ram Kumar Pandian, Phylogenetic analysis for typing lactobacillus strains using molecular gene marker, Second National Conference on Innovations in Bio and Chemical Engineering for Sustainable Life, May 20-21, 2021	National
15.	BalaMurugan M, Santhosh Krishnan S, Subash M, Selvaraj K, and Ram Kumar Pandian S, Elucidating the role of phytochemicals screened from <i>semecarpus anacardium</i> on macrophage activation and polarization: an in silico approach, Second National Conference on Innovations in Bio and Chemical Engineering for Sustainable Life, May 20-21, 2021	National
16.	Sundara Pandian V, Selvaraj K, and Ram Kumar Pandian S, screening of bioactive compounds from <i>asparagus racemosus</i> and <i>semecarpus anacardium</i> : an in silico investigation against neural disorders, Second National Conference on Innovations in Bio and Chemical Engineering for Sustainable Life, May 20-21, 2021	National
17.	R Aanandhalakshmi, B Vanavil, In silico characterization of alginate lyase produced by different species, National Conference on Biological, Biochemical, Biomedical, Bioenergy, and Environmental Biotechnology, National Institute of Technology Warangal, January 29-30, 2021	National
18.	P.S Gowtham, B Vanavil, Docking and molecular interaction studies of Covid-19 viral targets with sulphated polysaccharides, National Conference on Biological, Biochemical, Biomedical, Bioenergy, and Environmental Biotechnology, National Institute of Technology Warangal, January 29-30, 2021	National
19.	P. BazeeraFerdhous, Aanandhalakshmi R, P. Ramya and B. Vanavil, Scrutiny of metal ion binding sites in alginate lyase through in silico analysis, 2 nd Virtual Annual International Conference on Naturopathy, Nanotechnology, Nutraceuticals and Immunotherapy in Cancer Research, BSA Crescent Institute of Science and Technology, June 11-12, 2021	International
20.	P. BazeeraFerdhous, P.S.Gowtham, B.Vanavil, Curdlan Sulfate as a Novel Inhibitor for SARS-CoV-2 (COVID – 19): A Molecular Docking Study using Computational Tools, 3 rd International Conference on Communication and Intelligent Systems, National Institute of Technology, Delhi, December 18-19, 2021	National
21.	Velmurugan Sundarapandian, Selvaraj Kunjiappan, Sureshbabu Ram Kumar Pandian, Role of <i>Asparagus racemosus</i> on pentazole-induced epilepsy in rodent model, Conference on Innovations in Bio &Chemical Engineering for Sustainable Life, June 8-9, 2020	National
22.	R. Atchaya, V. Dhana Pradeeba, D. Inba Jothi, K. Selvaraj, K. Sundar, S. Ram Kumar Pandian, Role of <i>Semecarpus anacardium</i> linn extracts on macrophage polarization in vitro, Conference on Innovations in Bio &Chemical Engineering for Sustainable Life, June 8-9, 2020	National

The research laboratories have the following equipment:

Name of the Laboratory	Equipment Available	Quantity	Cost (Rs)	Total Cost (Rs)	Utilization by project students
Proteomics Lab	Carl Zeiss Stereo Zoom Microscope	1	3,00,000	39,63,046	20 Hours/Week
	Isoelectric Focusing Unit (IEF)	1	6,50,000		
	SDS-PAGE Apparatus	1	1,30,000		
	Submarine for DNA gel electrophoresis	1	1,00,000		
	Power pack SE-600	1	1,90,000		
	Semi dry western blot apparatus	1	1,54,000		
	Wet Western blot apparatus	1	1,00,000		
	Refrigerator (45L)	1	6,250		
	Microwave Oven	1	7,796		
	Biosafety cabinet class II	1	4,50,000		
	CO2 incubator	1	4,50,000		
	Sorval Centrifuge	1	4,75,000		
	Speedvac Concentrator	1	3,50,000		
	Sanyo Deep Freezer	1	6,00,000		
Molecular immunology Research Lab-20	Sanyo - Ultra Low temperature freezer	1	2,60,076	83,55,177	20 Hours/Week
	Microfiltration / Ultrafiltration Unit	1	2,78,667		
	Micro Plate reader – BioradiMark	1	5,00,000		
	Inverted Phase Contrast Microscope	1	3,59,456		
	Analytical balance - Shimadzu	1	62,000		
	Liquid nitrogen tank Model 1X-35	1	28,191		
	-20°C Deep Freezer	1	1,11,330		
	Class-II Biohazard Safety cabinet	1	4,49,414		
	Galaxy B CO2 incubator	1	3,97,817		
	Easy Pipetting Aid	1	69,192		
	MilliQ water purification system	1	3,85,000		
	Platform Rocker II (GR2)	1	22,561		
	Nucleofector Device II	1	8,56,190		
	Multi well fluorescence & Luminescence reader	1	11,38,977		
	Micro Centrifuge	1	1,22,304		

	Chemi-doc imager	1	8,84,000		
	Fluorescence microscope	1	12,57,360		
	Binocular microscope	1	96,000		
	Thermocycler	1			
	Refrigerated Centrifuge				
	UV-VIS Spectrophotometer				
	-20 Freezer				
	Refrigerator (420L)	1	28,515.62		
	Refrigerator (190L)	1	10,546.86		
	Microwave Oven	1	7,796		
Plant Molecular Biology Laboratory	Refrigerator	1	36,225	5,36,060	20 Hours/ Week
	Plant tissue culture rack	1	24,000		
	Green House	2	2,52,000		
	Laminar Air Flow unit	1	1,14,920		
	pH Meter	1	16,500		
	Weighing Balance	1	15,000		
	Magnetic Stirrer	1	11,426		
	Gel apparatus and Power Pack	1	29,645		
	Vortex Mixer	1	3,696		
	Gel Rocker	1	15,960		
	Vacuum pump	1	16,688		
Enzyme Biotechnology Laboratory	Incubator Shaker	1	2,55,000	6,95,002	20 Hours/ Week
	Microscope with camera	1	59,795		
	Electronic Balance	1	19,200		
	Agarose gel electrophoresis unit (Maxi)	1	32,450		
	Drybath	1	37,120		
	SDS-PAGE apparatus with powerpack	1	6,890		
	Western Blot apparatus (Dry)	1	34,633		
	High speed centrifuge	1	81,320		
	Tabletop centrifuge for microcentrifuge tubes	1	12,980		
	Laminar Air Flow unit	1	88,264		
	Deep freezer (-20)	1	25,600		
	Refrigerator (220 L)	1	23,300		
	Refrigerator (180 L)	1	10,000		
	Microwave oven	1	6,500		
	Mixi	1	1,950		
Zebrafish Developmental Genetic	Refrigerator	1	20,000	1,32,000	20 Hours/ Week
	Cement Tank	1	6,000		
	Working Platform	1	1,00,000		

Laboratory	Rack	1	6,000		
Center for Cardiovascular and Adverse Drug Reactions	Real-Time PCR	1	7,69,685	23,43,659	20 Hours/ Week
	pH Meter	1	7,619.05		
	Refrigerator	1	23,000.00		
	Magnetic stirrer	1	5,466.67		
	Balance	1	11,333.30		
	Gel electrophoresis Unit	1	9,109.50		
	Mini Centrifuge	1	8,014.20		
	Vortex Mixture	1	3,961.90		
	Microwave oven	1	4,990.00		
	Western Blot	1	1,69,741.00		
	-20°C Deep Freezer	1	21,315.00		
	-80°C Freezer	1	3,68,550.00		
	Cooling Incubator	1	95,172.00		
	ELISA Reader	1	1,30,000.00		
	High Speed Cooling Centrifuge	1	1,80,000.00		
	Gradient PCR	1	1,20,000.00		
	Laminar Air Flow	1	55,500.00		
	Inverted Microscope with Fluorescent attachment	1	3,24,975.00		
	UV-Trans illuminator	1	17,430.00		
	Refrigerator	1	17,796.62		



Plant Biotechnology Laboratory



Proteomics Laboratory



Cell culture facility



**Molecular Immunology
Research Laboratory**



Enzyme Biotechnology Laboratory



**Zebrafish Developmental
Genetics Laboratory**



**Center for Cardiovascular and Adverse
Drug Reactions**

CRITERION 7	Continuous Improvement	75
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7.1 Actions taken based on the results of evaluation of each of the COs, POs & PSOs (30)

Course attainment derived by assessing the Course Outcome (CO) for individual students was used to improve the PO attainment. For improving the PO attainment necessary remedial measures are considered and implemented. The data acquired from CO and PO attainment was discussed elaborately in the class committee meetings and faculty meetings and based on the discussions remedial measures were introduced to improve the attainment.

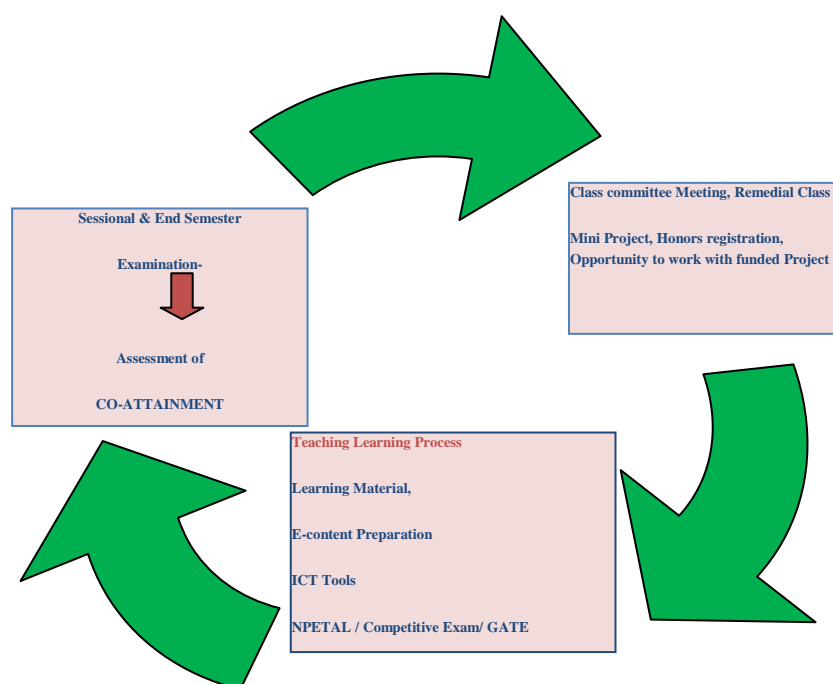
Action points taken based on the evaluation of COs, POs and PSOs include:

- Curriculum Intervention
- Introduction of new pedagogical tools in the teaching-learning process

Improvement in support systems such as,

- Remedial classes for the particular course
- Improvement in E-content provided to the students
- Exposure more practical sessions by providing hands-on-training
- ICT tools/ MOOC/NPTEL courses

Systematic procedures for monitoring continuous improvement process.



Pos	Target Level	Attainment Level	Observations
PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
2016-2020 Batch PO Attainment			
PO1	1.7	1.6	CHE 357: Reaction Engineering for Biotechnologists
		2.2	BIT 304: Genetic Engineering
		1.8	BIT 403: Downstream Processing
BIT 18 R 372: Genetic Engineering			
Action taken			
More assignments are provided to the students to understand the basic principles in genetic engineering and useful to solve problems in the laboratory.			
CHE 357: Reaction Engineering for Biotechnologist			
Issue discussed:			
1. Some of the students have not taken mathematics during their +2.			
2. They felt difficult to understand the fundamental concepts			
3. Lack of practicing the problem discussed during class time			
Action taken:			
1. Coaching & tutorial classes were conducted to teach the fundamental concepts			
2. More number of assignments and problems were given to the students and were asked to practice the problems			
3. Open book test and e-learning materials were provided.			
BIT 403: Downstream Processing			
Issue Identified:			
1. Student found difficulty to solve mathematical problems and calculations, since many of them were not from mathematical background.			
2. Concepts such as MEE (Multiple Effect Evaporators) and Electro dialysis were difficult for student to comprehend			
3. The problems involving chromatography and extraction were found to be difficult for students to solve.			

Actions Taken:			
1. Tutorial Classes were held for students to improve their problem-solving ability			
2. Real time case studies were given to students to gain better understanding of the concepts of Multiple Effect Evaporators			
3. Students were grouped as teams and allowed to design simple experiments pertaining to chromatography and extraction to strengthen the fundamentals.			
2017-2021 Batch PO Attainment			
2	2.2	CHE18R320: Reaction Engineering for Biotechnologist	
	2	BIT18R372: Genetic Engineering	
	2.6	BIT18R471: Bio-separation Principles and Applications	
The above courses PO Attainment was improved compared with 2016-2020 batch.			
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.			
2016-2020 Batch PO Attainment			
PO2	1.7	1.8	BIT403: Downstream processing
		2	BIT401: Animal Biotechnology
		1.6	BIT402: Plant Biotechnology
BIT 403: Downstream processing			
Issue Identified:			
1. The students were unable to distinguish between different chromatographic techniques and solve the problems related to the same.			
2. Students lacked interest to learn theoretical topics such as rheological characteristics of fermentation broths			
Actions Taken:			
1. Handovers were provided to the students on the concerned topics and teams were formed to solve simple problems as team activity.			
2. Students video recorded simple downstream processing techniques and were found			

to develop skills through activity-based learning.			
BIT 401: Animal Biotechnology			
Issue Identified			
Students lagging in analytical thinking and imagination. They struggle in understanding the concepts of animal biotechnology.			
Actions taken			
Practical classes conducted for the students			
Students were grouped as teams and allowed to design simple experiments			
BIT 18R 403: Plant Biotechnology			
Action taken:			
<ol style="list-style-type: none"> 1. Identified the weak students and given lot of study materials and videos for better understanding. 2. Capability of solving the service based minor and major problems was taught to the students. 3. Task in terms of simplify the Plant Biotechnology project was given to the students to strengthen their knowledge in ethics for genetically modified plants system. 4. Students were given group-based project activities to enhance their understanding of cloning and expression in plant system for food crops fulfilling the project objectives. 			
2017-2021 Batch PO Attainment			
	2	2.6	BIT 18 R 471: Bioseparation: Principles and Applications
		3	BIT 18 R 402: Animal Biotechnology
		2.2	BIT 18R 403: Plant Biotechnology
Based on the strategies followed the PO attainment was improved compared to 2016-2020 batch.			
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.			
2016-2020 Batch PO Attainment			
PO3	1.7	2.4	BIT211: Principles of Biochemistry

	2.2	BIT304: Genetic Engineering
	1.8	BIT403: Downstream Processing
BIT 18 R 272: Principles of Biochemistry Issue Identified <ol style="list-style-type: none"> 1. Most of the students do not have a strong basic knowledge of chemistry and organic chemistry. 2. Some students were not able to differentiate the various roles of biomolecules. 3. Lack of practice on the structure of basic biomolecules involved in the pathways 4. Lack of practice in identifying the names and function/role of enzymes involved in the pathways Action taken <p>The students were advised to register for the related fundamental NPTEL courses for a thorough understanding of the fundamental concepts.</p> <p>The course syllabus was revised and changed into IC course. Students have easily understood the fundamental concepts and are able to follow the experiments, do analysis and interpret the observed results through laboratory classes.</p>		
BIT 18 R 372: Genetic Engineering Action taken <p>During regular classes, previous year's genetic engineering GATE questions are practiced and discussed. This practice helpful for the students to design solutions for complex engineering problems.</p>		
BIT 403: Downstream Processing Issue Identified: <ol style="list-style-type: none"> 1. Students were unable to apply the theoretical concepts during the practical experiment sessions. 2. Group interaction and peer learning skills were found to be missing amongst the students Actions Taken: <ol style="list-style-type: none"> 1. The BIT18R471 – Bio separations Principles and Application was modified as Integrated Course containing both theory and practical classes for a blended learning approach. 2. The students were allowed to frame their questions in groups and distribute to the 		

	fellow class mates to solve. This demonstrated the peer learning abilities and developed interpersonal skills amongst the students.		
	2017-2021 Batch PO Attainment		
	2	1.4	BIT 18R272: Principles of Biochemistry
		2	BIT 18R372: Genetic Engineering
2.6		BIT 18R471: Bioseparation Principles and Applications	
The syllabus was revised for few courses. Students were able to understand the concept properly by lab with practical and the PO attainment were improved.			
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.			
2016-2020 Batch PO Attainment			
PO4	1.7	2.2	BIT305: Biochemical Engineering
		1.6	BIT203: Bioenergetics and Metabolism
		2.2	BIT209: Molecular Biology
BIT 305: Biochemical Engineering			
Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.			
Action taken:			
The teaching learning process was continuously monitored by the course coordinators and subject experts.			
The subject handling faculty used new pedagogy tools (such as e-learning materials, videos, simulation tools, software, demonstration in the lab) for explaining their concept thoroughly.			
The students were encouraged to register for NPTEL course related to the subject for improving the PO attainment.			
GATE questions were discussed in classroom. Tutorial problems were given the students for solving. Case study assignment (Assignment 5) was given to enhance learning experience related to design of enzyme bioreactors.			

Bioenergetics and Metabolism:

Issue discussed:

1. Students not able to remember the pathways and related enzymes.
2. Students not able to differentiate the roles of enzymes and their function in each metabolic pathway.

Action taken:

The teaching learning process was continuously monitored by the course coordinators and subject experts.

The subject handling faculty used new pedagogy tools (such as e-learning materials, videos) for explaining their concept thoroughly.

More number of assignment and case studies are provided to the students for improving the PO attainment.

The students were encouraged to attend online/ NPTEL courses related to the subject for improving the PO attainment.

GATE questions and pathway related case studies are discussed in classroom and students presented their case studies individually and group.

The students were advised to register for the related fundamental NPTEL courses for a thorough understanding of the fundamental concepts.

BIT 209: Molecular Biology

The teaching learning process was continuously monitored by the course coordinators and subject experts.

The subject handling faculty used new pedagogy tools (such as e-learning study materials, videos) for explaining their concept thoroughly.

The students were encouraged to attend online/ NPTEL courses related to the subject and also to take up assignments for improving the PO attainment.

2017-2021 Batch PO Attainment

PO4	2	2.8	BIT 18 R 373: Biochemical Engineering
		3	BIT 18 R 205: Bioenergetics and Metabolism
		2.2	BIT 18 R 273: Molecular Biology

Programme outcomes are periodically measured by conducting examinations and evaluations. The PO attainment level was increased.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

2016-2020 Batch PO Attainment			
PO5	1.7	2.2	BIT 304: Genetic Engineering
		2	BIT 401: Animal Biotechnology
		1.6	BIT 402: Plant Biotechnology
BIT 18 R 372: Genetic Engineering			
Action Taken			
Animations and various software tools are displaced to the students to predict complex engineering activities related to genetic engineering.			
BIT 401: Animal Biotechnology			
Issue Identified			
Students are unable to discriminate the complex problems in assisted reproductive techniques.			
Actions taken			
Case studies were provided to the students			
Recorded videos of ART was shown to the students			
BIT 18 R 403: Plant Biotechnology			
Action taken:			
<ol style="list-style-type: none">1. Team work was put to use and all effective establishment of modern tools uses ie. PyMol, like other tools of the project was achieved by the students2. Student team planned the tasks of the project and met its all deadlines3. Student team work was applied IT tool including prediction and modeling of phytochemicals complex, designing the drug from plant protein, and as well as secondary metabolites			
2017-2021 Batch PO Attainment			
	2	2	BIT 18 R 372: Genetic Engineering
		3	BIT 18 R 402: Animal Biotechnology
		2.2	BIT 18 R 403: Plant Biotechnology
Online software usage, team project work was assigned to the students, the attainment level was increased.			

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

2016-2020 Batch PO Attainment

PO6	1.7	2.2	BIT 304: Genetic Engineering
		1.6	BIT 402: Plant Biotechnology

BIT 18 R 403: Plant Biotechnology

Action taken:

1. Students were guided to communicate (oral, written) and to identify the problem from cultivation of plant system by using biofertilizer and improvement of plant productivity as a solution for the chosen project.
2. Students were societal, health, safety, legal and cultural issues during the study period.
3. Students were identified based on the personal interest for chosen the elective course (Plant Biotechnology) and given group project work.

BIT 18 R 372: Genetic Engineering

Action Taken

More number of quiz programs was conducted to the students on applications and safety issues in genetic engineering.

This practice useful to gain knowledge about responsibilities in relevant field of interest.

2017-2021 Batch PO Attainment

	2	2.2	BIT 18 R 403: Plant Biotechnology
		2	BIT 18 R 372: Genetic Engineering

Miniproject and active learning methods were implemented for improving the attainment level.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

2016-2020 Batch PO Attainment

PO7	1.7	2.2	BIT 304: Genetic Engineering
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		2.2	BIT 305: Biochemical Engineering
BIT 18 R 372: Genetic Engineering			
Action taken			
More hands on training were provided in the laboratory sessions with help advanced instrumentation.			
BIT 305: Biochemical Engineering			
Action taken:			
The teaching learning process was continuously monitored by the course coordinators and subject experts. The subject handling faculty used new pedagogy tools (such as e-learning materials, videos, simulation tools, software, demonstration in the lab) for explaining their concept thoroughly.			
The students were encouraged to register for NPTEL course related to the subject for improving the PO attainment. GATE questions were discussed in classroom. Tutorial problems were given the students for solving.			
2017-2021 Batch PO Attainment			
PO7	2	2	BIT 18 R 372: Genetic Engineering
		2.8	BIT 18 R 373: Biochemical Engineering
A hand on training, new pedagogy tools and online courses enriched curriculam was strengthened and the PO attainment level was increased.			
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
2016-2020 Batch PO Attainment			
PO8	1.7	3	BIT499 : Project Work
BIT499 : Project Work			
Action taken:			
1. Ethical codes needed for the project were taught to the students properly. 2. Capability of solving the service based ethical problems was taught to the students. 3. Task in terms of community service project was given to the students to strengthen their knowledge in ethics.			
2017-2021 Batch PO Attainment			

PO8	2	3	BIT 18 R 499: Project Work
Students were given group based project activities to enhance their understanding of ethical behavior in fulfilling the project objectives.			
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.			
2016-2020 Batch PO Attainment			
PO9	1.7	3	BIT 499: Project Work
Action taken: <ol style="list-style-type: none"> 1. Team work was put to use and all effective establishment of objectives of the project was achieved by the students 2. Student team planned the tasks of the project and met its all deadlines. 			
2017-2021 Batch PO Attainment			
	2	3	BIT 18 R 499: Project Work
Student team work was applied in analyzing risk and uncertainty of the objectives of the project and the PO attainment level was increased.			
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.			
2016-2020 Batch PO Attainment			
PO10	1.7	1.8	HSS102: English for technical Communication
Action taken: <ol style="list-style-type: none"> 1. Students were guided to communicate (oral, written) and were guided to identify the problem and suggest solution for the chosen project. 2. Students were guided to use communication to build team work and vice versa to complete the project. 			
2017-2021 Batch PO Attainment			
	2	3	HSS17 R 152: English for technical Communication

Students were informed to apply oral and written communication to do the survey, prepare need analysis report and final report of the project. The attainment level was increased.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

2016-2020 Batch PO Attainment

PO11	1.7	2.2	BIT 209: Molecular Biology
		2.2	BIT 306 : Immunology

BIT 18 R 273: Molecular Biology

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

The teaching learning process was continuously monitored by the course coordinators and subject experts. The subject handling faculty used new pedagogy tools (such as e-learning materials, videos) for explaining their concept thoroughly.

BIT 306 : Immunology

Issue identified

Students were unable to understand the theoretical concepts during practical experiments

Peer learning and group interaction were found to be missing among the students

Actions taken

A blended learning approach was implemented for Immunology course.

The students were allowed to frame their questions in groups and encouraged to solve the problem with peer team members with their acquired skills

2017-2021 Batch PO Attainment

PO11	2	2.2	BIT 18 R 273: Molecular Biology
		2.6	BIT 18 R 374 : Immunology

The students were encouraged to attend online/ NPTEL courses related to the subject and also to take up assignments for improving the PO attainment.

Programme outcomes are periodically measured by conducting examinations and evaluations.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

2016-2020 Batch PO Attainment

PO12	1.7	2.2	BIT 304: Genetic Engineering
		2	CSE102: Programming language

BIT 18 R 372: Genetic Engineering

Action Taken

More number of virtual laboratory sessions are provided to the students to practice the experiments.

CSE102: Programming language

Issue Identified:

1. Most of the students don't have fundamental programming language knowledge as they were from Biology background.
2. Understanding the basics of algorithm framing itself was lacking among majority of students.
3. The lack of practicing program codes was found among students.
4. The teaching methodology lacked hands-on knowledge and had more theoretical approach.

Action taken

1. The students were advised to register for the related fundamental online courses via Coursera / NPTEL/ Great Learning platforms for a thorough understanding of the fundamental concepts.
2. The course syllabus was revised and changed into IC course. Students are easily understood the fundamental concepts and design the experiments, analysis and interpret the observed results through laboratory classes.

2017-2021 Batch PO Attainment

PO12	2	2	BIT 18 R 372: Genetic Engineering
		2.2	BIT 17 R 171: Programming language

The students were advised to practice various programming codes through online platforms like Hacker rank. ICT tools frequently used for the theory and laboratory classes the PO attainment level was increased.

7.2 Academic Audit and actions taken during the period of Assessment

Academic audit system

The Academic audit process consists of internal audits and external audits. The main objective of an academic audit is to enhance both the quality of academic practices and attainment of target by implementing quality assurance mechanisms of the program. Audits are conducted for faculty, Laboratories, and departmental activities. The auditing team verifies the following Teaching-Learning components (Fig 7.2.1) and recommend necessary corrective measures to improve further.

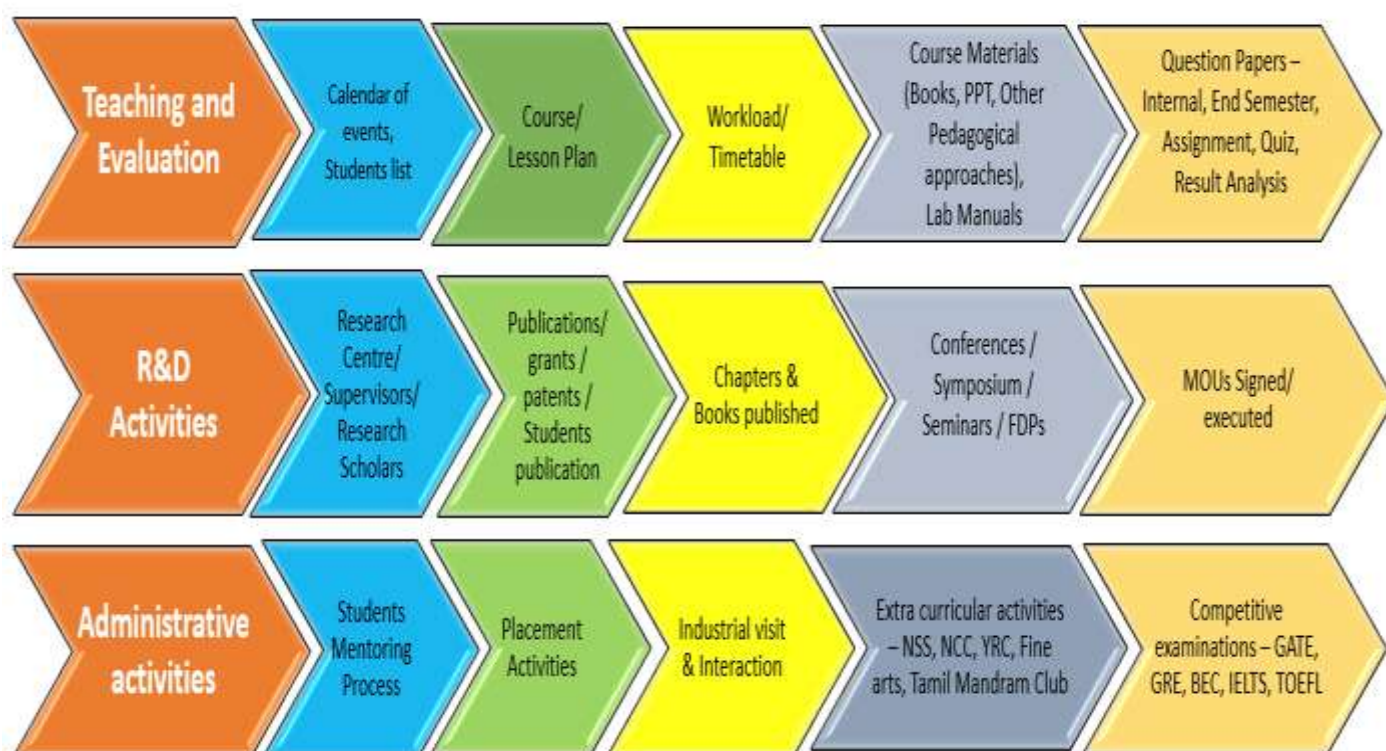


Fig. 7.2.1 Auditing Check List

The academic audit systems is conducted at three levels and the process is depicted in Fig. 7.2.2

1. Department level
2. Academic audit by Senior faculty members of other departments coordinated by Academic Office

3. Academic audit done by IQAC Office

Academic audit assessment criteria

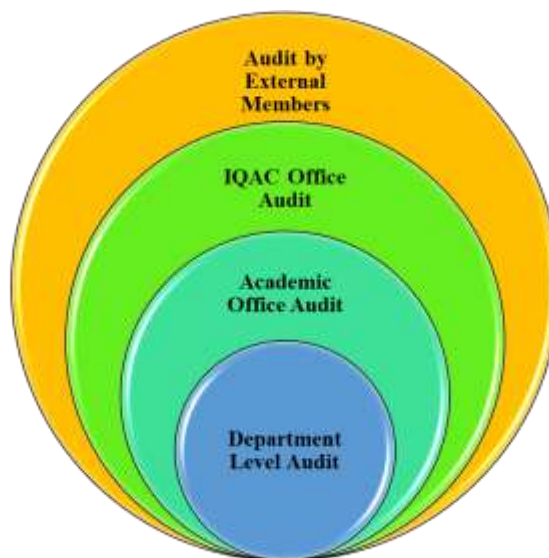


Fig. 7.2.2 Academic audit system

- ✚ On commencement of each semester, faculty members are informed to prepare the course materials as per the guidelines given in the Director-Academics and IQAC office.
- ✚ The course coordinator prepares course material for retaining competency and uniqueness.
- ✚ The course material is verified by the senior faculty members of the department.
- ✚ Regular scrutinizing is done by a senior faculty from non-allied departments appointed by the Director (Academics).

Frequency of the academic audit

After the commencement of each sessional examination the Director (Academic) office will conduct the academic audit to verify the syllabus covered by the faculty members. The frequency of the audit is given in Fig 7.2.3.

- ✚ Check list for faculty, Laboratories, and departmental activities has been designed and evaluation is based upon the performance of the faculty in teaching-learning activities, Departmental activities and research oriented activities by Department (Fig 7.2.4) , Academic office (Fig 7.2.5), IQAC Office (Fig 7.2.6 (a - e))
- ✚ Comments from the auditing team are given as suggestions to the faculty members to take corrective measures.



Fig.7.2.3 Frequency of Academic Audit

KALASALINGAM UNIVERSITY
(Kalasalingam Academy of Research and Education)
Internal Academic Auditing (ODD 2020-2021)

Department: _____

S.No	Name of the staff	Subject Name / Subject code	For Theory courses				Availability of Assignments and Tutorials (Y/N)	For Laboratory Courses	Remarks (if any)
			Course Plan (OBE Based) Available (Y/N)	Number of units for which Course Material is available	Availability of E-learning materials (PPT, Online Materials) (Y/N)	Availability of Question Bank , Model Question Papers Expected		Availability of Lab Manual (Y/N)	

Signature of the Verification Officer(s)

Fig.7.2.4 Internal Academic Audit Sample form

 KALASALINGAM Academy of Research and Education DEEMED TO BE UNIVERSITY <small>Estd. U/E 3 of USC Act 1956. Accredited by NAAC with "A" Grade</small> www.kalasalingam.ac.in 1800 425 7884 1800 425 9395	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">NOV/DEC 2019</div> Anand Nagar, Krishnankottai – 626 126 Srivilliputhur (via), Virudhunagar (DT) Tamilnadu, INDIA. Ph: 04563-289300 e-mail : coe@klu.ac.in
OFFICE OF THE CONTROLLER OF EXAMINATIONS	

EXTERNAL AUDIT REPORT ON ACADEMIC PROCESS

Department: _____ Sem: _____

Course Name with Code: _____ Credit: _____

Theory / Practical _____

Name of the Staff Member: _____ Designation: _____

Rating and Quality of Academic Procedure: _____

S.No	Activities	Rating	Suggestion for improvement
1.	Course Plan		
2.	Maintenance of Log Book		
3.	Additional Topics covered		
4.	Course Material File		
5.	Quality of Assignment Questions		
6.	Conduct of Tutorials / Quizzes/Seminars		
7.	Quality of SE I / SE II / SE III questions		
8.	Valuation of SE I / SE II / SE III Answer books		
9.	Number of Text Books/Reference Books used		
10.	Self Learning is ensured through assignments		
11.	Quality e-learning materials		
12.	Encouragement of participative learning		
13.	Extent of use of experimental learning		
14.	Extent of use of Smart Board / ICT facilities		
15.	Use of Virtual Lab		
16.	Extent of support offered to improve fast / advanced learners		

S.No	Activities	Rating	Suggestion for improvement
17.	Special Efforts taken on Slow learners		
18.	Follow up of Preventive and Corrective measures		

General Observation / Comments:

Name and Designation: _____ Signature(s) of the Expert(s) with date _____

Institution : _____

Major Observation / Deficiency:

Minor Observation :

Noted by:

Course Teacher _____ Course Co-ordinator _____ Head of the Department _____

Action Plan:

- 1.
- 2.
- 3.
- 4.
- 5.

Implementation of Action Plan:

Director (Academic)/Controller of Examinations

Fig.7.2.5 Academic Academic Audit Sample form

PART B: ACADEMIC PERFORMANCE INDICATORS																			
CATEGORY I: Teaching, Learning and Evaluation Related Actions																			
1.1. Teaching Load :																			
Academic Year:																			
S.No	Sem.	Course Code	Theory Course Title	Core/Elective	Elective Type Major/Minor/Hons.	Prog.	Year	Sec.	Class Strength	Credits	No. of hrs./ week	Pass percentage						Feedback	
												SE-I	SE-II	SE-III	ESE	Overall	Score	Average Score	
1	VI			Core		B.Tech	III	A&B	75	4	6	79	90					2	3
2	II			Core		M.Tech	I	A	4	3	5	100	100	100				4	
S.No	Sem.	Lab Code	Laboratory Course Title	Prog.	Year	Sec.	Class Strength	Credits	No. of hrs./ week	Pass percentage				Feedback					
										ME-I	ME-II	ESE	Overall	Average Score					
1	VI			B.Tech	III	A&B	35	2	6	100	100		4	4					
Note: 1. Feedback score will not be considered for assessment of no. of students participated is less than 80% of class strength. 2. Weighted average will be taken based on student strength if faculty is handling more than one course.																			
Feedback given by Students																			
S.No	Sem	Course Code	Course Title	Total Students	No. of Students given feedback	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Average Score			

Fig.7.2.6 (a) IQAC Audit Sample form - Teaching and Evaluation

Note: If faculty member is handling more than one course, the self score can be put as average score in the courses handled

1.2 Details of Contribution in Imparting Syllabus-oriented Knowledge (Max 140)

Theory I					Theory II					Theory III				
S.No	Nature of the Activity	Weightage	Self Score for Theory I	Review Committee Score for	Nature of the Activity	Weightage	Self Score for	Review Committee Score for	Nature of the Activity	Weightage	Self Score for	Review Committee Score for		
Completeness of Course File					Completeness of Course File					Completeness of Course File				
1.	Course plan is OBE based	10	1		Course plan is OBE based	10	0		Course plan is OBE based	10				
2.	Lecture plan is strictly adhered	10	3		Lecture plan is strictly adhered	10	2		Lecture plan is strictly adhered	10				
3.	Lecture notes updated for all units	10	4		Lecture notes updated for all units	10	4		Lecture notes updated for all units	10				
4.	Details of class test/Quiz/tutorials/question bank/model question paper etc.	10	4		Details of class test/Quiz/tutorials/question bank/model question paper etc.	10	2		Details of class test/Quiz/tutorials/question bank/model question paper etc.	10				
5.	Proof of topics taught beyond syllabus	10	2		Proof of topics taught beyond syllabus (10)	10	3		Proof of topics taught beyond syllabus (10)	10				
6.	Availability of sample answer book for SE-I to III, Assignments given etc.	10	4		Availability of sample answer book for SE-I to III, Assignments given etc.	10	2		Availability of sample answer book for SE-I to III, Assignments given etc.	10				
7.	Analysis of SE - I, II, III results and action plan	10	3		Analysis of SE - I, II, III results and action plan	10	1		Analysis of SE - I, II, III results and action plan	10				
Quality of Assignments					Quality of Assignments					Quality of Assignments				
8.	Assignments are given on each unit	10	3		Assignments are given on each unit	10	3		Assignments are given on each unit	10				
9.	Specific constructive comments are given on	10	3		Specific constructive comments are given on	10	3		Specific constructive comments are given on	10				
10.	Self learning is ensured through assignment	10	2		Self learning is ensured through assignment	10	3		Self learning is ensured through assignment	10				
11.	Quality of Questions in assignments	10	2		Quality of Questions in assignments	10	3		Quality of Questions in assignments	10				
Lab I					Lab II					Lab III				
S.No	Nature of the Activity	Weightage	Self Score for Theory I	Review Committee Score for	Nature of the Activity	Weightage	Self Score for	Review Committee Score for	Nature of the Activity	Weightage	Self Score for	Review Committee Score for		
Laboratory Courses					Laboratory Courses					Laboratory Courses				
12.	Lab Manual content is adequate in terms of basic Principles and Procedure used	10	4		Lab Manual content is adequate in terms of basic Principles and Procedure used	10			Lab Manual content is adequate in terms of basic Principles and Procedure used	10				
13.	Constructive suggestions are given to students in analysis of experimental results	10	3		Constructive suggestions are given to students in analysis of experimental results	10			Constructive suggestions are given to students in analysis of experimental results	10				
14.	Relevant PO assessment (such as teamwork, communication skill, etc) are properly assessed	10	3		Relevant PO assessment (such as teamwork, communication skill, etc) are properly assessed	10			Relevant PO assessment (such as teamwork, communication skill, etc) are properly assessed	10				
		140	41				140					140		
Cumulative SCA_1.2					Cumulative SCA_1.2					Cumulative SCA_1.2				
Theory Courses					Lab Courses									
S.No	Nature of the Activity	Weightage	Average Self	Average Review	Nature of the Activity	Weightage	Average Self	Average Review						

Part-A (General) Part-B, Category I Category II Category III Category IV Total Score

Fig.7.2.6 (b) IQAC Audit Sample form - Teaching and Evaluation

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A	B	C	D	E	F	G	H	I	J																																																																																																																																																											
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Fig.7.2.6 (c) IQAC Audit Sample form - Teaching and Evaluation

S.No	Nature of Duty	Weightage	Self Score	Review Committee
1.	Students Counseling through FAS (50)	50	45	
2.	Class Coordinator (50)	50	0	
3.	Coaching classes for GATE/CAT/GRE etc	50	0	
4.	Joint publications with students (50)			
	Journal publications (30)	30	0	
	Conference publications (20)	20	20	
5.	Joint patents with students (50)	50	0	
6.	Participation in students' Industrial Visit (50)	50	0	
7.	Community Based Projects (50)	50	40	
8.	Association in Student Fine Arts Association / Cultural Clubs/ Poet Clubs/ Any other contribution (each carries 50 marks wt)	50	45	
9.		50		
10.		50		
11.		50		

Part-A (General) Part-B, Category I Category II Category III Category IV Total Score

Fig.7.2.6 (d) IQAC Audit Sample form - Co-curricular activities

S.No	Nature of Duty	Weightage	Self Score	Review Committee
3.1	Details of Research papers published			
	1. Publications in Journal (100)	100		
	2. Publications in the Conference (60)	60	60	
	Total	160		
	Cumulative SCA 3.1			
3.2	Text or reference books by international/National publishers (40)	40		
	Cumulative SCA 3.2			
3.3	Details of Major / Minor Research Projects (150)	150		
	Cumulative SCA 3.3			
3.4	Research Guidance (130)			
	1. Details of UG/PG Project Guiding (50)	50	50	
	2. Details of M.Phil / Ph.Ds Awarded / Submitted /	80		
	Total	130		
	Cumulative SCA 3.4			
3.5	Details of collaboration (50)	50		
	Cumulative SCA 3.5			

Fig.7.2.6 (e) IQAC Audit Sample form - Research, Consultancy and Extension activities

Table 7.2.1: Action taken by the faculty members

Sl. No	Academic Activities	Associated practices	Audit Reports	Corrective Action
1.	Curriculum Planning	Course Plan, Course File Preparation. All these files are verified and approved by Head of the Department.	All course files and lesson plans are prepared before commencement of The new semester by respective subject faculty.	If any of the faculty members are unable to complete files, necessary action is taken and re-auditing will be done.
		Quality of assignment, tutorials and quizzes	Quality of assignment, tutorials and quizzes are verified by Module coordinator	If the quality is not of desired standard, the concerned faculty has been counselled to improve it.
		Syllabus Coverage	Curriculum delivery progress is monitored continuously by the Head of Department before internal exam.	If any subject is lagging in the coverage of syllabus as per the lesson plan, the respective faculty are asked to take extra classes to complete the syllabus within the stipulated time.
2	Students Performance	Performance analysis of students in sessional examination	Marks are collected from the faculty members and the results were analyzed	Based on the students' performance, the students are divided into two categories: Slow and Fast learners
		Identification of slow and Fast learners	Identify students' learning capability based on previous semester results/ sessional exam/lab performance	The identified slow learners are counseled and special care has been given to those students to improve their performance. Fast learners are motivated for getting higher score in the university rank

3	Co-curricular and extra-curricular activities	Events organized by the department and Students participation in Conference, Workshops, Seminars, Technical and Cultural Fest	The data of students who have participated in seminars, workshops, symposiums inside and outside the campus, is recorded.	Inactive Students are motivated by explaining the importance of the programs and provided with necessary suggestions and guidelines.
4	Examination Process	Quality of question Paper	Question Paper Auditing committee checks question papers with the relevance of questions to COs.	Course instructor refines the question paper based on the suggestion given Auditing committee and Submit for Program Coordinator approval if there are no suggestions
		Quality of evaluation of answer sheets	After the internal examinations, Answer Sheets are evaluated and marks are submitted to Head of Department by the respective subject faculty.	Results are analyzed. Ensures the quality is maintained in evaluating answer scripts
5	Academic Surveys	Course exit survey Graduate exit survey Alumni survey	Survey forms are collected and aggregated by Program Coordinator for attainment analysis.	Makes sure that the survey forms are properly filled.
6	Laboratory Auditing	Lab manuals and Evaluation scheme	Laboratory manuals and evaluation scheme are prepared before commencement of the semester by respective subject faculty.	If any of the faculty members are unable to complete files, necessary action is taken and re-auditing will be done.
		Lab Record - Students	Student lab records and observation are checked by respective subject	Ensure the quality is maintained in the student lab records.

			faculty.	
		Equipment and Software status	Laboratory audit is done once in a semester by lab in-charges and Head of the Department. Lab in-charges and lab technicians check the Equipments, components and software status periodically.	If any equipment or components are in shortage, lab in-charge checks the list and recommends purchasing the components and equipment. If any equipment is damaged or not working properly, it must be serviced by lab technicians or service agencies

7.3 Improvement in Placement, Higher studies and Entrepreneurs

A) Improvement in placement

- Efforts are taken by the Department of Biotechnology to ensure 100% placements for all the eligible students.
- To achieve this department organizes various events and training programs to equip the students in technical and soft skills so as to help them in getting placed in reputed companies and industries.
- The training programs include the soft skill training, aptitude training, technical training, orientation program to introduce various avenues available to the students, alumni interactions, mock recruitment drives, career guidance programs, workshops wherein industrial personal participate as resource persons; guest lectures by industrial experts.
- The department also offers value added courses and supports the students to attend in-plant trainings / internships at various industries / laboratories which will be helpful to the students for placement.

Fig 7.31 shows various steps involved in getting of 100% placement



Fig 7.32 shows the placements details of last three batches

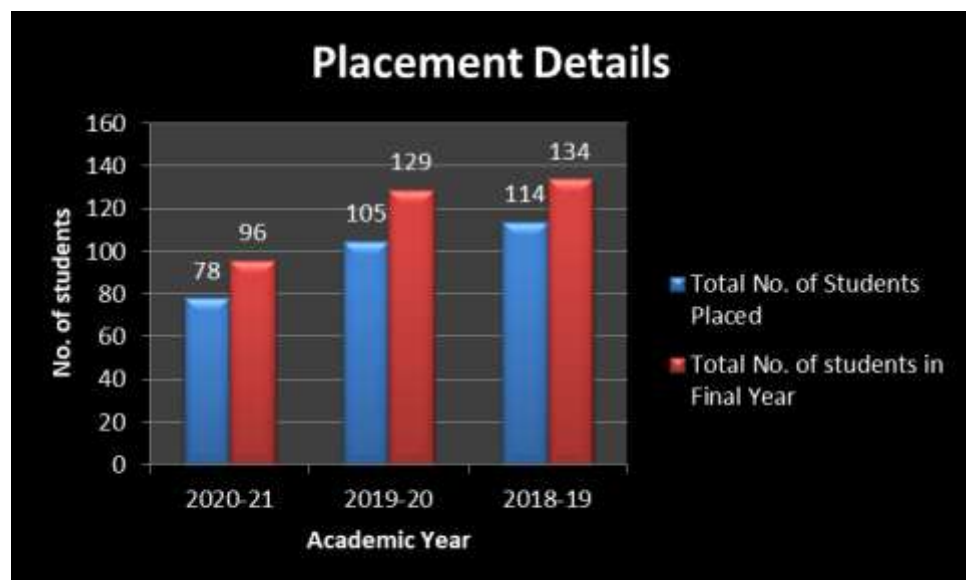


Table 7.31 shows that sample of placement details with company and salary package from last three academic years.

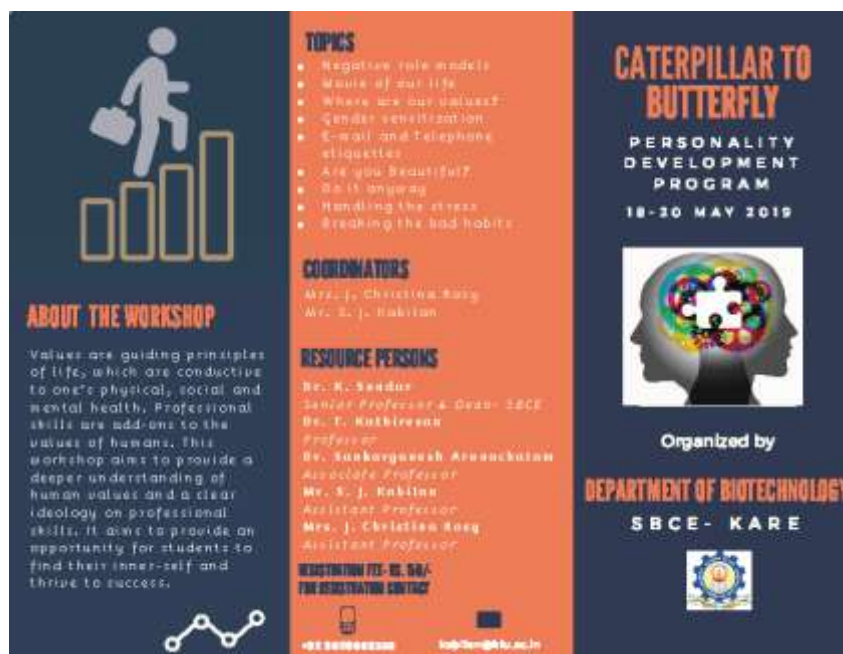
S.No.	Name of the Student	Name of the Company	Salary Package (in LPA)	Academic Year
1	Aarti M.S.S	Scope Knowledge E	1.2	2017-18
2	Bhuvaneshwaran P.S	Healthwatch	1.2	2017-18
3	Nandhini G	Kotak	3.6	2017-18
4	Ramalakshmi. S	Visionary RCM	1.56	2017-18
5	Pradeep Pandian P	Zifornd Solutions	4.37	2018-19
6	Revathy P	Sanofi	3.2	2018-19
7	Lavanya S	Sanofi	3.2	2018-19
8	Rahul Raj B	Algal R	1.45	2018-19
9	N Mrudul Lalitya	Byjus	10	2018-19
10	Varsha M	Codemantra	2.5	2018-19
11	Pradeepkumar B	Healthwatch	1.68	2018-19
12	Anu Krithika A K	Spi Global	1.8	2018-19
13	Pavithra K R	Spi Global	1.8	2018-19
14	Kalaiyaran A	Zifornd Solutions	4.7	2019-20
15	Subikshaa Mahesh	Iqvia	3.5	2019-20
16	Revathi G	Covance	3.5	2019-20
17	Hemapriya S	PPD	3.5	2019-20
18	Shaik Mohammad Sohail	Covance	3.8	2019-20
19	Lalitha A R	Intellipat	5.5	2020-21
20	Narayanan S	Tamil Nadu Test House	1.44	2020-21
21	Gowshiki S	Calyx	3.8	2020-21
22	Suvetha C J	Parry Nutraceuticals	2	2020-21

Soft skills training and workshops:

- Some of the students from rural background were found to have strong technical competency but fails to get placed because of lack of communication skills.
- To address this problem, extra soft-skills classes were conducted by the university to enrich the students with soft-skills particularly communication skills.
- Many experts were invited from reputed professional training centres to train our students and plan the career-path of the student.

- BEC classes were given importance and student were encouraged to register. They attend the training provided by the specific recognized trainers and passing the exam is considered as their proficiency in English.
- From the department of Biotechnology, an annual personality development workshop titled ‘Caterpillar to Butterfly’ was also organized to enhance the soft skills.
- Due to these soft skill training and workshops, the performance of the students in placement has been increased which is evident from the increase in placement percentage in the next two academic years (2019-20 and 2020-21).

Fig.7.33 Sample Images of the Personality training workshop – “Caterpillar to Butterfly”.





Placement training and mock interviews:

- Both from the University and department, various placement training programs were organized to help the students get ready for the job.
- From University, company specific interviews also were carried out which helped the students in cracking the interview.
- From the Department, training for resume preparation, mock Group discussion and mock HR were conducted which helped in improving the placement.

Fig.7.34 Image from the resume writing workshop

CATERPILLAR TO BUTTERFLY 2.0
PERSONALITY DEVELOPMENT WORKSHOP



ORGANIZED BY
DEPARTMENT OF BIOTECHNOLOGY
SBCE - KARE

SESSION VII



MR. SATHEESH KUMAR TYAPPAN
ANALYTICAL CHEMIST,
NORDIC BIOMANALYTICS AB,
SWEDEN

"WRITING A WINNING RESUME"

JOIN US ON
JUNE 9, 2020
9 AM - 10 AM

ABOUT THE SPEAKER

Mr. Satheesh Kumar Tyappan is currently working as an Analytical Chemist at Nordic Biomanalitics AB in Stockholm, Sweden. He is responsible for the chemistry laboratory and also deals with customers regarding the projects.

He has diverse job experiences and explored different career paths like sales, marketing and research from small start-ups to multi-national research and pharma companies. His varied experiences made him a transferable resource for multiple jobs and hence a valuable asset for the employers.

He is skilled in team management, customer handling and project management. He has been pivotal in helping different people in the export community in Sweden to find jobs by reviewing their resumes for free. His hobbies include dancing, photography and movie watching.

He has always been enthusiastic to learn new things and believed in taking risks to find what is interesting and fulfilling for himself, which has been the major reason for his successful career and personal life.



B. Improvement in higher studies

- Department of Biotechnology emphasizes greater importance towards Competitive Examinations like GATE, NET, TANCET, GAT-B, DBT-BET, AIEEA, etc., using which the students can enter into top institutions for their higher studies and research career.
- The university has a Centre for Competitive Examinations (CCE) exclusively to facilitate more students participation in these examinations.
- Fast-learners identified by the department were encouraged to attend GATE training that helps them in not only qualifying in GATE exam but also improve their CGPA. This is possible because of the earnest effort put by the department by deputing their faculty members to handle special sessions arranged for GATE.
- GATE resources available in the the university central library and frequent mock tests conducted by the faculty and the Cell in-charges help the students in scoring good marks.
- Fig 7.35 shows the various strategies adopted to boost the higher education and
- Fig 7.36 shows that the higher studies details for the past three batches
- Fig.7.37 Shows the improvement in the percentage of students went for pursuing higher education

Fig.7.35 Strategies adopted to improve higher educations

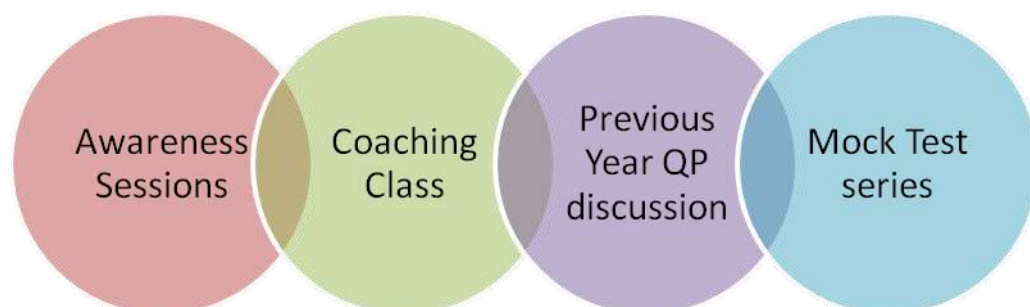


Fig.7.36 Higher education details for the past three batches

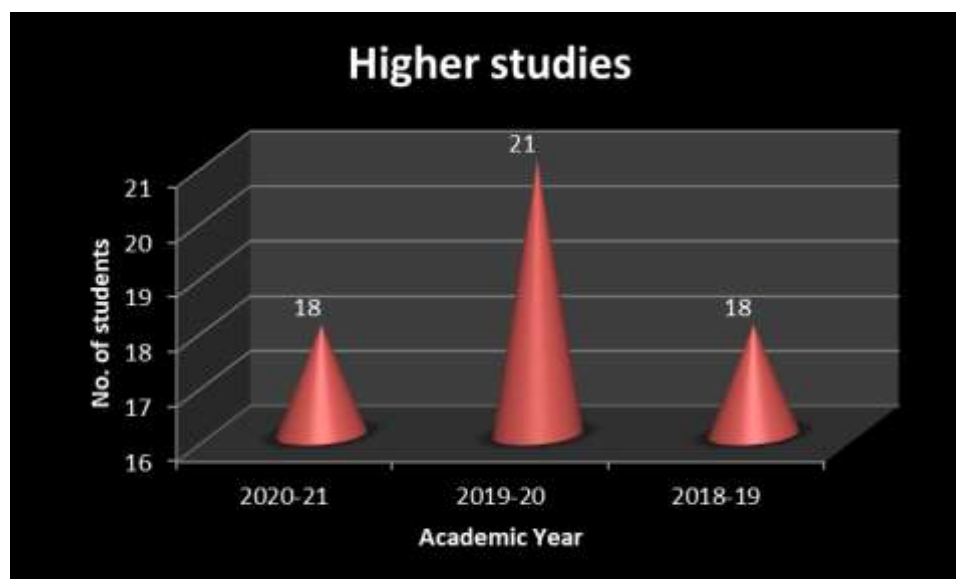
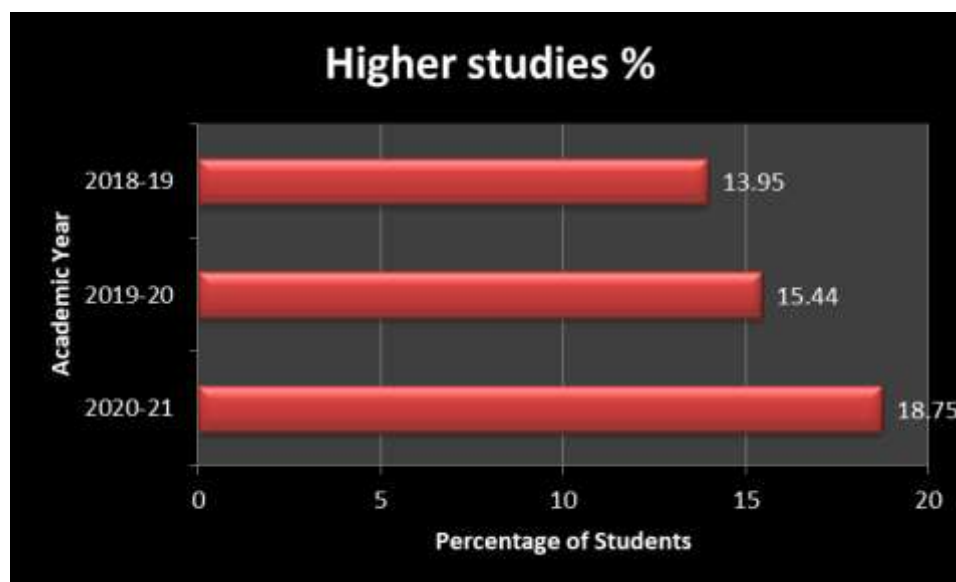


Fig.7.37 Sows improvement in the percentage of students who opted for higher education



- From 2015-16 onwards, faculty members from the department were deputed exclusively for GATE for providing coaching to the students.
- FAST - TRACK coaching was also provided to the student on the verge of examinations.
- Due to this training, there is a strategic improvement in the GATE examination for the years 2018-19 and 2019-20.
- Now repeated mock tests are being conducted to the students to get good score in the upcoming examinations.
- GATE qualified students were motivated to join premier institution like IITs, NITs, for their higher studies and research. This resulted in students joining for PhD program at IISER, Bhopal and IIT-M and Masters' program at IIT-G, BITS-Pilani, Hyderabad etc.
- Table 7.32 shows the list of students qualified in the competitive examinations
- Fig 7.38 shows the sample of GATE score card of the student, enabling to the get admission for higher education.
- Table 7.33 shows the details of students undergone for higher education

Table 7.32 List of students cleared various competitive exams during past three academic years

S. No	Name of the Student	Name of the exam cleared	Academic Year
1	ARUN KARTHIKEYAN	GATE	2018-2019
2	T S ABIRAMI	GATE	2018-2019
3	ARUN KARTHIKEYAN	JAM	2018-2019
4	ARUN KARTHIKEYAN	DBT - BET	2018-2019
5	KAVITHA.A	AIEEA	2018-2019
6	RAMKISHORE A	TANCET	2018-2019
7	PAVITHRA U	TANCET	2018-2019
8	SIVARANJANI V	TANCET	2018-2019
9	JAYASHREE B	TANCET	2018-2019
10	OVIYA S	GATE	2019-2020
11	SHALINI M	GATE	2019-2020
12	HEMAPRIYA S	TANCET	2019-2020
13	REVATHI	TANCET	2019-2020
14	TVARETA T	TANCET	2019-2020
15	SURESH KRISHNAN S P	TANCET	2019-2020
16	PRASEETHA S	TANCET	2019-2020
17	SHALINI M	TANCET	2019-2020
18	GHURUPREYA R	GATE	2020-2021
19	GEETIKA DEVI K	GATE	2020-2021
20	NIVEDHITA S	GAT-B	2020-2021
21	GHURUPREYA R	TANCET	2020-2021
22	GEETIKA DEVI K	TANCET	2020-2021
23	SUJA GAYATHRI S	TANCET	2020-2021
24	HELINA ROSE A	TANCET	2020-2021
25	BHAVANI R	GATE	2021-2022
26	GOPIKRISHNA G	GATE	2021-2022
27	NIVEDHITHA K	GATE	2021-2022
28	DHEEPAK R	GATE	2021-2022
29	SANDRA BABU	GATE	2021-2022

Fig.7.38 Snap shot of GATE score card

GATE 2021 Scorecard
Graduate Aptitude Test in Engineering (GATE)

Candidate's Details

Name: **GHURUPREYA R**
Parent's / Guardian's Name: **C RAMESH**
Registration Number: **BT21S57326017**
Date of Birth: **23-Dec-1999**
Examination Paper: **Biotechnology (BT)**

Performance

GATE Score: **497**
Marks out of 100*: **40**
Qualifying Marks**: **30.0** (General), **27.0** (EWS/OBC (NCL)), **20.0** (SC/ST/PwD)

Number of Candidates Appeared in this paper: **13186**
All India Rank in this paper: **634**

Valid up to 31st March 2024

* Normalized marks in Civil Engineering (CE), Computer Science and Information Technology (CS) and Mechanical Engineering (ME) Papers.
** A candidate is considered qualified if the marks secured are greater than or equal to the qualifying marks mentioned for the category for which valid category certificate, if applicable, is produced along with this scorecard.

Prof. Deepankar Choudhury
Organising Chairperson, GATE 2021
(on behalf of NGE - GATE, for MoE)

Table 7.33 Students gone for higher education details – Sample list

S. No	Name of the Student	Name of the Institute	Name of the Course
1	Antara Roy	Cleveland State University, Ohio, USA	PhD in Regulatory Biology Program (Immunology)
2	Adhvitha Premanand	University of Zurich, Switzerland	Masters in Chemical and Molecular Sciences
3	Arun Karthikeyan K	IIT-M, Chennai	Ph.D. Cancer Genomics
4	T.S. Abirami	BITS-Pilani, Hyderabad	M.E., Biotechnology
5	C Bhavishya	McGill University, Canada	Masters in Applied Biotechnology
6	Mehabob Nisha J	Nottingham Trent University, UK	Masters in Biotechnology
7	Kota Durga Pravallika	University of New South Wales (UNSW), Australia	Masters in Food Science and Technology

8	Teekanam Jahnavi	University of Missouri St. Louis, USA	Masters in Biotechnology
9	Karthik K	University of Padova, Italy	Masters in Molecular Biology
10	Jayaprabhakaran M	Anna University, Chennai	M. Tech (Biopharmaceutical Technology)
11	Ghurupreya R	IIT, Guwahati	M.Tech.- Biosciences and Bioengineering
12	Oviya S	Kalasalingam Academy of Research and Education	M.Tech. Biotechnology
13	Shalini M	Kalasalingam Academy of Research and Education	M.Tech. Biotechnology
14	Nivetha S	University of Glasgow, Scotland	Masters in Biotechnology

Improvement in entrepreneurship

- Department of Biotechnology is also taking steps in motivating the students not to become job seekers but job providers. , Innovation and Entrepreneurship Development Centre (IEDC) of the university has provided various types of training to the students to become a good Entrepreneurs.
- The training basically focuses on students to start their own companies by providing them information about various funding opportunities available.
- Community service projects also helps students in getting an insight into identifying a problem statement and providing a solution which has a market value. Students also learn the economic aspects and business surrounding a product during this period.

Fig.7.39 shows the various strategies adopted to improve the entrepreneurship



The separate cell for entrepreneurship called Innovation and Entrepreneurship Centre (IEDC), is functioning in the university and conducts awareness camp for students to become entrepreneur helping them to innovate new projects and helpful to community.

Table 7.34: List of events organized by IEDC cell – Sample list

S. No	Name of the Event	Date
1	Idea Competition	April 10, 2019
2	ISTE Innovation Contest	February 29, 2020
3	Technology Entrepreneurship Development Programme on Biotechnology	9th of March 2020 to 14th of March 2020

Fig 7.34 shows flyer related to an IEDC event.



Criteria 7.4 Improvement in the quality of students admitted to the program

- KARE has its own admission centres across the country and staff in the admissions office visit education fairs organized at various cities throughout the country.
- KARE admission centres are located at various places throughout India to provide information about the admission process. Admission brochures and intimation of Kalasalingam Engineering Entrance Examination (KEEE) are sent to all schools.
- KEEE questions are asked from higher secondary syllabus like Physics, Chemistry and Mathematics with higher competence.
- Eligible criteria for KARE engineering admission is to pass in higher secondary examination of state board, CBSE, Matric with an aggregate of 50% and above in Physics, Chemistry and Mathematics courses.
- Admission to the Undergraduate, Post graduate courses is done on the basis of performance of entrance examination.
- Diploma Student with 60% marks in the pre final and final semesters can avail for appearance in the KEEE.
- The application sent by the candidate will be scrutinized by staff members and the KEEE hall ticket will be sent to all eligible students and called for examination at various Examination Centers.
- In KARE every year entrance examination will be conducted on first week of June for undergraduate students and on last week of June for post graduate students.
- The entrance examination result will be published on the forthcoming weeks and students are called for counselling process on June second week.
- KEEE rank will be calculated based on marks scored in HSC (Physics, Chemistry and Mathematics) out of 100 and mark scored in KEEE out of 100 and finally rank will be allotted based on these average marks. Table 7.41 shows how to calculate the KEEE cut off marks to get admission in KLU. Table 7.42 shows the consolidated list of admitted students.

Table 7.41 Methodology of KLU cut-off calculation

S. No	Exam pattern	Average Marks
1	Physics, Chemistry and Mathematics	100
2	KLU Entrance Examination	100
Total marks		200
KARE Cut-off		100

Table 7.42: Consolidated report for student's admission

ITEM		CAY (2021- 22)	CAY (2020- 21)	CAYm1 (2019-20)	CAYm2 (2018-19)
National level entrance exam (JEE, AIEEE)	No of students admitted	Nil	Nil	Nil	Nil
	Opening score	Nil	Nil	Nil	Nil
	Closing score	Nil	Nil	Nil	Nil
State / Institute / Level entrance exam / others (KAREEEEE)	No of students admitted	72	80	70	67
	Opening score	5	5	5	7
	Closing score	120	120	110	98
Name of the entrance exam for lateral entry or lateral entry details	No of students admitted	-		-	-
	Opening score	-		-	-
	Closing score	-		-	-
Average CBSE /		-		-	-

Any other board result of admitted students (Phy, Che, Maths)				
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- Table 7.43 shows the KEEE cut off marks of the student enrolled for the entrance examination is attached herewith in the rank list
- University Rank card will be sent to the individual student who qualified in the entrance examination and are eligible to opt admission in Kalasalingam University. Fig 7.42 shows that the rank card of qualified student.

Table 7.43 KLU cut-off marks for counseling

S.No	Reg. No	Name of the students	Avg mark (100)	KLU EEE mark	Cut off (100)	Rank
1	E20207124	MEDA SOWMYA	78	86	82	134
2	E20207125	SHIVASHANKARAN VIGNESH S	62	94	78	196
3	E20207126	ANITH AHAMED K	98	76	87	174
4	E20207127	NARISETI CHARITHA DEVI	91	68	79	169
5	E20207128	VADLA DHANUSH	53	73	63	354
6	E20207129	ANUPRIYA P	71	66	69	317
7	E20207130	SELSIYA P	85	76	80	156

8	E20207131	JESSICA BHARATHI	85	78	92	180
9	E20207132	BADRI JOSHNA	78	79	90	179
10	E20207133	CHINNAKATHI SINDHU	81	78	91	154
11	E20207134	GAMIDI POOJA	76	80	88	163
12	E20207135	NUNNA SANTOSH KARTHIK	81	82	84	189
13	E20207136	PUJITHA PEDDIREDDY	80	81	90	120
14	E20207137	PUNNAM THARANA L N SHRINIDHI	79	85	88	144
15	E20207138	VISHNUSHANKAR T V	76	85	89	132

- The KEEE question paper is formulated by a team of experts and is validated.
- The cut off for the admission via KEEE to KARE is based on the validation of the last three year cut off marks.
- Henceforth the higher quality of the students are very keen interest to get admitted in biotechnology department, Fig 7.43 shows that the top score assessment of students admitted in department of biotechnology.

Name of the student: BASAVA ROHIT		KARE Register No: E20207141	
Marks scored in HSC (out of 100)	Marks scored in KEEE (out of 100)	Overall marks (out of 100)	Rank
65	84.5	74.6	165

For further details contact University's admission office: 04563-289022

Fig 7.42 Student rank statement

KARE EEE

(Top Score in academic year 2018-19, 2019-20, 2020-21, 2021-22)

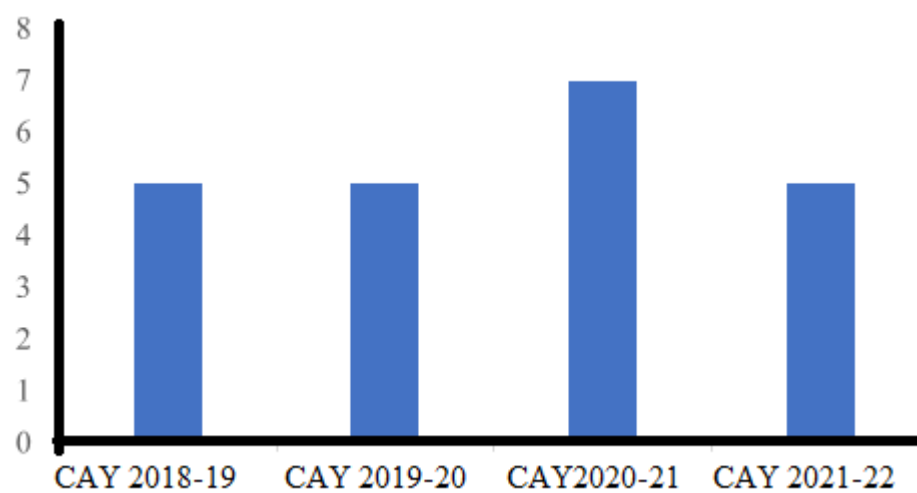


Fig 7.43 Top score assessment



INSTITUTION LEVEL CRITERIA

Criteria-8 – First Year Academics

8.1 First Year Student-Faculty Ratio (FYSFR) (5)

Name of the faculty member	PAN No.	Qualification	Date of Receiving Highest Degree	Area of Specialization	Designation	Date of joining	Teaching load (%)			Currentl y Associat e (Yes/No)	Nature Of Associati on(Regu lar/Cont ract)	Date Of leavi ng(In case Curr ently Assoc iated is 'No')
							CAY 21-22	CAYm1 20-21	CAYm2 19-20			
ANISHA M	CJEP A1703P	ME/M. Tech and PhD	5/1/2018	Bioinformatics	Associate Professor	6/27/2018	100	100	100	Yes	Regular	
NIRMALA DEVI S	BSWPN1263R	M.E/M.Tech	5/1/2018	Genetic Engineering	Assistant Professor	7/1/2019	100	100	0	Yes	Regular	
REKHA M	CDXPR3025E	M.E/M.Tech	5/1/2013	Bioprocess Engineering	Assistant Professor	7/1/2017	100	100	100	No	Regular	5/30/2022
SUSHMITHA M	IVJPS6533J	M.E/M.Tech	6/1/2017	Microbiology	Assistant Professor	7/24/2017	100	100	100	No	Regular	5/30/2022
UPEKSHA T G U	ADOPU6302Q	M.E/M.Tech	5/1/2014	Microbial Technology	Assistant Professor	7/28/2017	100	100	100	Yes	Regular	
VIGNESHWARAN R	AJSPV6897R	M.E/M.Tech	5/1/2013	Molecular Biology	Assistant Professor	7/2/2018	0	100	100	No	Regular	5/28/2021
VIGNESHWARI N	AVXPV1981F	M.E/M.Tech	6/1/2017	Biochemistry	Assistant Professor	6/12/2017	100	100	100	No	Regular	5/30/2022
POORNIMA B	FMOPP1727E	M-E/M-Tech	7/10/2021	Biotechnology	Assistant	7/15/2021	100	0	0	Yes	Regular	

					Professor							
LAKSHMANAN P	ANSPL7514R	M.Sc. and PhD	6/27/2007	Inorganic chemistry	Associate Professor	12/14/2016	0	100	100	No	Regular	5/20/2021
RAJAJEYAGANTHAN R	ALKPR9252N	M.Sc. and PhD	11/13/2012	Physical Chemistry	Assistant Professor	6/12/2017	0	100	100	No	Regular	5/20/2021
RAMESHKUMAR P	CDFPR3481Q	M.Sc. and PhD	9/22/2016	Inorganic chemistry	Assistant Professor	12/14/2016	0	100	100	No	Regular	5/20/2021
KALAIARASI T	EBGPK4165K	M.Sc. and PhD	4/1/2016	Pharmaceutical Chemistry	Assistant Professor	3/2/2020	0	100	0	No	Regular	5/21/2021
RAMALINGAM S	BEKPR9928B	M.Sc. and PhD	7/6/2015	Industrial Chemistry	Professor	9/1/2009	0	100	100	No	Regular	5/25/2021
VELAYUTHAM PILLAI	BIFPP3194Q	M.Sc. and PhD	2/26/2016	Organic Chemistry	Assistant Professor	8/18/2007	0	100	100	No	Regular	5/25/2021
ARUNACHALAM S	ARDPA5318F	M.Sc. and PhD	3/12/2012	Physical Chemistry	Assistant Professor	7/8/2016	0	100	100	No	Regular	5/28/2021
GANGADHARA A	AMKPA3080A	M.Sc. and PhD	3/8/2017	Organic Chemistry	Assistant Professor	6/30/2015	100	100	100	Yes	Regular	
GEETHA D	ASCPG2788H	M.Sc. and PhD	8/9/2016	Industrial Chemistry	Associate Professor	6/12/2017	100	100	100	Yes	Regular	
LAKSHMINARAYANAN P	BIFPP3194Q	M.Sc. and PhD	8/9/2016	Inorganic chemistry	Associate Professor	12/3/2008	100	100	100	Yes	Regular	
NAGARAJAN E R	AGLPN0824E	M.Sc. and PhD	1/25/2001	Polymer Chemistry	Professor	9/1/2000	100	100	100	Yes	Regular	
RAMALINGAN C	BDTPR7626A	M.Sc. and PhD	10/6/2002	Organic Chemistry	Professor	12/3/2002	100	100	100	Yes	Regular	
SELVAPALAM N	DLJPS5567K	M.Sc. and PhD	5/26/1997	Organic Chemistry	Associate Professor	3/2/2000	100	100	100	Yes	Regular	
SIVARANJANA P	DDGPS6521E	M.Sc. and PhD	1/4/2020	Material Chemistry	Assistant Professor	6/13/2008	100	100	100	Yes	Regular	
SUNDARAVEL B	CCQPS6642Q	M.Sc. and PhD	11/5/2014	Organic Chemistry	Assistant Professor	12/12/2016	100	100	100	Yes	Regular	
SWAMINATHAN M	AGEPS5149N	M.Sc. and PhD	5/17/1983	Organic Chemistry	Professor	7/6/2015	100	100	100	Yes	Regular	
SYED ALI FATHIMA S	GFBPS1442N	M.Sc. and PhD	4/3/2021	Inorganic chemistry	Assistant Professor	7/15/2020	100	100	0	Yes	Regular	
DATTATRI K NAGESHA	AUSPN23364	M- Sc-, Ph-D-	1/8/2004	Nanomaterials	Professor	7/1/2021	100	0	0	No	Regular	6/30/2022
PRANEETH K K	FQAPK5641G	M- Sc-, Ph-D-	2/4/2008	Inorganic chemistry	Associate Professor	8/2/2021	100	0	0	Yes	Regular	

THIRUPPATHI M	ATCPT4721E	M- Sc-, M-Phil-, PhD	4/3/2021	Material Chemistry	Assistant Professor	7/1/2021	100	0	0	Yes	Regular	
SIVARAMAKART HIKEYAN R	FCDPS9780P	M- Sc-, Ph-D-	9/15/2021	Organic Chemistry	Assistant Professor	7/1/2021	100	0	0	Yes	Regular	
AMUTHA	DURPA4884L	M- Sc-, Ph-D-	12/8/2006	Industrial Chemistry	Assistant Professor	8/2/2021	100	0	0	Yes	Regular	
STALIN DURAI	HENPS1785C	M- Sc-, Ph-D-	4/12/2018	Organic Chemistry	Assistant Professor	8/2/2021	100	0	0	Yes	Regular	
KUMERESAN M	HCFPM9248Q	M- Sc-, Ph-D-	11/11/2020	Material Chemistry	Assistant Professor	8/2/2021	100	0	0	Yes	Regular	
PANDIAN C	BUEPP2487M	M.E/M.Tech	6/20/2010	Cloud Computing	Assistant Professor	7/2/2018	0	100	100	No	Regular	5/18/2021
VEERAPATHIRAN S	APIPV1877K	M.E/M.Tech	8/6/2012	Cloud Computing	Assistant Professor	7/2/2018	0	100	100	No	Regular	5/18/2021
ELAVARASI G	ABQPE3828D	M.E/M.Tech	1/4/2020	Wireless Sensor Networks	Assistant Professor	7/1/2019	0	100	100	No	Regular	5/20/2021
KATHIRVEL S	EFVPK3542H	M.E/M.Tech	9/25/2014	Internet of Things	Assistant Professor	6/18/2014	0	100	100	No	Regular	5/22/2021
SUBBULAKSHMI	BUOPS4152C	M.E/M.Tech	8/21/2010	Data Mining	Assistant Professor	7/1/2010	0	100	100	No	Regular	5/22/2021
GURULAKSHMI K	AUFPG1391R	M.E/M.Tech	10/29/2018	Networks and Security	Assistant Professor	7/2/2018	0	100	100	No	Regular	6/30/2021
SAHILA T	CMUPS7244A	M.E/M.Tech	8/21/2013	Data Mining	Assistant Professor	6/19/2018	0	100	100	No	Regular	6/30/2021
GLORY A	DHMPG8498E	M.E/M.Tech	5/8/2020	Networks and Security	Assistant Professor	7/13/2020	100	100	0	Yes	Regular	
MANJUNATH T	BUYPM7523B	M.E/M.Tech	9/3/2011	Data Science	Assistant Professor	8/1/2020	100	100	0	Yes	Regular	
PARVATHA DEVI R	AVMPP9361L	M.E/M.Tech	8/21/2010	Cloud Computing	Assistant Professor	6/19/2018	100	100	100	Yes	Regular	
PONSURESH M	BEJPP2423Q	M.E/M.Tech	4/18/2009	Networks and Security	Assistant Professor	6/19/2018	100	100	100	Yes	Regular	
SUMATHI G	EGSPS2254E	M.E/M.Tech	9/3/2011	Cloud Computing	Assistant Professor	7/2/2018	100	100	100	Yes	Regular	
SMRITHY G S	FQAPS2652P	ME/M- Tech and PhD	4/22/2021	Data Science	Associate Professor	7/20/2021	100	0	0	No	Regular	6/27/2022
BALAJI C	BFSPB4768J	ME/M- Tech and PhD	6/30/2019	Networks & Security	Associate Professor	7/20/2021	100	0	0	No	Regular	6/27/2022
MOHD- USAMA	ACYPU5228N	ME/M- Tech	6/28/2020	Deep Learning	Associate	7/20/2021	100	0	0	No	Regular	5/30/

		and PhD			Professor							2022
MUTHULAKSHMI M	DSVPM7592F	M-E/M-Tech	4/30/2016	Image Processing	Assistant Professor	7/30/2021	100	0	0	Yes	Regular	
SURESH KUMAR S	DLAPS4033M	M-E/M-Tech	6/30/2014	Cloud Computing	Assistant Professor	7/30/2021	100	0	0	Yes	Regular	
MALATHI V	COJPM1368A	M-E/M-Tech	5/31/2016	Artificial Intelligence	Assistant Professor	7/6/2021	100	0	0	No	Regular	5/29/2022
VETRI SELVI V S	CEUPV4213G	M-E/M-Tech	5/31/2021	Machine Learning	Assistant Professor	7/6/2021	100	0	0	Yes	Regular	
KIRTHIGA N	BOFPK8117L	M-E/M-Tech	6/30/2014	Machine Learning	Assistant Professor	7/6/2021	100	0	0	Yes	Regular	
BAVANI K	DAZPB2825Q	M-E/M-Tech	4/30/2020	Deep Learning	Assistant Professor	7/6/2021	100	0	0	Yes	Regular	
RADHIKA NAMBIAR	BJGPN3489Q	M-E/M-Tech	5/22/2021	Machine Learning	Assistant Professor	8/13/2021	100	0	0	No	Regular	5/30/2022
RAJIB DEBNATH	CFIPD0547J	M-E/M-Tech	6/30/2013	Image Processing	Associate Professor	8/13/2021	100	0	0	No	Regular	5/30/2022
MOHANDAS R	AMFPR4996K	M-E/M-Tech	12/15/2020	IoT	Associate Professor	6/15/2021	100	0	0	No	Regular	6/27/2022
MARIA SHANTHI J	CGVPM6683A	M-E/M-Tech	4/26/2012	Networks & Security	Assistant Professor	6/15/2021	100	0	0	Yes	Regular	
SYED ALI FATHIMA R	BSIPS0707D	M-E/M-Tech	6/30/2016	Machine Learning	Assistant Professor	6/15/2021	100	0	0	Yes	Regular	
SURENDIRAN MUTHUKUMAR D	DOEPS4095L	M-E/M-Tech	6/30/2015	Networks & Security	Assistant Professor	7/1/2021	100	0	0	Yes	Regular	
PRASANTH S	DVXPP4250C	M-E/M-Tech	5/31/2021	Machine Learning	Assistant Professor	7/1/2021	100	0	0	No	Regular	5/30/2022
KALAIARASI P	BDYPK3797E	M-E/M-Tech	5/12/2011	Data Science	Assistant Professor	7/30/2021	100	0	0	Yes	Regular	
KARUPPASAMY PANDIAN M	DHOPK8636L	M.E/M.Tech	6/5/2014	Power System	Assistant Professor	6/22/2015	100	100	100	Yes	Regular	
PRIYA P	AXEPP2874L	M.E/M.Tech	5/30/2010	Power Electronics and Drives	Assistant Professor	6/22/2016	100	100	100	Yes	Regular	
RAJENDRAN S	BCGPR5179G	M.E/M.Tech	6/10/2011	Power Electronics and Drives	Assistant Professor	7/1/2011	100	100	100	Yes	Regular	
RAJESH K	AORPR0656Q	ME/M. Tech and PhD	3/1/2018	Power System	Associate Professor	7/27/2011	100	100	100	Yes	Regular	

SHILAJA C	BQVPS2054Q	ME/M. Tech and PhD	4/5/2018	Power System	Assistant Professor	7/9/2018	100	100	100	Yes	Regular	
VIJAYAKUMAR K	ANGPV8484Q	ME/M. Tech and PhD	12/11/2021	Power Electronics and Drives	Associate Professor	7/1/2011	100	100	100	Yes	Regular	
VINOTH KUMAR V	AMIPV6813E	ME/M-TECH	20-07-2013	Power Electronics and Drives	Assistant Professor	7/1/2021	100	0	0	Yes	Regular	
GURUSAMY K	AKZPG1047L	M.A and Ph.D	8/18/2017	English Language Teaching	Assistant Professor	10/7/1997	100	100	100	Yes	Regular	
HARIHARASUDAN A	AEHPH0160B	M.A and Ph.D	3/5/2018	English Language and Literature	Assistant Professor	1/2/2010	100	100	100	Yes	Regular	
HEPSIBA S	AWNPH6935J	M.Phil	3/19/2016	Common Wealth Literature	Assistant Professor	6/1/2016	100	100	100	Yes	Regular	
JOTHI C	BJSPJ0464K	M.A and Ph.D	10/23/2013	Latin American Literature	Assistant Professor	6/1/2016	100	100	100	Yes	Regular	
KANNAN R	BGWPK8723R	M.A and Ph.D	8/12/2009	English Language Teaching	Assistant Professor	7/1/2004	0	100	100	No	Regular	5/6/2021
MOHAN S	AXGPM2867C	M.A and Ph.D	6/13/2013	African American Literature	Assistant Professor	7/8/2015	100	100	100	Yes	Regular	
PANDIA RAJAMMAL P	CCLPP3080Q	M.A and Ph.D	7/14/2017	Comparative Literature	Assistant Professor	6/12/2017	100	100	100	Yes	Regular	
RAMKUMAR E V	BXLPR8008J	M.A and Ph.D	4/14/2014	English Language Teaching	Assistant Professor	6/1/2016	100	100	100	Yes	Regular	
REMA DEVI S	AJVPD3399K	M.A and Ph.D	1/11/2016	India Writing	Assistant Professor	6/12/2017	100	100	100	Yes	Regular	
ARAVIND B R	AXZPA9295R	M-A	7/17/2014	English Language Teaching	Assistant Professor	7/1/2021	100	0	0	Yes	Regular	
NAGARAJAN K	AAWPN0715D	M.Sc. and PhD	5/1/2010	Graph Theory	Assistant Professor	6/12/2017	0	100	100	No	Regular	5/6/2021
AMMAKKANNU G	AOVPA8259A	M.Phil	4/1/2008	Algebra	Assistant Professor	7/1/2002	0	100	100	No	Regular	5/25/2021

ANITHA M	BTNPA4382A	M.Phil	6/25/2015	Graph Theory	Assistant Professor	7/17/2020	0	100	0	No	Regular	5/25/2021
HEMALATHA S V	ACPPH5737G	M.Sc. and PhD	10/1/2017	Fluid Dynamics	Assistant Professor	6/12/2017	0	100	100	No	Regular	5/25/2021
KARUNAKARAN P	EFDPK3188H	M.Phil	4/1/2013	Topology	Assistant Professor	6/29/2013	0	100	100	No	Regular	5/25/2021
NIRMALA K	AMTPN5584H	M.Sc. and PhD	5/17/2017	Differential Equations	Assistant Professor	6/3/2019	0	100	100	No	Regular	5/25/2021
PRABHU C	CZSPP1923Q	M.Phil	7/1/2019	Fuzzy Topology	Assistant Professor	12/29/2010	0	100	100	No	Regular	5/25/2021
PRAKASH B	CYFPP7043B	M.Sc. and PhD	4/18/2018	Topology	Assistant Professor	6/29/2015	0	100	100	No	Regular	5/25/2021
RAJAKUMAR S	AFOPR8593L	M.Sc. and PhD	11/1/2015	Topology	Assistant Professor	6/25/2017	0	100	100	No	Regular	5/25/2021
SANKARA NARAYANAN P	GLZPS0006N	M.Phil	5/1/2015	Algebraic Graph Theory	Assistant Professor	6/29/2015	0	100	0	No	Regular	5/25/2021
SARAVANAKUMAR S	HDTPS3739D	M.Sc. and PhD	7/28/2017	Graph Theory	Assistant Professor	5/4/2011	0	100	100	No	Regular	5/25/2021
SARAVANAN M	GXDPS4198R	M.Sc. and PhD	12/8/2017	Graph Theory	Assistant Professor	6/29/2015	0	100	100	No	Regular	5/25/2021
SUTHERSAN P	DCUPS6588E	M.Phil	10/1/2016	Statistics	Assistant Professor	6/29/2015	0	100	100	No	Regular	5/25/2021
MERLIN S	BSLPM4085R	M.Phil	4/1/2000	Graph Theory	Assistant Professor	6/18/2000	0	100	100	No	Regular	6/4/2021
AHILA A	BBSPA8104R	M.Phil	12/1/2007	Graph Theory	Assistant Professor	9/8/2014	100	100	100	Yes	Regular	
INDIRA K	AENPI3699N	M.Sc. and PhD	3/2/2015	Differential Equations	Assistant Professor	7/10/2020	100	100	0	Yes	Regular	
KAMESWARI M	AINPK7170L	M.Sc. and PhD	11/19/2012	Fuzzy Topology	Assistant Professor	8/10/2020	100	100	0	Yes	Regular	
MATHESWARAN M	AWWPM4526B	M.Phil	5/9/2009	Topology	Assistant Professor	6/27/2018	100	100	100	Yes	Regular	
MUTHUSUBRAMANIAN L	BHRPM3435Q	M.Phil	6/15/2018	Graph Theory	Assistant Professor	12/2/2019	0	100	0	No	Regular	6/30/2021
RADHA S	DUTPK9909J	M.Sc	8/21/2010	Queuing Theory	Assistant Professor	6/23/2018	100	100	100	Yes	Regular	
SHUNMUGA PRIYA B	CPAPS9484M	M.Phil	4/25/2007	Statistical Quality Control	Assistant Professor	11/26/2019	100	100	0	Yes	Regular	
YEGNANARAYA	AANPY2356	ME/M. Tech	3/6/1997	Graph Theory	Professor	2/22/2021	100	100	0	Yes	Regular	

NAN V	A	and PhD										
DEVIKA V	HDBPD3424E	M-Sc-, M-Phil-, Ph-D	12/22/2021	Statistical Quality Control	Assistant Professor	7/1/2021	100	0	0	Yes	Regular	
HYDER ABBAS RIZVI	BVRPR8658A	M-Sc-, M-Phil-, Ph-D	4/8/2017	Variational inequalities	Assistant Professor	8/2/2021	100	0	0	Yes	Regular	
KARTHICK P	BRUPK8581N	M-Sc-, M-Phil-, Ph-D	4/30/2018	Fuzzy Graph Theory	Assistant Professor	8/3/2021	100	0	0	Yes	Regular	
MUTHUKANI VAIRAVEL T	AXLPM3477F	M-Sc-, M-Phil-, Ph-D	7/6/2021	Graph Theory	Assistant Professor	8/3/2021	100	0	0	Yes	Regular	
SRIDEVI S	BLXPS6433G	M-Sc-, M-Phil-, Ph-D	2/28/2017	Queueing Theory	Assistant Professor	8/3/2021	100	0	0	Yes	Regular	
RAJESHKUMAR MOHAPATRA	CGGPM8080A	M-Sc-, M-Phil-, Ph-D	7/19/2021	Fuzzy Set Theory	Assistant Professor	8/3/2021	100	0	0	Yes	Regular	
ASHA N	EHUPA3250P	M-Phil	4/30/2019	Graph Theory	Assistant Professor	8/3/2021	100	0	0	Yes	Regular	
CHITRA G	BGNPC9337E	M-Sc-, M-Phil-, Ph-D	7/28/2021	Graph Theory	Assistant Professor	8/4/2021	100	0	0	Yes	Regular	
ANUSHRAJ B	CBTPB0771R	M.E/M.Tech	11/14/2014	Energy engineering	Assistant Professor	5/10/2018	0	0	100	No	Regular	5/26/2020
GOWTHAM RAJAN A	VJWPV0086Q	M.E/M.Tech	10/8/2016	Automobile Engineering	Assistant Professor	5/23/2016	100	100	100	No	Regular	5/16/2022
GOWTHAMAN S	BCPPG7251K	ME/M. Tech and PhD	1/17/2017	Internal Combustion Engineering	Associate Professor	6/12/2017	100	100	0	Yes	Regular	
JESSY MICHLA J R	AVTPJ2479A	M.E/M.Tech	1/5/2013	CAD	Assistant Professor	5/1/2018	0	0	100	No	Regular	5/26/2020
KARTHIK K	BMAPK7107H	ME/M. Tech and PhD	7/27/2021	CFD	Associate Professor	7/2/2018	100	100	100	No	Regular	5/6/2022
KARTHIKEYAN S	BDFPK5392C	ME/M. Tech and PhD	5/16/2017	Production Engineering	Associate Professor	6/1/2009	100	100	100	Yes	Regular	
KOPPIAHRAJ K	EPJPK6428G	M.E/M.Tech	11/27/2016	CAD CAM	Assistant Professor	5/16/2018	0	100	100	No	Regular	5/25/2021
SANKAR J	GICPS0490A	M.E/M.Tech	9/9/2015	Nano Science and Nano Technology	Assistant Professor	5/16/2018	0	0	100	No	Regular	5/26/2020
SARATHKUMAR SEBASTIN J	AZNPJ1008K	M.E/M.Tech	5/5/2017	Solid Propulsion	Assistant Professor	6/12/2017	100	100	0	Yes	Regular	
SENTHILMUTHU KUMAR T	CVBPS1817D	ME/M. Tech and PhD	10/28/2018	Automotive Engineering	Associate Professor	1/2/2010	100	100	100	Yes	Regular	

SHYAMLAL C	DIWPS3034K	M.E/M.Tech	6/10/2011	Production Engineering	Assistant Professor	5/1/2018	0	100	100	No	Regular	5/25/2021
SIVASUBRAMANI AN M	AXOPS8894F	ME/M. Tech and PhD	10/16/2016	Production Engineering	Associate Professor	6/5/2008	100	100	100	Yes	Regular	
VELMURUGAN K	BJFPV3765C	M.E/M.Tech	8/31/2017	Manufacturing Engineering	Assistant Professor	5/12/2017	0	100	100	No	Regular	5/27/2021
Dr.G. Kalusuraman	AZZPK9807F	ME/M- Tech and PhD	5/9/2017	Manufacturing Engg	Associate Professor	6/4/2009	100	0	0	Yes	Regular	
Mr. M. ManojPrabhakar	AXRPM3548F	M-E/M-Tech	6/8/2011	CAD/CAM	Assistant Professor	1/12/2012	100	0	0	Yes	Regular	
Mr. G. Poomarimuthukumar	ATZPP6870D	M-E/M-Tech	6/7/2005	Manufacturing Engg	Assistant Professor	5/2/2016	100	0	0	Yes	Regular	
ARIVARASAN A	BYPPA4607P	M.Sc. and PhD	10/20/2014	Nanotechnology	Associate Professor	7/4/2016	100	100	100	Yes	Regular	
ASATH BAHADUR S	AENPA1181R	M.Sc. and PhD	12/8/1994	Crystal Growth	Professor	3/2/1998	100	100	100	Yes	Regular	
DEVENDRAN P	ANYPD2662C	M.Sc. and PhD	4/4/2016	Nanomaterials	Assistant Professor	6/12/2017	100	100	100	Yes	Regular	
JEYA VIJAYAN S	BAYPJ8153J	M.Sc. and PhD	7/20/2014	Spectroscopy	Assistant Professor	6/20/2006	100	100	100	Yes	Regular	
KRISHNA KUMAR M	AXOPK2479A	M.Sc. and PhD	3/26/2015	Nonlinear Optics	Assistant Professor	7/2/2015	100	100	100	Yes	Regular	
MUTHU VINAYAGAM M	ASQPM9491F	M.Sc. and PhD	6/26/2015	Polymer Electrolytes	Associate Professor	10/4/2002	0	100	100	No	Regular	5/25/2021
NAIDU DHANPAL JAYRAM	AHEPN8689H	M.Sc. and PhD	12/3/2015	Plasmonics	Assistant Professor	7/2/2018	100	100	100	Yes	Regular	
NALLAMUTHU N	AOVPN9174P	M.Sc. and PhD	10/17/2012	Electrochemical Energy Storage Devices	Associate Professor	7/1/2011	100	100	100	Yes	Regular	
REVATHY M S	ARLPR4734J	M.Sc. and PhD	12/9/2016	Thin Film	Assistant Professor	6/5/2017	100	100	100	Yes	Regular	
SARAVANAKUMAR S	FDMPS1972M	M.Sc. and PhD	8/27/2015	Optoelectronic Materials	Assistant Professor	9/19/2009	100	100	100	Yes	Regular	
SASIKUMAR S	HVFPS1260H	M.Sc. and PhD	12/14/2018	Ceramic Materials	Assistant Professor	6/20/2020	100	100	0	Yes	Regular	
SELVA RENGAN P	CVHPS2083R	M.Sc. and PhD	6/17/2005	Spectroscopy	Associate Professor	10/30/2006	100	100	100	Yes	Regular	
SRIKUMAR S R	BTMPS8537G	M.Sc. and	1/22/1998	Solar Cell and	Professor	7/1/1984	100	100	100	Yes	Regular	

		PhD		Thin Films								
THANGARASU S	AILPT3807H	M.Sc. and PhD	4/11/2017	Spectroscopy	Assistant Professor	7/14/2007	100	100	100	Yes	Regular	
THEIVA SANTHI T	AHEPT8110F	M.Sc. and PhD	12/14/2014	Nanomaterials	Associate Professor	11/1/2001	100	100	100	Yes	Regular	
VANITHA D	AGUPV6818M	M.Sc. and PhD	12/5/2016	Polymer Electrolytes	Assistant Professor	8/8/2007	100	100	100	Yes	Regular	
VISWANATHAN K	ABNPV6689C	M.Sc. and PhD	11/29/1989	Spectroscopy	Professor	8/17/2017	0	100	100	No	Regular	5/25/2021
INDIRA DEVI M P	AFOPI3777H	M-Sc-, M-Phil-, Ph-D	6/28/2019	Polymer Composites	Assistant Professor	7/1/2021	100	0	0	No	Regular	5/30/2022
SANDEEP AASHISH	BDTPA4390N	M-Sc-, Ph-D	7/17/2020	Cosmology	Assistant Professor	7/1/2021	100	0	0	No	Regular	6/10/2022
Dr. S. MARAGATHA SUNDARI	AUXPS6060P	M-Sc-, M-Phil-, Ph-D	8/16/2016	Queuing Theory	Assistant Professor	6/1/2016	100	0	0	Yes	Regular	
PRIYA NAIR	ANZPN9807E	M-Sc-, M-Phil-, Ph-D	4/16/2021	Stochastic Differential Equations	Assistant Professor	7/1/2021	100	0	0	No	Regular	5/30/2022
MANIVANNAN M	GTRPM3998B	M-Sc-, M-Phil-, Ph-D	10/8/2021	Complex Analysis	Assistant Professor	7/1/2021	100	0	0	No	Regular	5/30/2022
SRIRAMAN R	FYNPS7271D	M-Sc-, M-Phil-, Ph-D	1/6/2020	Stability Analysis	Assistant Professor	8/3/2021	100	0	0	No	Regular	5/30/2022
AMRITHA V C	BPIPA4644E	M-Sc-, M-Phil-, Ph-D	3/18/2021	Algebraic Graph Theory	Assistant Professor	8/3/2021	100	0	0	No	Regular	5/30/2022
TAMILVANAN K	AWJPT1536F	M-Sc-, M-Phil-, Ph-D	9/30/2021	Functional Equations	Assistant Professor	8/3/2021	100	0	0	No	Regular	5/30/2022

Academic Year	No. of Students (Approved Strength) (N)	No. of Faculty (Considering Fractional Load) (F)	FYSFR(N/F)	Assessment (5x20)/FYSFR (Limited to 5)
2019-2020	1290	88	15	5
2020-2021	1470	100	15	5
2021-2022	1590	110	15	5
Average	1450	99	15	5

8.2 Qualification of Faculty Teaching First Year Common Courses (5)

Academic Year	No. of Regular Faculty with Ph.D. (X)	No. of Regular faculty With Post-Graduation(Y)	RF (No. of Faculty required for SFR 1:20)	Assessment for faculty Qualification ((5x+3Y)/RF)
2019-2020	52	37	65	5
2020-2021	57	39	74	5

2021-2022	70	40	80	5
Average Assessment				5

8.3 First Year Academic Performance (10)

Academic Performance	2020-2021	2019-2020	2018-2019
Mean of CGPA (X)	7.8	7.46	6.81
Total no. of Successful students (Y)	1228	1160	752
Total No. of Students appeared for the Examinations (Z)	1228	1160	752
API [(X*(Y/Z))]	7.8	7.46	6.81
Assessment - Average	7.356		

8.4. Attainment of Course Outcomes of first year courses (10)

8.4.1. Describe the assessment processes used to gather the data upon which the evaluation of Course Outcomes of first year is done (5)

A. Assessment tools for evaluation of Course Outcomes (COs)

The data collection process for the attainment of Course Outcomes begins from the collection of the relevant data using various assessment tools. Most of the data for the direct attainment are collected from written examinations. In the regulation for 2020-2021 admitted batches, the written examination includes sessional examinations, semester end examinations and descriptive assignments. The next major form of assessment methodology is practical based examinations which examines the ability of the students to solve the problems. Some of the other data collection techniques include quizzes using online tools, seminars, paper presentations, projects, model creation, etc. During the evaluation process, data collection tools represented above is coming under the head of assignment. The list of tools adapted for the data collection is listed in the Table 8.4.

Table 8.4 Assessment Tools for data collection process to evaluate Course Outcome (COs)

Evaluation tool	Description
THEORY COURSES	
Sessional Examinations (SE) (Online)	<p>For the 2020-2021 admitted batch, there are 2 sessional examinations (online mode) conducted and both focuses on attainment of each course outcome during the semester.</p> <p>Question pattern for sessional examination I:</p> <p>Multiple choice questions (MCQs) = 40</p> <p>The marks scored by the students are converted into 100. Both CO1 and CO2 are equally weighted (20 MCQs from each COs).</p> <p>Further, among the 40 MCQs, 10 MCQs are common for the all the students to measure the CO attainment</p>

	<p>and they are equally weighted as well (i.e., CO1 = 5 Questions and CO2 = 5 Questions).</p> <p>Question pattern for sessional examination II:</p> <p>Multiple choice questions (MCQs) = 40</p> <p>The marks scored by the students are converted into 100. Both CO3 and CO4 are equally weighted (20 MCQs from each COs).</p> <p>In addition, among the 40 MCQs, 10 MCQs are common for the all the students to measure the CO attainment and they are also equally weighted (i.e., CO3 = 5 Questions and CO4 = 5 Questions).</p>
<p>Assignments (ASS)</p>	<p>Assignments are given by the faculty in order to inspect the level of understanding of the students during study. Some of the assignments utilized for the evaluations are descriptive type ones, quizzes using online tools, seminars, mini projects, models creation, etc.</p> <p>Assignment: 50marks:</p> <p>For each COs, a minimum of one assignment is given and the total marks secured by the students for a particular CO is converted as the cumulative marks out of 10 and stored.</p> <p>By adopting similar strategy, marks for rest of the COs are gathered.</p> <p>COs evaluated: CO1, CO2, CO3, CO4 and CO5.</p> <p>Question pattern for assignment:</p>

	<p>No specific question pattern for the assignments is suggested, however, the course coordinator can guide the course faculty in connection with the same.</p> <p>Specifically in the pandemic, the entire faculty used the online module such as Google classroom to manage assignments.</p>
<p>Semester End Examination (University level evaluation) (SEE) (Online)</p>	<p>In the case of semester end examinations conducted through online mode, multiple choice questions (MCQs) are used.</p> <p>Semester End Examination: 100 marks</p> <p>Question pattern for semester end examination:</p> <p>Multiple choice questions (MCQs) = 80</p> <p>The marks secured by the students are converted into 100. The entire COs such as CO1, CO2, CO3, CO4 and CO5 are almost equally weighted.</p> <p>Further, among the 80 MCQs, 25 MCQs are common for the all the students in order to evaluate the CO attainment. The entire COs such as CO1, CO2, CO3, CO4 and CO5 are equally weighted.</p>
LABORATORY BASED COURSES	
<p>Continuous Internal Evaluation (Practical)</p>	<p>For the online mode of continuous internal evaluation (Practical), virtual labs, online compilers, mobile based CAD tools etc. are commonly used.</p>

(CIEP) (Online)	<p>Continuous Internal Evaluation: 50 marks</p> <p>Internal marks secured by the students for a particular CO is converted as the cumulative marks out of 10 and stored.</p> <p>Similar approach has been adopted for the entire COs such as CO1, CO2, CO3, CO4 and CO5.</p>
Semester End Practical (SEP) (Online)	<p>The semester end practical examination (online mode) is conducted at the end of the semester for 3 hours. It is evaluated based on rubrics framed by the course coordinator for the corresponding laboratory course.</p> <p>Semester End Practical Examination: 100marks</p> <p>Semester end practical examination marks secured by the students for a particular CO is converted as the cumulative marks out of 20 and stored.</p> <p>Similar strategy has been adopted for the entire COs such as CO1, CO2, CO3, CO4 and CO5.</p>
SURVEYS	
COURSE END SURVEY	<p>At the end of every semester, each student is asked to provide a feedback report on the courses he/she has studied with assigned rubrics. The course end survey is assessed based on rubrics which are designed by the course coordinator.</p> <p>Course End Survey: 5-point scale evaluation</p>

	<p>COs evaluated: CO1, CO2, CO3, CO4 and CO5.</p> <p>During the study period of virtual mode, the surveys are collected through online forms such as Google forms etc.</p>
--	---

B. Types of the courses and their evaluation weightage

The courses are categorized into four major types based on the knowledge level need to be inculcated to the students.

1. Theory courses (T)
2. Laboratory courses (P)
3. Theory with practice courses (TP)
4. Integrated courses (IC)

The weightage for evaluation of the course outcomes for each course is different and the same is furnished in the Table 8.5.

Table 8.5 Weightage for the evaluation of the course outcomes

Type of course	INTERNAL				EXTERNAL			OA
	SE	ASS	CIEP	Total	SEE	SEP	Total	Total
Theory courses	35	15		50	50		50	100
Practical Course			50	50		50	50	100
Theory with Practical	20	15	15	50	50		50	100
Integrated course	20	15	15	50	30	20	50	100

*OA = Overall attainment

C. Illustration of CO attainment procedure

There are 5 COs for each course in the curriculum. The following procedure shows the calculation of CO attainment for a single CO of a course.

- STEP 1. Setting Benchmark score for the course
- STEP 2. Setting the level of attainment of the course
- STEP 3. Selection of weightage for the respective course
- STEP 4. Calculating Cumulative internal mark for the course
- STEP 5. Calculating Cumulative external mark for the course
- STEP 6. Calculating Cumulative total mark for the course
- STEP 7. Calculation of number of students attained
- STEP 8. Calculation of percentage of students attained
- STEP 9. Calculation of level of CO assessment
- STEP 10. Calculation of Direct CO attainment by considering average attainment of all COs

8.4.2. Record the attainment of Course Outcomes of all first-year courses (5)

The list of basic courses offered from humanities, sciences and engineering to the first year UG students in the academic year 2020-2021 is depicted in Table 8.6a. In total, there are 23 courses offered in the first year for various branches.

The PO attainment calculation for the first-year academics is based on the basic courses offered in both the semesters.

The CO attainment for all the courses imparted in the first year are calculated based on the steps provided above and the outcomes are furnished in Table 8.6b.

Table 8.6a List of basic courses offered to first year students (2020-2021 admitted batches)

S. No	Course Code	Course name
1	BIT18R101	Biology for Engineers
2	ECE18R171	Electronic devices
3	CHY18R171	Chemistry
4	CSE18R171	Programming for Problem Solving
5	CSE18R153	Programming in C
6	CSE18R108	IT Infrastructure Landscape Overview
7	CSE18R174	Computer Architecture and Organization
8	CSE18R254	Introduction to Python Programming

9	EEE18R171	Basic Electrical and Electronics Engineering
10	EEE18R172	Basic Electrical Engineering
11	HSS18R151	English for Technical Communication
12	MAT18R101	Calculus and Linear Algebra
13	MAT18R102	Multiple Integration, Ordinary Differential Equations and Complex Variable
14	MAT18R103	Multiple Integration, Ordinary Differential Equations and Vector Spaces
15	MAT18R104	Multiple Integration, Ordinary Differential Equations, probability and statistics
16	MEC18R151	Engineering Graphics and Design
17	MEC18R152	Engineering Practice
18	PHY18R171	Introduction to Electromagnetic Theory
19	PHY18R172	Introduction to Mechanics
20	PHY18R173	Oscillations, Waves and Optics
21	PHY18R174	Semiconductor Physics
22	PHY18R175	Optics, Electromagnetism and Quantum Mechanics
23	PHY18R176	Physics for Biotechnology

Table 8.6b Consolidation of CO attainment for the first year students (2020-2021 admitted batches)

S. No	Course Code	Course name	Benchmark	CO attainment
1	BIT18R101	Biology for Engineers	50	2.20
2	ECE18R171	Electronic Devices	70	2.60
3	CHY18R171	Chemistry	70	1.20
4	CSE18R171	Programming for Problem Solving	70	1.20
5	CSE18R153	Programming in C	70	2.80
6	CSE18R108	IT Infrastructure Landscape Overview	65	2.20
7	CSE18R174	Computer Architecture and Organization	65	2.60
8	CSE18R254	Introduction to Python Programming	65	1.60
9	EEE18R171	Basic Electrical and Electronics Engineering	70	2.20
10	EEE18R172	Basic Electrical Engineering	65	1.40
11	HSS18R151	English for Technical Communication	65	2.80
12	MAT18R101	Calculus and Linear Algebra	55	1.80
13	MAT18R102	Multiple Integration, Ordinary Differential Equations and Complex Variable	55	1.60
14	MAT18R103	Multiple Integration, Ordinary Differential Equations and Vector Spaces	60	1.60
15	MAT18R104	Multiple Integration, Ordinary Differential Equations, Probability and Statistics	55	2.60
16	MEC18R151	Engineering Graphics and Design	70	1.60

17	MEC18R152	Engineering Practice	70	2.00
18	PHY18R171	Introduction to Electromagnetic Theory	70	2.60
19	PHY18R172	Introduction to Mechanics	70	1.20
20	PHY18R173	Oscillations, Waves and Optics	70	1.80
21	PHY18R174	Semiconductor Physics	70	1.80
22	PHY18R175	Optics, Electromagnetism and Quantum Mechanics	70	1.60
23	PHY18R176	Physics for Biotechnology	70	1.60

STEP 1. Setting Benchmark score for the course:

The benchmark score is fixed by taking approximation of previous end semester marks average during first meeting of the course coordinators at the beginning of the course.

BIT18R101-Biology for Engineer was taken as an example, threshold value/benchmark value decided in the course coordinator minutes and the same is highlighted in the attainment sheet.

0887

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z AA AB AC AD AE AF AG AH AI AJ AK AL AM AN AO

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Krishnankudi - 626 126

Course Title
Biology for Engineers

Course code
BIT18R101

Course Type
Theory

Year of examination
1

Batch
2020

Assessment Mechanism (CO)

CO / Exam	SE	ASS	SPE	TOT	ESE	EPE	TOT	OA
CO1	15	15	0	30	30	0	30	100
CO2	15	15	0	30	30	0	30	100
CO3	15	15	0	30	30	0	30	100
CO4	15	15	0	30	30	0	30	100
CO5	30	0	30	30	0	30	100	

Verification status	
Verified By	Approved By

Correlation	PO									
	1	2	3	4	5	6	7	8	9	10
CO No.	1	2	2	2	3					
	2	3	2	1	2					
	3	3	2	3	2					
	4	3	2	1	3					
	5	3	2	2	3					
Att. Mat.	2.8	2		2.6	2.6					
Att. Mat.)	3	2		3	3					

Threshold value

50

CO ATTAINMENT

CO No.	DIRECT	CIE	EXT	TOT	CUM	INDIRECT	TOT
	1	2	2	2	2	2.1	2.1
2	2	2	1	1.5	2	2.3	2.3
3	1	2	1.5	2	2	2.9	2.9
4	1	1	1	1	2	2.1	2.1
5	3	4	1	2	3	2.5	2.5
Average attainment	1.8	2.2	1.2	1.5	2.2	2.2	2.2

PO ATTAINMENT

Direct	PO									
	1	2	3	4	5	6	7	8	9	10
Att.	1	2	3	4	5	6	7	8	9	10
	2.2	2.2	2.2	2.2	2.2					
Indirect										
	1	2	3	4	5	6	7	8	9	10
Att.	1	2	3	4	5	6	7	8	9	10
	2.4	2.4	2.4	2.4	2.4					

Attainment Levels fixed for the class			
	I	M	% Students reached the threshold value
L5	Level 0		in Between 0 - 60
S	Level 1	Low	in Between 60 - 70
G	Level 2	Mid	in Between 70 - 80
E	Level 3	High	in Between 80 - 100

L5-Less Satisfactory, S-Satisfactory, G-Good, E-Excellent,
 I-Indication, M-Level of Correlation

CO-Course Outcome, CIE-Continuous Internal Evaluation, EXT-University
 End Evaluation, TOT-TOTAL

PO-Program Outcome, Att. Mat.-Program Articulation Matrix, A-
 Attainment

BIT18R101, ECE18R171, CHY18R171, CSEN18R171

CSE18R151, CSE18R108

CSE18R174, CSE18R254

ECE18R171, ECE18R172

MECH18R101, MAT18R101

MAT18R102, MAT18R103

MAT18R104, MAT18R105

MAT18R106, MAT18R107

MAT18R108, MAT18R109

MAT18R110, MAT18R111

MAT18R112, MAT18R113

MAT18R114, MAT18R115

MAT18R116, MAT18R117

Fig. 1.Snapshot of Benchmark score in the attainment

STEP 2. Setting the level of attainment of the course:

The level of attainment of the course is based on the capability of the students during the entry of the course.

For 2020-2021 admitted batch, the attainment level for the students was fixed as shown in the following snapshot, the same has been decided in the meeting of the course coordinators.

Attainment Levels fixed for the class						
		I	M	% Students reached the threshold value		
L	Level	0		in Between	0	60
S	Level	1	Low	in Between	60	70
G	Level	2	Mid	in Between	70	80

E	Level	3	High	in Between	80	100	
*LS-Less Satisfactory, S-Satisfactory, G-Good, E-Excellent, I-Indication, M-Level of Correlation							

Course Title										Course code										Course Type										Year of examination																																																																																																			
Biology for Engineers										BIT18R101										Theory										1																																																																																																			
Assessment Methodology (%)	CO / Exam		INTERNAL				EXTERNAL				OA		Verification status										Correlation																																																																																																										
			SE	ASS	IPE	TOT	ESE	EPE	TOT	TOT	Verified By										Approved By																																																																																																												
	CO1		35	15	0	50	50	0	50	100																																																																																																																							
	CO2		35	15	0	50	50	0	50	100																																																																																																																							
	CO3		35	15	0	50	50	0	50	100																																																																																																																							
	CO4		35	15	0	50	50	0	50	100																																																																																																																							
	CO5		35	15	0	50	50	0	50	100																																																																																																																							
Threshold value										CO ATTAINMENT										PO ATTAINMENT																																																																																																													
(i.e., Set attainment level values decided in the Course coordinator meeting profile same as per PAC)										50																																																																																																																							
Attainment Levels fixed for the class										DIRECT										CUM										INDIRECT TOT																																																																																																			
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*LS-Less Satisfactory, S-Satisfactory, G-Good, E-Excellent, I-Indication, M-Level of Correlation										CO-Course Outcome, CIE-Continuous Internal Evaluation, EXT-University End-Evaluation, TOT-Total										*PO-Program Outcome, Arr. Mat. Attainment																																																																																																													
MICRO ANALYSIS										CONSIDERATION OF CO ATTAINMENT										MACRO ANALYSIS																																																																																																													
BIT18R101										ECE18R171										CHY18R171										CSE18R171										CSE18R153										CSE18R108										CSE18R174										CSE18R254										EEE18R171										EEE18R172										PSS18R181										MAT18R101										MAT18R101									

The screenshot displays a complex Excel spreadsheet used for academic assessment. Key sections include:

- Assessment Methodology CO:** A table with columns for CO/Exam, Internal (SE, ASS, IPE, TOT), External (ESE, EPE, TOT), and OA. Rows CO1 through CO5 show scores for various exams.
- Verification status:** Fields for Verified By and Approved By.
- Threshold value:** A table with columns I, M, and a description of student performance levels (e.g., 0-60, 60-70, 70-80, 80-100).
- Attainment Levels fixed for the class:** A table with columns I, M, and a description of student performance levels.
- CO ATTAINMENT:** A table with columns DIRECT, CIE, EXT, TOT, CUM, and INDIRECT TOT. It shows attainment for CO Nos. 1 through 5.
- PO ATTAINMENT:** A table with columns Direct and Indirect, and a description of student performance levels.
- Consolidation CO CO ATTAINMENT:** A table with columns CONDITION, Sessional, Assignment, Practical Examination, End semester, End Practical, Internal, External, and Total. It shows attainment for CO1 through CO5.
- MACRO ANALYSIS:** A table with columns Reg. No., Sessional, Assignment, Practical Examination, End semester, End Practical, Internal, External, and Total. It shows attainment for Reg. No. 1 through 10.

Fig. 5. Snapshot of calculation of cumulative External marks of the students appeared for the course

STEP 6. Calculating Cumulative total mark for the course:

To calculate the CO attainment for a particular course outcome, the cumulative total mark has been calculated as follows.

i.e., *Internal marks + External marks*

For example, BIT18R101-Biology for Engineer is chosen.

$$34.5 + 40 = 74.5$$

The formula used for calculating the cumulative marks is furnished in the following snapshot.

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Course Title Biology for Engineers		Course code BIT18R101		Course Type Theory		Year of examination 1		Batch 2022	
Assessment Methodology	CO / Exam	INTERNAL				EXTERNAL			
		SE	ASS	IP	TOT	ISE	IPP	TOT	OA
		35	15	0	50	50	0	50	100
	CO1	35 <td>15<td>0<td>50<td>50<td>0<td>50<td>100</td></td></td></td></td></td></td>	15 <td>0<td>50<td>50<td>0<td>50<td>100</td></td></td></td></td></td>	0 <td>50<td>50<td>0<td>50<td>100</td></td></td></td></td>	50 <td>50<td>0<td>50<td>100</td></td></td></td>	50 <td>0<td>50<td>100</td></td></td>	0 <td>50<td>100</td></td>	50 <td>100</td>	100
	CO2	35 <td>15<td>0<td>50<td>50<td>0<td>50<td>100</td></td></td></td></td></td></td>	15 <td>0<td>50<td>50<td>0<td>50<td>100</td></td></td></td></td></td>	0 <td>50<td>50<td>0<td>50<td>100</td></td></td></td></td>	50 <td>50<td>0<td>50<td>100</td></td></td></td>	50 <td>0<td>50<td>100</td></td></td>	0 <td>50<td>100</td></td>	50 <td>100</td>	100
	CO3	35 <td>15<td>0<td>50<td>50<td>0<td>50<td>100</td></td></td></td></td></td></td>	15 <td>0<td>50<td>50<td>0<td>50<td>100</td></td></td></td></td></td>	0 <td>50<td>50<td>0<td>50<td>100</td></td></td></td></td>	50 <td>50<td>0<td>50<td>100</td></td></td></td>	50 <td>0<td>50<td>100</td></td></td>	0 <td>50<td>100</td></td>	50 <td>100</td>	100
	CO4	35 <td>15<td>0<td>50<td>50<td>0<td>50<td>100</td></td></td></td></td></td></td>	15 <td>0<td>50<td>50<td>0<td>50<td>100</td></td></td></td></td></td>	0 <td>50<td>50<td>0<td>50<td>100</td></td></td></td></td>	50 <td>50<td>0<td>50<td>100</td></td></td></td>	50 <td>0<td>50<td>100</td></td></td>	0 <td>50<td>100</td></td>	50 <td>100</td>	100
	CO5	35 <td>15<td>0<td>50<td>50<td>0<td>50<td>100</td></td></td></td></td></td></td>	15 <td>0<td>50<td>50<td>0<td>50<td>100</td></td></td></td></td></td>	0 <td>50<td>50<td>0<td>50<td>100</td></td></td></td></td>	50 <td>50<td>0<td>50<td>100</td></td></td></td>	50 <td>0<td>50<td>100</td></td></td>	0 <td>50<td>100</td></td>	50 <td>100</td>	100
Threshold values									
Attainment Levels Based for the class									
		I	M	I: Indicates need for further threshold value					
LS	Level	0	16	Between	0	80			
S	Level	1	16	Between	50	70			
G	Level	2	Mid	16	Between	70	80		
E	Level	3	High	16	Between	80	100		
US Level Satisfaction: S: Satisfactory, G: Good, E: Excellent, I: Indicates All level of Completion									
Verification status									
CO ATTAINMENT									
DIRECT CO ATTAINMENT					INDIRECT CO ATTAINMENT				
		1	2	2	2				
		2	2	1	1				
		3	1	2	1				
		1	1	1	1				
		2	2	2	2				
		3	3	3	3				
		4	4	4	4				
		5	5	5	5				
		6	6	6	6				
		7	7	7	7				
		8	8	8	8				
		9	9	9	9				
		10	10	10	10				
		11	11	11	11				
		12	12	12	12				
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		15	15	15	15				
		16	16	16	16				
		17	17	17	17				
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		21	21	21	21				
		22	22	22	22				
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		31	31	31	31				
		32	32	32	32				
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		35	35	35	35				
		36	36	36	36				
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		105	105	105	105				
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		107	107	107	107				
		108	108	108	108				
		109	109	109	109				
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		112	112	112	112				
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		114	114	114	114				
		115	115	115	115				
		116	116	116	116				
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		118	118	118	118				
		119	119	119	119				
		120	120	120	120				
		121	121	121	121				
		122	122	122	122				
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		128	128	128	128				
		129	129	129	129				
		130	130	130	130				
		131	131	131	131				
		132	132	132	132				
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		136	136	136	136				
		137	137	137	137				
		138	138	138	138				
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		140	140	140	140				
		141	141	141	141				
		142	142	142	142				
		143	143	143	143				
		144	144	144	144				
		145	145	145	145				
		146	146	146	146				
		147	147	147	147				
		148	148	148	148				
		149	149	149	149				
		150	150	150	150				
		151	151	151	151				
		152	152	152	152				
		153	153	153	153				
		154	154	154	154				
		155	155	155	155				
		156	156	156	156				
		157	157	157	157				
		158	158	158	158				
		159	159	159	159				
		160	160	160	160				
		161	161	161	161				
		162	162	162	162				
		163	163	163	163				
		164	164	164	164				
		165	165	165	165				
		166	166	166	166				
		167	167	167	167				
		168	168	168	168				
		169	169	169	169				
		170	170	170	170				
		171	171	171	171				
		172	172	172	172				
		173	173	173	173				
		174	174	174	174				
		175	175	17					

Fig. 9. Snapshot of level of program for the COs shown in the attainment sheet

STEP 10. Calculation of Direct CO attainment by considering average attainment of all COs:

The direct CO attainment is calculated using the following formula.

$$\frac{((\text{Level of CO1}) + (\text{Level of CO2}) + (\text{Level of CO3}) + (\text{Level of CO4}) + (\text{Level of CO5}))}{5}$$

BIT18R101-Biology for Engineer is chosen, the average is calculated (from the below table) as follows,

$$((2 + 2 + 2 + 2 + 3))/5 = 2.2$$

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION Kishimondur - 626 126																								
Course Title Biology for Engineers					Course code BIT18R101					Course Type Theory					Year of examination 1					Batch 2022				
Assessment Methodology	CO / Exam	INTERNAL					EXTERNAL					OA												
		Ass. IP. SE. TOT					ISE. IPP. TOT																	
		CO1					CO2					CO3					CO4							
		35 15 0 50 50					35 15 0 50 50					35 15 0 50 50					35 15 0 50 50							
		35 15 0 50 50					35 15 0 50 50					35 15 0 50 50					35 15 0 50 50							
		35 15 0 50 50					35 15 0 50 50					35 15 0 50 50					35 15 0 50 50							
Threshold values CO1: 35, CO2: 35, CO3: 35, CO4: 35, OA: 35																								
Attainment Levels Based for the class US Level Satisfaction: S: Satisfactory, G: Good, E: Excellent, I: Indicates All level of Completion																								
Verification status Verified By: _____																								
CO ATTAINMENT DIRECT CO ATTAINMENT INDIRECT CO ATTAINMENT																								
MACRO ANALYSIS CONDITION Total Strength Average Level of the class																								
INTERNAL EXAMINATION EXTERNAL EXAMINATION OVERALL TOTAL																								

Fig. 10. Snapshot of direct CO attainment of the course shown in the attainment sheet

8.5. Attainment of Program Outcomes from first year courses (20)

8.5.1. Indicate results of evaluation of each relevant PO and/or PSO if applicable (10)

The Program Outcome attainment of a particular batch is based on the academic regulation's evaluation strategies, and the types of courses provided. The Program Outcome attainment can be calculated by both direct and indirect methods. Direct method represents that the attainment is calculated based on the academic marks. On the other hand, the indirect method represents that the attainment is calculated based on the feedbacks from the students. Table 8.7 describes the list of assessment tools, its measuring frequency and person responsible for the assessment and evaluation process.

Table 8.7 Assessment tools for POs attainment

Assessment Tools	Frequency (Per course)	Responsible Person
Direct Assessment		
Sessional	Twice in a semester	Course Coordinator
Assignment	Five in a semester	Course Teacher
End Semester	Once in a semester	Course Coordinator
Laboratory / Practical Examination (Model & End Semester)	Once in a Semester	Course Coordinator
Indirect Assessment		
Course Exit survey	Every Semester	Program Coordinator

A. Illustration of Program Outcome attainment procedure:

The procedure used to calculate PO attainment is explained below.

STEP 1. Calculation of Program articulation matrix:

The Program articulation matrix for the basic courses in the first-year curriculum is calculated and the same is provided in Table 8.8

Table 8.8. Program Articulation matrix for the first-year courses (2020-2021 admitted batch)

S. NO	COURSE CODE	COURSE NAME	PROGRAM OUTCOME											
			1	2	3	4	5	6	7	8	9	10	11	12
1	BIT18R101	Biology for Engineers	3	2		3		3						1
2	ECE18R171	Electronic devices	3	3	2	1	3	3	3		2			2
3	CHY18R171	Chemistry	2	2			1				1			1
4	CSE18R171	Programming for Problem Solving	3	3	3	3	3	2	2				2	2
5	CSE18R153	Programming in C	3	3	3	3	3	2	2				2	2
6	CSE18R108	IT Infrastructure Landscape Overview	3	3	3	3	3	2	2				2	1
7	CSE18R174	Computer Architecture and Organization	3	3	3	3	3	2			2		2	1

S. NO	COURSE CODE	COURSE NAME	PROGRAM OUTCOME											
			1	2	3	4	5	6	7	8	9	10	11	12
8	CSE18R254	Introduction to Python Programming	3	3	3	3	3	2					2	1
9	EEE18R171	Basic Electrical and Electronics Engineering	3	2		3		3						
10	EEE18R172	Basic Electrical Engineering	3	2		3		3			1			1
11	HSS18R151	English for Technical Communication						1		2	1	3		2
12	MAT18R101	Calculus and Linear Algebra	3	3		3		3			1			1
13	MAT18R102	Multiple Integration, Ordinary Differential Equations and Complex Variable	3	2		3		3						
14	MAT18R103	Multiple Integration, Ordinary Differential Equations and Vector Spaces	3	3		3	2		1					
15	MAT18R104	Multiple Integration, Ordinary Differential Equations, probability and statistics	3	3		3	2		1					
16	MEC18R151	Engineering Graphics and Design	2	2	2		3		3					2
17	MEC18R152	Engineering Practice	2	1	1			2	2		2			1
18	PHY18R171	Introduction to Electromagnetic Theory	3	2		3		3						

S. NO	COURSE CODE	COURSE NAME	PROGRAM OUTCOME											
			1	2	3	4	5	6	7	8	9	10	11	12
19	PHY18R172	Introduction to Mechanics	3	2		3		3						
20	PHY18R173	Oscillations, Waves and Optics	3	2		3		3						
21	PHY18R174	Semiconductor Physics	3	2		3		3						
22	PHY18R175	Optics, Electromagnetism and Quantum Mechanics	3	2		3		3						
23	PHY18R176	Physics for Biotechnology	3	2		3		3						

As a model, MAT18R101 - Calculus and Differential Equation has been chosen and the Course articulation matrix is presented below. The Program Articulation matrix is calculated by taking the average of correlation of all correlated COs.

Correlation		PO											
		1	2	3	4	5	6	7	8	9	10	11	12
CO Nos	1	3	3		2		3			1			
	2	3	3		3		2			1			
	3	3	3		3		2			1			1
	4	3	3		3		3			1			1
	5	3	2		2		3			1			1
Arr. Mat.		3	2.8		2.6		2.6			1			1
(Arr. Mat.)		3	3		3		3			1			1

Consider, PO1, the Program Articulation matrix is calculated as follows

$$\text{Program Articulation} = \frac{3+3+3+3+3}{5} = 3$$

Similarly, the Program Articulation Matrix is calculated for all the first-year courses.

STEP 2. Calculation of Program Outcome attainment

The PO attainment, based on the basic courses offered to first year students, is calculated based on the level of correlation between the course and program Outcomes. The Program Outcome attainment for all the courses is shown in the table 8.9.

Program Outcome attainment is calculated using the below mentioned formula

PO attainment

$$= \frac{\sum_{i=1}^5 (\text{Correlation between the course outcome}_i \text{ and PO} \times \text{CO attainment}_i)}{\text{Sum of Correlation}}$$

Where, i = Number of Course outcomes of a particular course

Table 8.9. PO attainment of first year courses (2020-2021 admitted batches)

S. No	Course code	Course name	PO											
			1	2	3	4	5	6	7	8	9	10	11	12
1	BIT18R101	Biology for Engineers	2.21	2.20		2.15		2.23						2.33
2	ECE18R171	Electronic devices	2.67	2.33	2.83	2.75	3.00	3.00	3.00		3.00			3.00
3	CHY18R171	Chemistry	1.18	1.18			1.25				1.20			1.00
4	CSE18R171	Programming for Problem Solving	1.20	1.67	3.00	1.25	1.25	3.00	3.00				2.50	3.00
5	CSE18R153	Programming in C	2.80	3.00	3.00	2.75	2.75	3.00	3.00				3.00	3.00
6	CSE18R108	IT Infrastructure Landscape Overview	2.20	2.00	2.09	2.08	2.08	2.00	2.33				2.33	2.29
7	CSE18R174	Computer Architecture and Organization	2.60	2.75	2.73	2.69	2.69	2.63			2.63		2.67	2.57
8	CSE18R254	Introduction to Python Programming	1.60	1.75	1.73	1.69	1.69	1.63					1.67	1.57
9	EEE18R171	Basic Electrical and Electronics Engineering	2.21	2.20		2.15		2.23						
10	EEE18R172	Basic Electrical Engineering	1.40	1.50		1.31		1.38			1.40			1.00
11	HSS18R151	English for Technical Communication						2.86		2.78	2.80	2.80		2.88
12	MAT18R101	Calculus and Linear Algebra	1.80	1.71		1.69		1.85			1.80			1.67
13	MAT18R102	Multiple Integration, Ordinary Differential Equations and Complex Variable	1.57	1.60		1.46		1.69						
14	MAT18R103	Multiple Integration, Ordinary Differential Equations and Vector Spaces	1.60	1.57		1.36	1.50		1.50					

S. No	Course code	Course name	PO											
			1	2	3	4	5	6	7	8	9	10	11	12
15	MAT18R104	Multiple Integration, Ordinary Differential Equations, probability and statistics	2.60	2.57		2.45	2.50		2.50					
16	MEC18R151	Engineering Graphics and Design	1.80	1.38	1.90		1.90		1.90					1.89
17	MEC18R152	Engineering Practice	2.00	1.67	1.83			1.89	1.60		2.00			1.86
18	PHY18R171	Introduction to Electromagnetic Theory	2.64	2.60		2.62		2.62						
19	PHY18R172	Introduction to Mechanics	1.21	1.20		1.15		1.23						
20	PHY18R173	Oscillations, Waves and Optics	1.86	1.80		1.77		1.85						
21	PHY18R174	Semiconductor Physics	1.79	1.80		1.69		1.85						
22	PHY18R175	Optics, Electromagnetism and Quantum Mechanics	1.57	1.60		1.46		1.69						
23	PHY18R176	Physics for Biotechnology	1.60	1.60		1.57		1.60						
	Direct PO attainment		1.91	1.89	2.39	1.90	2.06	2.12	2.35	2.78	2.12	2.80	2.43	2.16

Akin to the same, the calculation of PO attainment of all courses of the first year has been executed.

Consider PO1 in the table 8.9, overall PO attainment is calculated by the sum of all the PO attainment values divided by number of courses correlated to PO1.

Similar calculation has been made for rest of the POs

8.5.2. Actions taken based on the results of evaluation of relevant POs (10)

The direct attainment levels (student performance) and their targets are presented in the following table.

POs	Target Level	Attainment Level	Observations
PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
PO1	2.1	1.91	The PO1 is not attained, the following courses need improvement
			CHY18R171 1. The students felt Unit-1 and Unit-5 was tough for them as they both deal with higher level concepts. 2. Since the classes were online, the understanding of the students was poor.
			MAT18R102 1.Students were unable to understand the basic concepts of the mathematics. 2.Students were found difficulty in learning through the online teaching, most of the students used mobile phones instead of laptops.
			PHY18R172 1. Students were unable to understand the basic concepts. 2.Students lack writing practice.
			BIT18R101:

			<p>Commonly the usage of the virtual tools for the study was newer for the students.</p> <ol style="list-style-type: none"> 1. The concept of the infection and immunity were not understood by the students because the students are mostly from the computer science background. 2. Students were unable to present themselves in the examinations since it was quiz-based examination.
Action 1: Conducted bridge courses for the chosen students to provide a basic knowledge on the given subjects.			
Action 2: Coaching classes for the slow learners were conducted in order to make them understand the concepts. Also, recorded sessions and the handouts were shared among the students to accelerate the learning.			
Action 3: More writing practice were given on important topics. The assignments related to description were also given.			
Action 4: Coaching classes were conducted for the slow learners. The students were advised to take special attention on Assignments.			
PO2: Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.			
PO2	2.1	1.89	The PO2 is not attained, the following courses require improvement.
			<p>CHY18R171</p> <ol style="list-style-type: none"> 1. The students felt the concepts were tough for them as they deal with higher level of chemistry. 2. Identification of the practical experiments were troubling because of lack of resources among the students.

			CSE18R171 1. The students felt tough to deal with programming fundamentals.
			MAT18R102 1. The students were unable to understand the applications of the common mathematical concepts. So answering the real time based questions are difficult.
			MEC18R151 1. Students were unable to understand the concepts and the applications of the projections.
			PHY18R172 1. Students were unable to understand the real applications of the physics.
Action 1: Conducted special classes to improve the understanding which made the students to grasp the concept. A newer platform for practicals using the mobile resources (android option) were identified and implemented for the benefit of the students.			
Action 2: Conducted special classes to improve the understanding which made the students to write the algorithm.			
Action 3: Conducted tutorial classes for the students to enrich their knowledge towards understanding the concept of the problem.			
Action 4: Conducted additional classes for the students to enrich their knowledge towards understanding the concept of the problem. More visual based materials with animations were given to improve the learning level of the students.			
Action 5: Conducted bridge courses for the students to enhance their knowledge towards understanding the application of the physics.			
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental			

considerations.			
PO3	2.1	2.39	The PO3 is attained but the following courses got scope for improvement
			CSE18R254 1. Students'knowledge towards fundamentals of computers was lagging. Obviously, it was difficult for them to grasp the knowledge of programming for those students. Writing newer algorithm for the real time issue was quite difficult.
			MEC18R151 1. The projected concept was found to be tough for the students especially they were undergone the quiz-based examination.
Action 1: Conducted special classes to improve the understanding in connection with grasping the concept. A newer platform for practicals using the mobile resources (android) were identified and implemented for the benefit of the students. Web resources and online platform were shared to the students to learn.			
Action 2: Conducted animated classes to improve the understanding. Web resources and online platform-based quiz examinations were conducted for the welfare of the students.			
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.			
PO4	2.1	1.9	The PO4 is not attained, the following courses need improvement.
			CSE18R171 1. Students found difficult to grasp the real time applications of programming. Writing newer

			algorithm for the real time issue was quite difficult.
			EEE18R172 1.Difficult to solve problems in Mesh and Nodal Analysis. 2. Difficult to understand the construction and principle of operation of electrical machines.
			PHY18R172 1. Students were unable to understand the real applications of the physics.
Action 1: Conducted classes by using the real time problems. Moreover, the assignments were also given to understand smaller level real time issues.			
Action 2: Students were given more tutorial exercises on problems and also provided with more simple Animations and Flipped videos.			
Action 3: Conducted bridge courses for the students to enhance their knowledge towards understanding the application of the physics.			
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.			
PO5	2.1	2.06	The PO5 is not attained, the following courses need improvement
			CHY18R171 1.Students were unable to present themselves in the examinations since they were quiz-based examinations. 2. Students were unable to concentrate more on the classes as they were exclusively online.

			<p>CSE18R171</p> <ol style="list-style-type: none"> 1. Students were unable to present themselves in the examinations since they were quiz-based ones. 2. Students were mostly relying on the mobiles for compiling the program during the laboratory classes seem difficult for the C programming.
			<p>MAT18R103</p> <ol style="list-style-type: none"> 1. Students were unable to present themselves in the examinations as they were quiz-based ones. 2. Students were mostly relying on the mobiles (android) for compiling the program for the laboratory classes seem difficult for MATLAB. 3. Usage of scientific calculators was difficult for the students.
Action 1: Provided practice classes for the needy students and started more demo to demonstrate procedure to improve the level of concentration of the students.			
Action 2: Provided practice classes for the needy students and compiling the codes using the online tools in the class helped the students. Secondly, students were trained in the online compiler available on the android-based mobiles.			
Action 3: Provided practice classes for the needy students and secondly, students were trained in the online compiler available on the android-based mobiles for MAT Lab applications.			
PO6: Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.			

PO6	2.1	2.12	The PO6 is attained but the following courses got scope for improvement
			EEE18R172 1. Students found difficult to grasp the real time applications of electrical machineries in the society.
			PHY18R172 1. Students were unable to understand the societal impact of the physics.
			BIT18R101 1. Students were unable to draw the scientific diagrams which influence the real societal issues. Since the classes were conducted through online, the understanding of the students was poor.
Action 1: Provided societal based problems in the assignments to improve the concentration towards the learning.			
Action 2: A case study related to usage of physics in solving the real time issue in the regular class was provided which motivated the students to critically think about the application.			
Action 3:Students were motivated to take literature study on basics of infection and immunity.			
PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of need for sustainable development.			
PO7	2.1	2.35	The PO7 is attained but the following courses got scope for improvement
			MAT18R103 1. Students experienced difficult to understand the impact of mathematics in the societal issues.

			MEC18R152 1. Students found difficulty in understanding the concepts and importance of sustainability.
Action 1: Provided societal based problems in the assignments to improve the concentration towards the learning.			
Action 2: Provided sustainable based product and program developments in the assignments to improve the concentration towards the learning.			
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.			
PO8	2.1	2.78	The PO8 is attained but the following courses got scope for improvement
			HSS18R151 1. Students experienced difficulty in committing the ethical guidelines in the practical classes. Since it is based on both individual and group activity, some of them were not involved much in the classes.
Action 1: Provided classrooms by virtual mode by having the discussion rooms in the G-meet, Zoom helped the students in discussion of practical experiments. Specific rubrics to clearly analyse the individual contribution towards the work completion motivated the students to learn ethical behaviour in practice.			
PO9: Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.			
PO9	2.1	2.12	The PO9 is attained but the following courses got scope for improvement

			<p>CHY18R171</p> <p>1. Since it was online based, the practicalclasses and project-based experiments were both individual and group activity. A few were not involved much in the classes.</p> <p>2. Insufficient resourceswere notified by the students.</p>
			<p>EEE18R172</p> <p>1. Involving all the students in the online mode was difficult.</p>
Action 1: Provided classrooms by virtual mode by having the discussion rooms in the G-meet, Zoom helped the students in discussion of practical experiments. Specific rubrics to clearly analyse the individual contribution towards the work completion. Conducted periodic reviews for addressing the difficulty in the timely manner.			
Action 2: Provided classrooms by virtual laboratory to train the students during free hours. Provided periodic reviews for addressing the difficulty in the timely manner.			
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.			
PO10	2.1	2.8	<p>The PO10 is attained but the following courses got scope for improvement</p>
			<p>HSS18R151</p> <p>1. The students faced problems in Word Formation since they lack basic knowledge about the origin of words. Some of the students lack resources for the learning.</p>
Action 1: Provided online seminars to improve the level of communications. Third party quiz and Word Formation tools were utilized to know about the root of any words.			
PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.			

PO11	2.1	2.43	The PO11 is attained but the following course got scope for improvement
			CSE18R254 1. Some of the students lack resources for the learning. 2. Students lack industrial knowledge towards the application of the python. 3. Some students were not concentrating much because some of the assignments were group tasks.
Action 1: Easy tools using the mobile phones were shared among the students for learning. Some classes were conducted by the industrial expert and the same person evaluated based on the problems / project completed. Provided periodic reviews to understand the involvement of all the students.			
PO12: Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.			
PO12	2.1	2.16	The PO12 is attained but the following course got scope for improvement
			CHY18R171 1. Students lack motivation in understanding their responsibilities towards learning the newer concepts.
Action 1: Provided the advantage of the continuous learning and provided a program development in the assignments to motivate the learning.			

**CRITERION 9: STUDENT SUPPORT SYSTEMS (50)****9.1 Mentoring system to help at individual level (5)**

KARE offers a well-established student support and mentoring system. The student support system is monitored by the office of Director Students' Affairs. Based on the strength of the class the Mentors are allocated to the students and they will function as per as per the guidelines as per the B.Tech Regulation.

Faculty Advisory System (FAS)

FAS assist in academic, personal and career advancement through the centralized monitoring process. For every 20 students one Mentor is allocated. A software EDU_KARE exclusively designed for the FAS has been established provides the academic information (CGPA, Non-CGPA, attendance, etc.,) of the students with regular updates. The academic and personal information of the students are available in the EDU_KARE for tracking the students. Sample screen-shot of EDU_KARE software showing the academic information of wards under the tab Faculty Advisor' is given in Figure 9.1.1.

The screenshot shows the EDU-KARE Faculty Advisor interface. On the left is a dark sidebar with navigation links: Dashboard, Manage Students, Attendance, Marks, Job Time Table, Travel History, Assign Courses, and Grade Entry. The main area is titled 'Student Details' and contains a table of student information. Above the table are buttons for Copy, CSV, Print, and a search bar. The table has columns for ID, Action, Gender, Register no, Student Name, Pgm, Batch, Sec, Email, and Po. The first three rows of data are visible.

ID	Action	Gender	Register no	Student Name	Pgm	Batch	Sec	Email	Po
10296	—	Male	9917001003	AATHI KESAVAN M S	BIOUG	2017	8	m.a.sathik7@gmail.com	97
10296	—	Male	9917001006	YASWANTH J	BIOUG	2017	8	yaswanthofficial@gmail.com	96
10414	—	Female	9917001082	VISHVASHI A p	BIOUG	2017	8	9917001082@klu.ac.in	94

Figure 9.1.1 Sample Screenshot of the academic information of wards under FAS in EDU-KARE software

Summary of mentoring system

- Frequency of meeting:
 - **Attendance Monitoring:** Daily
 - **Class feedback:** Weekly once
 - **Academic discussion, result analysis and diary updating:** 3 Per Semester
 - **Any other guidance:** Any time based on student's requirement
- Faculty Mentors continuously monitor their wards to identify the slow-learners and advanced learners.
- Slow-learners are given special coaching to improve their academic performance and advised in selecting the courses, based on performance / ability.
- Fast learners are advised to register for additional courses and to undergo special training and certifications.
- The Faculty Mentor maintains a regular contact with parents/guardians of the wards and updates them about the wards' performance.
- External and internal professional counselors are available in special cases wherever a student needs special assistance (Counseling, Meditation, etc.).

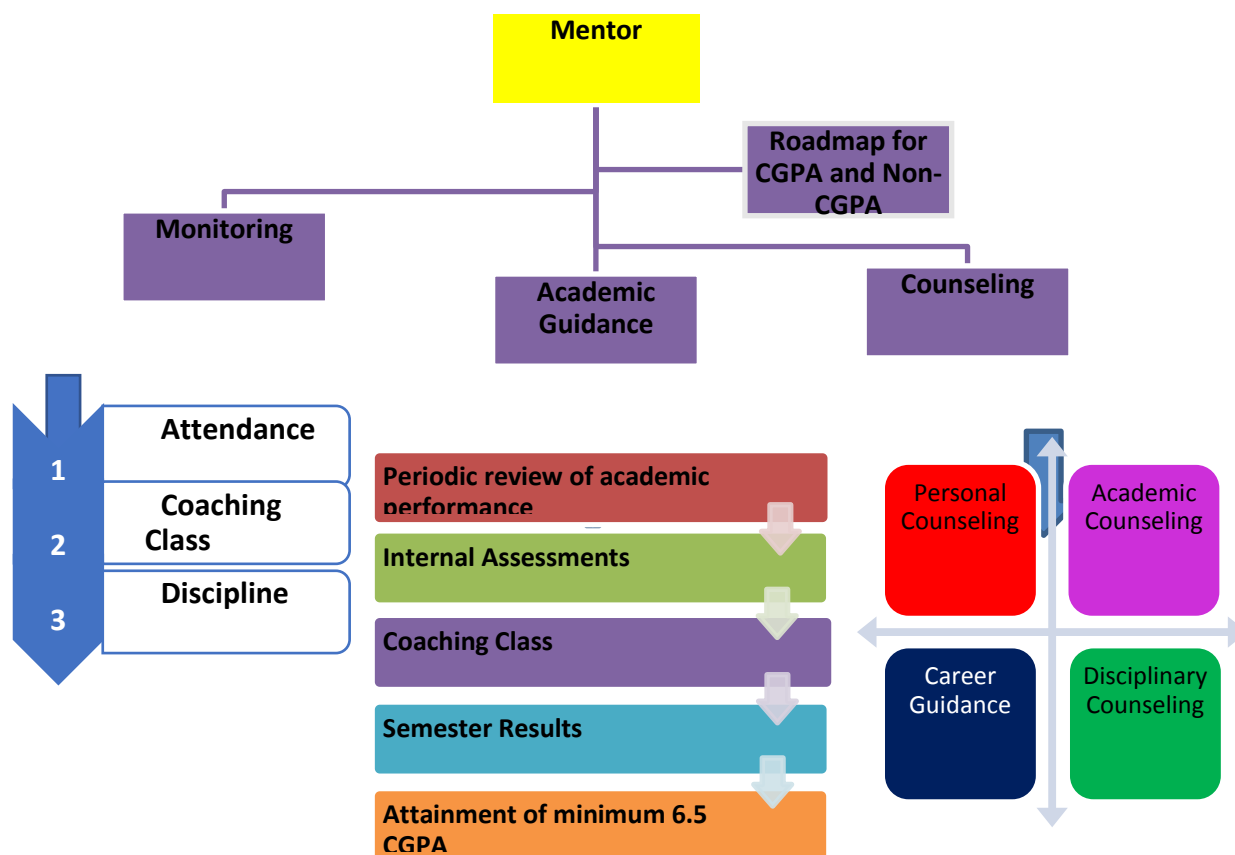


Figure 9.1.2 Responsibility chart for the FAS



Support offered to slow-learners

1. Constant monitoring and interaction by mentors help to encourage, and arrange special classes by the faculty members and the peers.
2. Mentors are available and accessible to the students to interact one-on-one.
3. Faculty members repeat teaching the tough topics as per the students' request and provide university question bank, discuss the ways of presenting the answers in the examinations.
4. The summer-term provides facility to undergo the failed courses during the summer.
5. ICT enabled tools and aids, such as animation videos, descriptions using models etc., to visualize the concepts, are provided
6. Co-teaching/Team Teaching Concept: Course teacher along with additional subject experts works together in theory and laboratory sessions and provides one-to-one teaching or re-teaching so as to satisfy the special needs of slow-learners.
7. Bridge courses are also conducted for courses based on the requirement.

Samples of slow-learner improvement

Sample of improvement in slow-learner performance by mentor is shown in Fig 9.1.3.

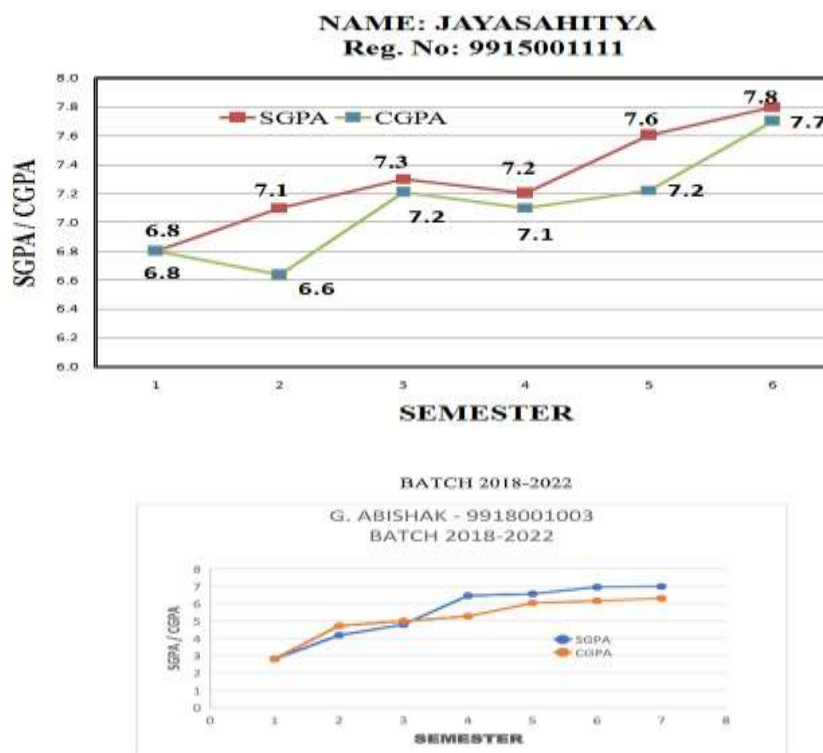


Figure 9.1.3 Sample proof for students improvement in CGPA through FAS

Support for Advanced Learners:

The FAS also helps the advanced learners to upgrade their knowledge and skills to reach the next level of their career growth. The Methodologies followed by the FAS for fast learners is explained in Figure 9.1.4.

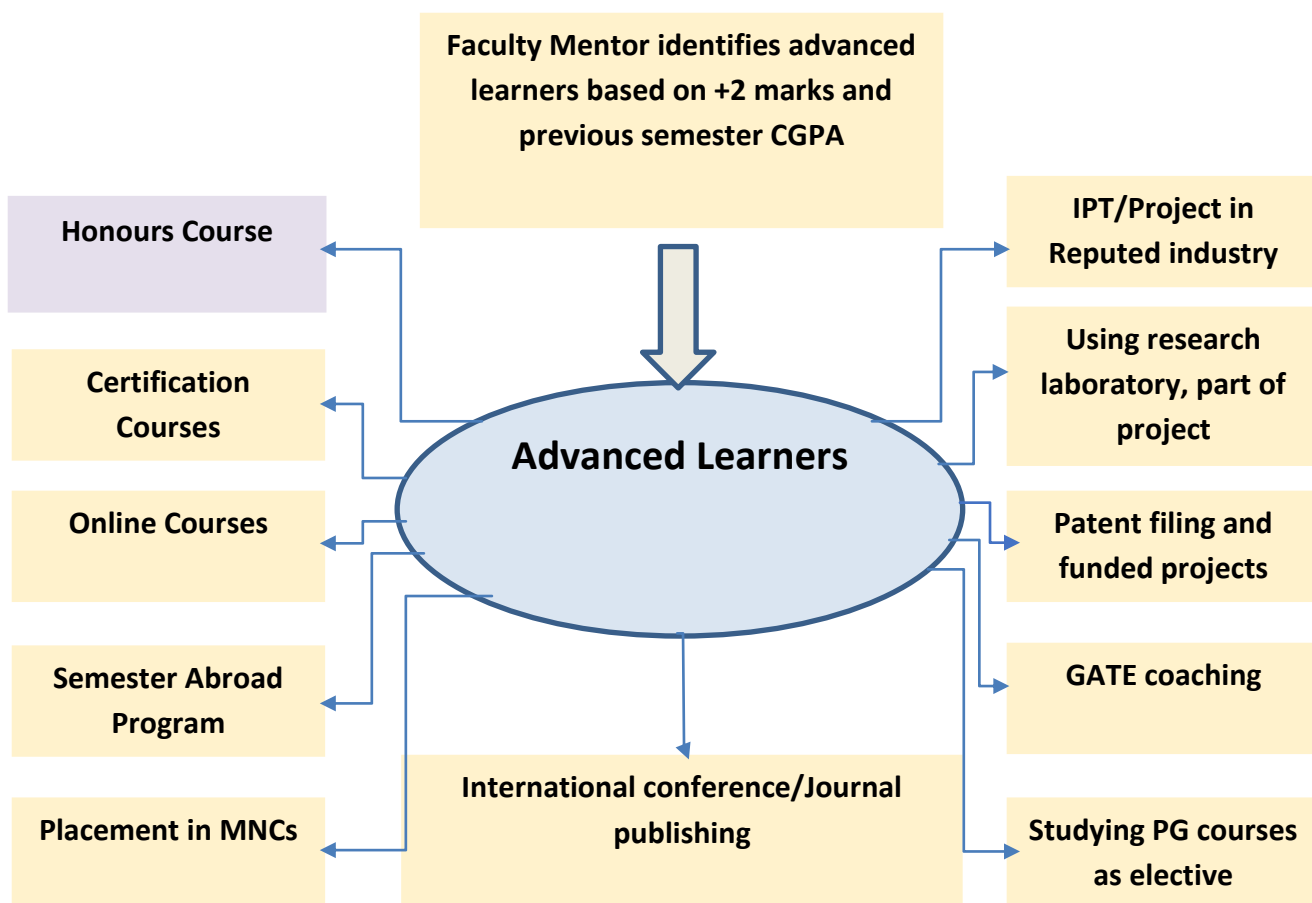


Fig.9.1.4 Methodologies followed by the FAS for advanced learners

Programs offered to advanced learners:

1. Provisions for receiving Honors degree and First Class with distinction degree are available.
2. Advanced learners are encouraged to study MOOC courses in NPTEL, SWAYAM, etc. with credits transfer provision.
3. ERP-SAP training is offered to suitable students. Students are encouraged to be members of professional bodies such as CSI, IEEE, ISTE, IETE, BSOI, and organize technical events.



4. Students participate in events such as hackathons, group discussions, and quizzes.
5. KARE offers training and guidance for appearing in competitive examinations such as GATE, GRE, TOEFL, IELTS, CAT and Banking Examinations.
6. Rank holders and the best project teams are provided with certificates and cash prizes.
7. Students are financially supported to participate in seminars etc, and to file patents.
8. Students are encouraged to participate in IUCEE students' events and network with other peer students.
9. Options such as associating in sponsored projects, taking internships in reputed industries, institutions in India and abroad, utilizing the Semester Abroad Scheme, and participating in Coders' Club, Researchers Club are well-utilized by students.
10. One-credit courses offered by the industrial experts enable the students to keep abreast of the needs of the industry.

9.2. Feedback analysis and reward /corrective measures taken, if any (10)

a. Feedback collected for all courses (Yes/No) : Yes

b. Specify the feedback collection process

The feedback collection process takes place twice in a semester.

(i).After Sessional Exam I

(ii).After Sessional Exam II

- A standard feedback questionnaire as given in Annexure 9.1 and 9.2 is prepared by the IQAC for all the students for every semester, and course wise. Feedback mechanism is systematically organized in the University and it is taken periodically in each semester to improve the teaching skills of the faculty members. The feedback is collected online.
- At the beginning of the feedback collection process, it is defined and communicated to the student about the purpose of the assessment. The students normally understand the purpose and outcome of the process and accordingly give their feedback.
- **Percentage of students participating 95 - 100%.**

Feedback analysis process

The feedback analysis process takes place in the following steps:

- All the parameters mentioned in the feedback form are analyzed.
- Ability of teaching with respect to each item and comprehensive ability of the teachers is analyzed.



- All the comments provided by the students in the feedback forms are communicated to the respective faculty members along with their feedback levels (score) to know their strengths and weaknesses and to enhance their teaching skills.
- The feedback is obtained online, and a descriptive summary of the feedback is submitted to the Head of Department for each faculty.
- The outcome of the evaluation process is reported back to the staff concerned and actions are taken based on that feedback.
- **Feedback through Impartus Lecture Capture System:** KARE has Impartus Lecture Capture System in all the departments which have been used more extensively and giving a greater impetus to use and experience the power of digital platform in education. Through the Lecture Capture System faculty teaching ability and performance is evaluated and also provide a base for flipped class where the students can retrieve the lecture at any time.

Record of corrective measures, if any

- Feedback along with the comments given by the students in the feedback forms is communicated to the respective faculty members to know their strengths and weaknesses and to enhance their teaching skills.

Corrective Measures: Faculty members who get average feedback below 0.8 on a 1.0 scale are identified.

- The score obtained through student feedback on different attributes helps faculty to plan improvement strategies. The faculty members who get a low feedback score are asked to prepare an action plan to improve their teaching skills.
- As part of the action plan, senior faculty members in the department mentor the junior faculty.
- Needy faculty members are deputed to attend workshops and Faculty Development Programs to improve their teaching skills.

Center for Learning Technology (CLT) plans and organizes such programs based on the feedback analysis for individual faculty. Fig.9.2.1 shows the participants attended Faculty Development Program on “Statistical and Analytical Techniques in Biotechnology Research” on 2nd – 7th July 2018



Fig.9.2.1.Group Photo – Guests, Trainers and Participants attended Faculty Development Program on ‘Statistical and Analytical Techniques in Biotechnology Research’

Reward to Faculties on Best Performance

Faculty who get the best feedback are appreciated and rewarded by the best teacher award. The best teacher awards, the best researcher awards and the best department awards are given through the office of IQAC as shown in Fig 9.2.2.



Fig.9.2.2. Mr. S.J. Kabilan Receiving the Best Teacher award 2019

- The IQAC Day function is celebrated every year on Engineers day. In the IQAC day function, faculty members will be awarded for best teacher, best faculty advisor, best project, best lab with mini project and research competence as shown in Fig 9.2.3 (a-c).



Fig.9.2.3. (a) Dr. S. Sheik Asraf Receiving the award for Best Mentor for Project



Fig.9.2.3. (b) Ms. M. Sushmitha Receiving the award for Best Mentor Mini project



Fig.9.2.3. (c) Ms. Bala Hari Priya receiving the award for Lab with Mini Project

9.3. Feedback on facilities (5)

The feedback on academic infrastructure, hostel and other facilities are obtained through the questionnaire as shown in the Annexure 9.3 and the corrective actions are initiated.



Infrastructure - Classrooms / Laboratories / Internet facilities - In Class Committee Meetings held thrice a semester, the students provide feedback on any issues related to classrooms, lab equipment which are communicated to the authorities concerned and are rectified.

Hostel- Hostel committee meetings are held at the hostel every month where hostel inmates raise problems, if any, related to hostels. Also, the Wardens, the Deputy Wardens and the teaching staff visit hostels daily and provide feedback on the food and other maintenance-related issues, if any. They are brought to the notice of the wardens and the maintenance department and are rectified immediately. Anti-ragging squads consisting of teaching staff visit all hostels every evening and interact with students to acquaint themselves with any issue. If any complaints are received, they are immediately addressed.

Others- When issues related to food courts, bank facilities, medical facilities etc. arise they are reported to the Faculty or the respective Dean, and the issues are resolved immediately.

Analysis and Corrective Actions taken

The feedback collected online is compiled and statistically analyzed by a central committee of the University. The feedback analysis is deliberated in the IQAC meeting and the corrective measures are decided accordingly. The positive and the negative aspects of the feedback are communicated to the respective Heads of Departments/Facilities for effective implementation of easy and comfortable use of facilities. KARE created and upgraded the facilities wherever required and is also in the process of building better facilities on the basis of students' feedback. The consolidated No. of grievances appealed and No. of grievances redressed are as shown the Table 9.3.1. Table 9.3.2 gives the exact requirements from the students collected through the feedback and corrective action taken.

Table 9.3.1 Consolidated grievances appealed and grievances redressed

Year	No. of grievances appealed		No. of grievances redressed	Average time for grievance redressal in number of days
		Total		
2021-22	3	13	3	7
2020-21	3		3	7
2019-20	2		2	7
2018-19	5		5	7

**Table 9.3.2 Corrective action taken.**

Year	No of cases received	No of cases redressed	Name of the cases received from Students	Name of the case redressed
2021-22	3	1	Requested to conduct the vaccination Camp within the campus for 2 nd Dose	Vaccination Camp conducted within the campus in two times.
		2	Requested to conduct the cultural fest program in our university.	One Cultural fest was conducted in our campus.
		3	Need Online Learning study materials.	KALVI LMS portal was created for online learning management system.
2020-21	3	3	Requested to conduct the vaccination Camp within the campus	Vaccination Camp conducted within the campus in two times.
			Requested to conduct the Mack test for online examination.	Mack test for online examination was conducted in three times.
			Requested to conduct the online fest program in our university.	Based on the request, conducted cultural fest for inter and intra college fest through online mode.
2019-20	2	2	Requested to open the Xerox shop in working hours	Permitted to open the Xerox shop from 9.00 am to 7.30 pm
			Requested to conduct the fest program in our university.	Based on the request, conducted cultural fest for inter and intra college fest
2018-19	5	5	Need to improve the food quality	Implemented SODEXO
			Need for laundry facilities for hostel inmates	Implemented Sunshine



			Requested to no limit to be fixed for washing and ironing the clothes.	Based on the request, for hostel inmates there is no limit for washing and ironing the clothes and for others payment basis with minimum rate.
			Requested to provide the North Indian Menu	Based on the request, implemented South Indian, North Indian and Andhra Menu for preparing the students
			Requested to arrange the internship/ industrial training program for all the students.	Implemented and mandatory for all the students, and included in the curriculum.

9.4. Self-Learning (5)

Scope for Self-learning: Apart from classroom interaction, provisions are available for self-learning of the students. These self-learning activities are more essential to stay motivated. These self-learning activities provide hands-on exercise while studying the theory subjects. KARE provides Wi-Fi facility throughout the campus which enables students to access the self-learning materials such as NPTEL, LMS etc. To enhance the self-learning activity seminar, workshop guest lectures are also organized. The following are the initiatives at

KARE for self-learning;

- **NPTEL** provides 343 web courses and 327 video courses in engineering/science and humanities and have been available in the library for self-learning.
- **MIT Open Courseware** is a free publication of MIT course materials that reflects almost all the undergraduate and graduate subjects taught at MIT and it could be accessed in the central library
- **Coursera** is a U.S.-based massive open online course provider, offer online certification courses on variety of subjects.
- **Learning management system (LMS)**



The course materials are organized by course coordinators with the help of module coordinators and the same is uploaded to the server. Students can retrieve the course material using their username and password provided to them. (<http://kalasalingam.ac.in/elearn>) as shown in Fig.9.4.1.

User name: Register number;

Password: Register number

The screenshot displays the login interface of the Kalasalingam University Learning Management System. The header includes the university logo and navigation links. The main content area features a 'Log In' form with input fields for 'Username' and 'Password', a 'Remember Me' checkbox, and a 'Log In' button. A 'Lost Password' link is located below the button. A sidebar on the right titled 'Recent Posts' lists three items: 'Mechanical Engineering', 'Bio-Technology', and 'Hello world!'.

Fig.9.4.1. Learning Management System (LMS) - students login

Fig 9.4.1 shows the Learning Management System (LMS) of students login.

● **Kalvi LMS**

Kalvi LMS is utilized for managing all the materials for the course. The course teachers can upload the contents, quiz and assignments for their courses. The students can view and download the course materials for the learning purpose. The course teachers can also view their reports of quiz and assignment submission and evaluation. This system supports the development of the student career and enhance the learning skills. Fig 9.4.2 shows the Learning Management System (LMS) of students' login.



Fig.9.4.2. KALVI-Learning Management System (LMS) - student's login

- **Open Virtual Lab**

It provides remote access to laboratories in various disciplines of Science and Engineering. These Virtual Laboratories would cater to students at the undergraduate level, postgraduate level as well as research scholars.

- **Self-Study Elective:** During their project period, the student has to select one elective course from the major elective as self-study elective. This is a teacher-directed self-study elective in which the pattern of evaluation is similar to that of other courses.
- **Others:** X Option, Theory with Practical and Integrated Course options are available for the students to solve the real-time case studies through and hands-on exercise.
- Facility for self-learning activity at KARE is as shown in Table 9.4.2.

Table.9.4.2. Facility for self-learning activity

Sl No	Facility	Description
1	Digital Library	2000+ CD's and computers with journal links
2	E-learning resources	NPTEL, e-books, Intranet server
3	Central computer centre	200 computers with internet and intranet facilities
4	Wi-Fi Facility	All buildings are provided with Wi-Fi Facility
5	Department laboratories	Computers with internet and intranet facilities, Usage of Software and hardware facilities.
6	Events encouraging self-learning	Seminar, Workshop, Conferences, Guest lectures, Career guidance, Industrial tours, Associations Activity, ISTE, IETE, IEEE, IPT, Industrial Visit



9.5. Career Guidance, Training, Placement (10)

a. Carrier guidance program for higher studies and placements

- The institution has a very active Training and Placement Section which is part of the Office of Corporate Relations. The students are given comprehensive training in aptitude, group discussion and interview skills that help them in securing placements.
- The institution also offers career guidance and counselling programs to develop competencies in knowledge, educational and occupational exploration, and career planning.

b. Centre for Competitive Examinations

- ✓ A Deputy Director is appointed for Centre for Competitive Examinations (CCE) under the Director (Student Affairs). The CCE organize various activities and motivates the students to take up competitive examinations such as GATE/GRE, GMAT etc. to pursue higher studies in the leading institutions in India and abroad.
- ✓ GATE/GRE, GMAT etc. training programs are provided to our students through CCE.

c. Pre-placement Training

- Appropriate reforms have been made in the curriculum recently, for example, a course on “Soft Skills” carry one credit and has been incorporated into the regular curriculum and the students undergo “Soft Skills” course in semesters II, III, IV and V. ‘Soft Skills’ courses are conducted by the HR Personalsout-sourced from various soft-skills training providers as given in Table 9.5.1.
- During First year, the students are trained under soft skills such as creativity, Analytical thinking, Emotional Intelligence, Interpersonal communication skills, Judgment, decision making and leadership skills
- During Second year, the students are trained under Aptitude which includes Numerical Reasoning, logical and verbal ability.
- During Third year, technical proficiency training will provide to enhance the skills on Programming languages such as C, C++, Python, Java, IOT and Artificial Intelligence based programs.
- Pre-Assessment will be conducted during third year to analyze the strength and weakness of the students.



- Based on Assessment Reports, the list of students will be segregated, and specific training programs will be planned from end of 6th semester.

Table.9.5.1 Soft Skill & Placement Training programme

Academic Year	Batch	Period	Training Name	No. of Students
2018-19	2015-19	19 th Nov, 2018	Soft skills by SMART Learning	186
		3 rd to 13 th Nov, 2018	Aptitude and Mock Interview Preparation by ABC Group	143
2019-20	2016-20	Jul – Nov, 2019	Soft skills by SMART Learning	112
2017-18	2014-18	21 July 2017	Training program on Placement Preparation (Mock Interview)	43
2017-18	2014-18	27/07/2017 to 06/08/2017	Training on “C and Java”	45
2017-18	2014-18	13 th to 15 th , 28 th & 29 th October 2017	Java Training Program	45
2017-18	2014-18	22 nd to 24 th Aug, 2017	Aptitude and Verbal Training	45
2017-18	2014-18	22 nd Aug – 24 th Aug, 2017	WIPRO Specific Training Programme	42
2017-18	2014-18	28 th Aug – 30 th Aug, 2017	Java Training for WIPRO eligible students	42
2017-18	2014-18	03/01/2018	Industry Ready Engineers-2020	45
2017-18	2014-18	15 th Sep, 2017	Verbal & Group Discussion for M/S.WIPRO Camps Drive	45
2017-18	2014-18	13, 14, 15, 28 & 29 Oct, 2017	JAVA Training Programme for Pre-Final Year Students	182
2017-18	2014-18	10/01/2018 and 24/01/2018	Guest Lecture on “Resume Preparation and Interview skills”	45
2017-18	2014-18	24/01/2018	Preparation of Resume and Interview Skills	45
2017-18	2014-18	24 Jan 2018 To 30 Jan 2018	WIPRO Ltd Company Specific Training	45
2017-18	2016-20	10 th April – 14 th April, 2018	Industry Specific Training for Second Year B. Tech Students	182
2018-19	2015-19	24 th -26 th July, 2018	Company Specific Training for ZOHO Corp eligible students Program by M/s. Top Freshers, Chennai	67



Academic Year	Batch	Period	Training Name	No. of Students
2018-19	2015-19	01 st Aug – 07 th Aug 2018	Company Specific Technical Training for ZOHO Corp eligible students Program by M/s. Top Freshers, Chennai	67
2018-19	2015-19	3 rd Oct, 2018	TCS Ninja Specific training program by Mr. Meyappan Natrajan/ Managing Director- Top Freshers	20
2018-19	2015-19	29 th Sep – 4 th Oct, 2018	WIPRO Specific Training Program for WIPRO eligible students by Top Freshers	112
2018-19	2015-19	13 th & 14 th Oct, 2018	Hexaware Company Specific Training Program for Hexaware eligible students by M/s Top Freshers	112
2018-19	2015-19	22 nd & 23 rd Oct, 2019	IBM Company Specific Training Program for IBM eligible students by Mission Ignite	112
2018-19	2015-19	19 th Nov, 2018	Soft Skills conducted for all the Final Year soft skills arrear students from by M/s Smart Learning Resources	186
2018-19	2015-19	19 th Nov, 2018	Training cum AMCAT test conducted based on Aptitude, C programming for all WIPRO eligible students by M/s Aspiring Minds	182
2018-19	2015-19	3 rd – 13 th Jan, 2019	Company Specific Training program by ABC Group	143
2018-19	2015-19	3 rd , 4 th , 5 th , 11 th & 12 th Jan, 2019	JAVA Training Program by Campus Connection	164
2018-19	2015-19	26 th & 27 th Jan, 2019	Cognizant Specific Training program by FACE	30
2018-19	2015-19	2 nd & 3 rd Feb, 2019	Cognizant Specific Training program by Mission Ignite	60
2018-19	2015-19	2 nd Feb, 2019	Mock online assessment by AMCAT	112
2018-19	2015-19	28 th Feb – 2 nd March, 2019	Conducted Diagnostic Test on Aptitude, Verbal, Logical ability & Programming language	112



Academic Year	Batch	Period	Training Name	No. of Students
2018-19	2015-19	July – Nov, 2019	Advanced Soft skills by M/s Smart training Resources	112
2019-20	2016-20	20 th June to 19 th July, 2019	SAP Training	823
2019-20	2016-20	2 nd Sep, 2019	Mphasis Training	124
2019-20	2016-20	5 th Sep, 2019	Svar And Writex Training	116
2019-20	2016-20	16 th Sep, 2019	Amcat Assessment	182
2019-20	2016-20	18 th Sep, 2019	Refreshing Training for Mphasis	143
2019-20	2016-20	24 th Sep, 2019	Technical Training	164
2019-20	2016-20	5 th Oct, 2019	IBM Training	186
2019-20	2016-20	15 th Oct, 2019	Wipro Training	162
2019-20	2016-20	18 th Oct, 2019	Tcs Training	112
2019-20	2016-20	20 th Oct, 2019	Cts Training	306
2019-20	2016-20	3 rd Nov, 2019	Cts Refreshing Training	306
2019-20	2016-20	6 th Feb, 2020	Java Training	312
2019-20	2016-20	24 th Feb, 2020	Industry Specific training Programme	163
2020-21	2017-21	8 th June to 2 nd July (Except 12 th & 23 rd June)	TCS NINJA	483
2020-21	2017-21	7 th Aug to 16 th Aug	Company Specific Training (Capgemini, Aspire, IBM)	424
2020-21	2017-21	19 th Aug to 22 nd Aug	ZIFO Specific Training	178
2020-21	2017-21	27 th to 29 th Aug & 31 st Aug to 5 th Sep	Automata Fix Training	306
2020-21	2017-21	5 th Sep to 14 th Sep	CTS Specific Training	308
2020-21	2017-21	3 rd Oct to 9 th Oct	CTS Specific Training	511
2020-21	2017-21	14 th Dec to	TCS Specific Training	33



Academic Year	Batch	Period	Training Name	No. of Students
		18 th Dec		
2020-21	2017-21	16 th Dec to 21 st Dec	Accenture Specific Training	639
2020-21	2017-21	4 th Jan to 13 th Jan	Aptitude and Technical (Programming) Training	289
2020-21	2017-21	26 th Feb to 28 th Feb	Aspire Specific Training	54
2020-21	2017-21	1 st to 5 th March	Java Specific Training	65
2020-21	2017-21	12 th Mar to 14 th Mar	Capgemini Specific Training	48
2020-21	2017-21	17 th , 18 th , 24 th , 25 th Apr & 1 st , 2 nd May	Interview and Employability skill Training	54
2020-21	2017-21	5 th & 6 th May	Accenture Specific Training	25
2020-21	2017-21	11 th May to 14 th May	Wipro Specific Training	19
2020-21	2017-21	24 th & 25 th May	Capgemini Specific Training	94
2020-21	2017-21	31 st May to 5 th June	Employability skill Training	205
2020-21	2017-21	7 th to 11 th June	DXC and HCL Specific Training	326
2020-21	2017-21	12 th & 13 th June	DXC and HCL Specific Training- Extension	134
2020-21	2017-21	18 th , 19 th & 21 st June	C Specific Training	324
2020-21	2017-21	24 th & 25 th June	Analytical & Verbal Training	304
2021 - 22	2018 - 22	18th June 2021 – 20th June 2021	C Programming Training	324
2021 - 22	2018 - 22	30th July 2021 –	Training on Automata Fix	191



Academic Year	Batch	Period	Training Name	No. of Students
		06th Aug 2021		
2021 - 22	2018 - 22	24th & 25th June 2021	Analytical and Verbal Training Programme	304
2021 - 22	2018 - 22	03rd & 04th July 2021	C Programming Training	249
2021 - 22	2018 - 22	12th July – 26th July 2021	Capgemini Specific Training	347
2021 - 22	2018 - 22	30th Aug – 3 Sep 2021	Cognizant Specific Training	404
2021 - 22	2018 - 22	2nd & 3rd Sep 2021	Group Discussion	143
2021 - 22	2018 - 22	11th – 13th Sep 2021	Accenture Specific Training	538
2021 - 22	2018 - 22	16th – 19th Sep 2021	Zoho Specific Training	72
2021 - 22	2018 - 22	25th & 26th Sep 2021	CTS – Specific Training	211
2021 - 22	2018 - 22	13th Nov – 16th Nov 2021	Programming Skills Training	187
2021 - 22	2018 - 22	20th Nov – 27th Nov 2021	Training Programme on SoftSkills, Communication and Aptitude	233
2021 - 22	2018 - 22	25 Nov 2021	Edvoy Specific Training	92

d. Placement Process and Support

i. Campus Recruitment Process

Requirements of a company are received by the Director Corporate Relations (CR) for campus recruitment. The same is formalized by initiating a meeting of the recruitment committee. The committee approves the campus placement, and a circular is sent to the Department Heads and the students about the recruitment. The department shortlists the



candidates and send the same to the Training and Placement Office. Consequently, the list of students is forwarded to the respective company.

ii. Off Campus Recruitment

The Training and Placement office shortlists the students from the database matching the company requirements and sends the list to Heads of the Departments and the Placement cell PDs of the respective departments. The list of students is forwarded to the respective company.

iii. Placement Process and Rules

- Companies are expected to give a Pre-Placement Talk [PPT] laying out the details of the company and the offer before the process. In case there is no PPT by the company, then the Training and Placement office gives the job description to the students.
- Once the student appears for the process, the student cannot reject the offer made by the company.
- Incase if a company has a specific requirement / request, the recruitment committee has all the rights to nominate a set of / individual student(s) and it is mandatory that the student/s has/have to attend the interview. If the student is selected and an offer is made, then he/she is free to decide about the same.
- Every student is eligible for multiple offers.
- A company is free to make their choice of students irrespective of their specialization
- The Director CR shall decide on slots for companies. No company is allowed to make offers before the slotted day and time
- If, for any reason, a company wants to conduct its process before the slotted day and time they are free to do so.
- In case a student who is placed through the institute placement process takes up private placement as well in another company, the Director, in consultation with the companies concerned, shall nullify both the offers
- Students who have got an internship offer are eligible to attend placements provided the date of joining of the company is only after the completion of their internship period.
- If a student gets placed in IT or Core Company, then he/she is eligible for the IT/Core Company if the CTC of the company is at least Rs. 2 lakhs more than the CTC of the company in which he/she has got already placed.
- All correspondence to and from the company is routed through the Office of Corporate Relations only.



9.6. Entrepreneurship Center (5)

Innovation and Entrepreneurship Development Center

About The Centre

The Innovation and Entrepreneurship Development Centre (IEDC) at Kalasalingam University is established as an initiative of National Science and Technology Entrepreneurship Development Board (NSTEDB), Department of Science and Technology (DST), New Delhi, with an aim of developing institutional mechanism to create entrepreneurial culture in academic institutions to foster growth of innovation and entrepreneurship amongst the faculty and students.

Every year this centre is providing financial support to a number of students for developing innovative products. Apart from this financial support, mentoring and Infrastructural support are provided for these projects. Moreover, the centre arranges so many classes and camps to promote technology based innovation and entrepreneurship among the students. The Vision of IEDC is "To be a self funded department catering to the needs of young entrepreneurs with innovative ideas of national/international importance and societal needs" with the mission to Develop a mechanism with required infrastructure that can enable students and faculty to innovate and prototype their innovation with support from Govt., industry and academic institution

The KARE was one of the Top 25 Deemed Universities (Band A) in Atal Ranking of Institutions on Innovation Achievements (ARIIA)-2020. KARE also got 5 star rating for Entrepreneurship, Innovation and Startup activities in 2019-20. KARE was approved as a Knowledge partner for Innovation Voucher Program (IVP), supported by Entrepreneurship Development and Innovation Institute, Government of Tamilnadu. The following Table 9.6.1 gives the activities conducted of IEDC for the benefit of the students

Table 9.6.1 Activities conducted by IEDC

S.No	Year	Number of Activities	Number of students Benefitted / Attended
1	2018-19	14	1204
2	2019-20	11	1148



3	2020-21	25	2334
4	2021-22	24	2115

Record on students Benefitted

The following funds are used for conducting entrepreneurship awareness training programs and seed fund support for product development to the students' community. The funding details are shown in Table 9.6.2.

Table 9.6.2.Funds Received for Innovation and Entrepreneurship Activities

S.No	Year	Project Title	Funding Agency	Funded Amount
1	2018-2019	NIMAT-2018-19	EDII, Gujarat	Rs. 1,00,000
2	2018-2019	IEDC (Innovation and Entrepreneurship Development Centre)	DST	Rs. 8,00,000
3	2018-2019	DST STARTUP NIDHI	DST, EDII, Gujarat	Rs. 20,00,000
4	2019-2020	NIMAT-2019-20	EDII, Gujarat	Rs. 3,80,000
5	2019-2020	Technology Business Incubators(TBI)	MSME	Rs.2, 50,00,000*
6	2020-2021	Innovation Voucher Program	EDII,Tamilnadu	Rs. 3, 64, 400
7	2021-2022	Innovation Voucher Program	EDII,Tamilnadu	Rs.1,63, 280

Student's projects supported by IEDC:

The following students' innovative projects are supported by IEDC (Innovation and Entrepreneurship Development Centre). Each project got Rs. 1 Lakh for product development. The list of projects and students innovators is shown in Table 9.6.3.

Table 9.6.3 IEDC Supported Projects

S.No	Title of the Project	Department	Guide Name	Students Name
1	Development Of Juice To Prevent Gastro-Intestinal Tract Cancer Using Banana Stems	Biotech	Dr. K. Palanichelvam	Mulla Sariyanaz N.S. Supraja Sahana Parveen



2	Bio Polymer And Graphene Nano Sheet Based Food Packing Material Which Can Be Efficiently Used For Carbonated Beverage Packaging	Food	Mr. S. I. JeyanthAllwin	Ritujasree Anet B George Sreelakshmi
3	Development of Electronic Lockers with Multiple keys using Visual Cryptography Scheme	CSE ECE	Dr.K.Suthendran	Sai anand.M Harish R
4	Attachable Wheelchair Automator	Automobile	Mr. G. Balamurugan	A.Deepak Praveen K. Vijay R. Gurumoorthy
5	Smart Tube light	ECE	Dr.J.Deny Mr.V.Ramachandran	R.Vengat Rahul

Student's projects supported by DST STARTUP NIDHI:

The following students' innovative projects are supported by DST STARTUP NIDHI. Each project got Rs. 10 Lakh for product development. The list of projects and students innovators is shown in Table 9.6.4.

Table 9.6.4 DST STARTUP NIDHI Supported Projects

S.No	Title of the Invention	Department	Student Team	Mentor
1.	ECO friendly Manufacturing of Tiles from used PET Bottles	Mechanical	VB. Saravanan G. Ramkumar	Dr.I.Siva
2	Low cost Smart Cleaner for Solar Panels	EEE	G.P.Santhosh Ram M.AbubakkarSiddhik	Mr. K.Vijayakumar

Twelve students' start-up companies are functioning in the University campus as shown in Table 9.6.5.

Table 9.6.5 Student Start-up Companies incubated in KARE



S.No	Project Title	Dept	Company Name
1	Noise Reduction in Muffler	Auto	NAV Mufflers Pvt .Ltd
2	Production of Biofungicide with Earthworm	Bio Tech	IWO Biosciences Pvt. Ltd
3	Beneficial Enzyme for Bio processing Agro Industrial Waste	Bio Tech	SKIM Biotech Pvt. Ltd
4	Smart Cart for Super Market	CSE, ECE	Yugti Smart Solutions Pvt. Ltd.
5	Efficacy of Bio control Agents viz. Pseudomonas sp and Trichoderma sp. and control of onion diseases	Bio Tech	RingarrBiocontrol Pvt. Ltd
6	Design and Development of Low Cost Photomograph for Identification of Thyroid Dysfunction	ECE	Raj Bioelectronics And Intelligent Pvt. Ltd
7	Low Cost High Performance Inverter	EEE	Minniayal Pvt. Ltd
8	ECO friendly Manufacturing of Tiles from used PET Bottles	Mechanical	Compimero Makers Pvt.Ltd
9	Low cost Smart Cleaner for Solar Panels	EEE	ThaaniyalPvt.Ltd
10	SunFish - Hybrid Powered Low Cost Solar fish Dryer	ECE	M/s Optimum Energy Solar System
11	HC-EMG device: A Pamphlet sized Electromyography for Detecting Nerve Disorders	ECE	M/s HCTRONIQS
12	Wearable / Portable electrical muscle stimulation belt for cervicalgia patients	BME	M/s PSM Enterprise

Other successful Milestones:

- i. **Innovation Ambassadors:** The following faculty members successfully completed Innovation Ambassador Training Program conducted by the Ministry of Education's Innovation Cell and AICTE.

Foundation Level:

- 1) Dr.Viji.R/MBA
- 2) Dr S. Suprakash/IT
- 3) Dr.B. Perumal/ECE
- 4) Dr Muneeswaran V/ECE
- 5) Mrs P Priya/EEE
- 6) Mr. M. Sakthimohan/ECE
- 7) Mr.S.Sakthivel/BME
- 8) Dr.S.Kavitha/Mech
- 9) Mrs. G. Elizabeth Rani/CSE
- 10) Dr. K. Pandiaraj/ECE

**Advance level:**

- 1) Dr. J Deny/IEDC
- 2) Dr.S.B. Inayath Ahamed/MBA
- 3) Mr. K Vijayakumar/EEE
- 4) Mr. D. Prem Raja/IT
- 5) Mr.Ramesh G/ECE

ii. IIC Mentor-Mentee Program

Through IEDC academic institutions are also guided for successful implementation of IIC. The following intuitions are joined as a mentee to our University under the IIC Mentor-Mentee Program

1. P A C Ramasamy Raja Polytechnic College
2. AAA College of Engineering And Technology
3. M.Kumarasamy College of Engineering
4. Kamaraj College of Engineering

iii. Atal Community Innovation Center-Kalasalingam Innovation Foundation

Atal Community Innovation Center-Kalasalingam Innovation Foundation (ACIC-KIF) is a non-profit community innovation center established by April 2021 with the support of Atal Innovation Mission, NITI Aayog, Govt. of India. The aim of ACIC is to promote economy, employment, and enable community-oriented innovations. We encourage innovative projects from all stages starting from ideation, early traction, validation, and scaling. The ACIC-KIF provides community innovation space at subscription charges to innovators and start-ups, handholding, prototyping, validation, POC, precommercial versions, software development and other services required for start-ups. We also conduct extensive training on different technological aspects, patenting and other services required for start-ups and innovators. Once the Proof-of-concept (POC) is developed, we provide scaling services to convert your POC to pre-commercial and commercial versions. So far, this center has incubated 24 start-ups and few common issues faced by the nearby community are identified and solved by ACIC-KIF.

9.7. Co-curricular and Extra-curricular Activities (10)**a. Co-curricular Activities**



The University encourages students to participate in various co-curricular and extra-curricular activities. Students actively participate in various co-curricular activities including in-plant training, industrial visit, conferences/ seminars and workshops.

Table 9.7.1: List of Co-curricular Activities Organized

S.No	Year	No of Conferences/ Seminars	No. of Guest Lectures/Industrial Lectures/Webinars	No of Workshops/ Training Programmes	No of Project Contest
1	2018-19	12	95	89	5
2	2019-20	51	43	33	6
3	2020-21	34	33	21	6
4	2021-22	1	47	27	3

a. Extra-curricular activities

Students are encouraged to participate in various club activities and students have been actively organizing, participating in the activities of their choice. Students are encouraged to participate in extra-curricular activities as part of non-CGPA courses such as Tamil Mandram, Nature Club, Music Club, Photographic Club, Fine Arts Club, Youth Red Cross (YRC), NSS, Entrepreneurs Cell, NCC and Aquatic Club.

1. Availability of Sports Facilities:

A state-of-the-art infrastructure for both indoor and outdoor games is established. Playgrounds with athletic tracks and floodlights are available for training students to take part in State and National level games such as Cricket, Hockey, Football, Basketball, Volleyball, etc. These facilities are built according to the appropriate standards followed by the various sports associations in India.

Indoor Facilities:

A standard multipurpose Indoor Stadium (1298 m²) with wooden flooring and following facilities is established as given in table 9.7.2.

Table 9.7.2 Indoor Facility Details

Game	Dimension of Play Area (Court/Field)	Number of Courts / Rooms
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Badminton	82 m ²	3
Basket Ball	420 m ²	1
Volley Ball	162 m ²	1
Boxing Training Hall	298 m ²	1
Wrestling Training Hall	298 m ²	1

Outdoor Facilities

Table 9.7.3 Outdoor Facility Details

Game facility	Dimension Of Play Area (Court/Field)	Number of units
Athletic track and field	400 m Track with 8 Lanes(Std. Track)	1
Basketball Court	420 m ²	3
Volley ball courts	162 m ²	3
Tennis courts	195 m ²	1
Football field	7000 m ²	2
Hockey Field	5027 m ²	1
Kabaddi Court	130 m ²	2
Throw ball court	223.26 m ²	1
Kho-Kho court	464 m ²	1
Ball Badminton	288 m ²	1
Cricket	Radius 60 yards.	2
Hand ball	800 m ²	2
Swimming Pool	50m x 25m	1

Gymnasium: A standard gymnasium for training the students and ensuring their physical fitness equipped with the following facilities is available.



- 16 station multi gym, cross over machine
- Elliptical cross trainer
- Peck and deck butterfly
- Power station with leg press
- Recumbent bike
- Roman chair
- Late rowing bar
- Belt vibrator
- Cheat press
- Squat stand
- Weightlifting stand
- Weight plates
- Dumble bells
- Push- up stand
- Olympic weight bench
- Bar bell rod
- Karalakkatai
- Thigh press
- Weighingmachine etc.

Further, additional gyms are available in the hostels.

Swimming Pool: An Olympic standard swimming pool (50 m x 25 m) 8 lanes, 5 feet deep, with modern filtering and chlorination facility, is one of the major attractions of the campus. Most of the state level and national level swimming competitions are periodically conducted here. The pool is provided with clinically sterile water. Male and female lifeguards are available full-time to assist in case of emergencies.

(i) National Cadet Corps (NCC)

The National Cadet Corps in Kalasalingam Academy of Research and Education (KARE) formerly Kalasalingam University was formed with the National Cadet Corps Act of 1948. It was raised in September 2003 under the Unit 4(TN) Engineering Company NCC, Madurai. Our Technical Unit was started with a sanctioned strength of 100 cadets. This subunit has achieved several landmarks and has added several feathers to the cap of the university.

Our NCC cadets are trained in various activates like drill for smart composure, weapon training for confidence, map reading for self-reliance, field craft for calculations and lateral thinking, physical training for toughness, social service for leadership and selflessness, Shooting, cycling, trekking activities and sports. The students participate in the various training camps, which consolidate their training every year. Moreover, they participate in



special camps and centrally organized camps like Republic Day camp, National integrated camp, Army/Navy/Air force attachment camps and all India trekking camps. The B and C certificates are offered by the NCC, after one-year and two years of training respectively. From 2016 to the present 188 students have been successful in B certificate examination and 132 students have successfully cleared the C certificate examination. In addition, the NCC unit also conducts activities for the nation building and encourages the cadets to participate in all the events. The details of the annual students' activities conducted is as shown in Table 9.7.4.

Table 9.7.4 Activities conducted by NCC

S.No	Year	Number of Activities	Number of students Benefitted / Attended
1	2018-19	11	100
2	2019-20	6	100
3	2020-21	8	100
4	2021-22	5	100

List of Some Major Activities:

1. Republic Day Celebration
2. Independence Day celebration
3. SWACHHTA PAKHWADA
4. Awareness Rally
5. Annual Training Camp

(ii) National Service Scheme

National Service Scheme (NSS) has been introduced in the erstwhile Arulmigu Kalasalingam College of Engineering in 1987 as part of the academic programmes and ever since NSS has been functioning as a regular feature in the realm of the University. Students are encouraged to participate in the NSS Programmes as a part of non-CGPA course. The NSS has 17 units with 100 volunteers in each unit. There is one NSS Programme officer. Every year, during the semester holidays, NSS camps are organized through which many villages have been served. Besides this, there are regular NSS activities organized throughout the year. The endowment awards are also given to the best male and the best female NSS Volunteers to



encourage the students. The details of the annual students' activities conducted are as shown in Table 9.7.5.

Table 9.7.5 Activities conducted by NSS

S.No	Year	Number of Activities	Number of students Benefitted / Attended
1	2018-19	82	1769
2	2019-20	86	1827
3	2020-21	40	1822
4	2021-22	15	825

List of Some Major Activities:

1. Kerala Flood Relief Program
2. Youth Parliament
3. International Yoga day
4. NSS Day Celebration
5. Fit India Cyclothon 2020
6. Republic Day & Independence Day celebration
7. Blood donation camp

(iii) Nature Club

One of the active and popular clubs around Viruthunagar is Nature Club, KARE and it was started on September 20, 2008. It aims to inculcate a sense of awareness about the environment and how to improve it amongst the students and the general public. This club is formed mainly to create awareness among the campus community. The motto of the Nature Club is -**“to strengthen the unity of mankind and nature-for nature’s sake”**. This club actively helps in creating awareness among the people and in helping them to protect nature and wild life for the benefit of the future generations. The details of the annual students activities conducted is as shown in Table 9.7.6.

**Table 9.7.6 Activities conducted by Nature Club**

S.No	Year	Number of Activities	Number of students Benefitted / Attended
1	2018-19	2	238
2	2019-20	4	382
3	2020-21	5	496
4	2021-22	6	475

List of Some Major Activities:

1. Vithai 2K19- world water conservation day Celebration
2. Orion 2K19- Intra-college event
3. Drizzle 2k19-intra university competition
4. Zoophiles-2020
5. Greenolin-2K21

(iv) YOUTH RED CROSS

In the University Youth Red Cross Club was inaugurated in the year 2015-16 Youth represent a substantial part of the membership of the Red Cross for its humanitarian commitment. Young volunteers can make a significant contribution to meeting the needs of the most vulnerable people within their local communities through Red Cross youth programme. The details of the annual students activities conducted is as shown in Table 9.7.7.

Table 9.7.7 Activities conducted by Youth Red Cross

S.No	Year	Number of Activities	Number of students Benefitted / Attended
1	2018-19	5	303
2	2019-20	5	542
3	2020-21	3	759
4	2021-22	4	600

List of Some Major Activities:

1. Help for Kerala
2. Blood donation camp



3. Help for Delta
4. Water conservation Rally
5. Save Environment Rally
6. Awareness program on Hygiene practices

(v) Green Army

The Green Army works on the Vision to bring zero pollution level in the university by means of adopting new technologies and continuous monitoring through survey and analyze energy usage and emission of greenhouse gases in the area in order to reduce the amount of carbon footprint without affecting the output(s). The Energy Audits are conducted within the campus; it is the need of a dedicated team to work in all aspects of energy conservation and environment protection. This thought leads to the birth of the Green Team and the Green Army. The Green Army is the group of student volunteers who will be responsible to keep a watch on the judicious use of resources (Energy and water) and green environment. The details of the annual students' activities conducted is as shown in Table 9.7.8.

Table 9.7.8 Activities conducted by Green Army

S.No	Year	Number of Activities	Number of students Benefitted / Attended
1	2018-19	4	74
2	2019-20	7	116
3	2020-21	5	84
4	2021-22	2	120

List of Some Major Activities:

1. Energy Conservation for Sustainable development
2. Energy Auditing and Management for reducing the wastage of Power
3. Vehicle free day on all final Saturday of each Month
4. Carbon Footprint Calculation for each academic year
5. Motivational seminars on Renewable Energy Resources

(vi) Fine Arts Club

The energetic and charming bludgeon of the college is the Fine Arts Club. The Fine Arts Club is one of the popular clubs of the institution organizing Inter and Intra College Fest every year by providing the students, a platform to exhibit their talents to the world. On the



aphorism of bringing out the unprecedented talents of students in KARE and also to cater to those students who have an aptitude for dance or other talents in fine arts. The Fine Arts Club consists of many teams like Music, Dance, Variety, Art, Fashion, Gaming with more than 100+ talented members. Opportunities are given to all students to register for extra-curricular activities conducted by the Fine arts Club members to celebrate their club functions. The details of the annual students activities conducted is as shown in Table 9.7.9.

Table 9.7.9 Activities conducted by Fine Arts Club

S.No	Year	Number of Activities	Number of students Benefitted / Attended
1	2018-19	06	1962
2	2019-20	03	824
3	2020-21	05	1848
4	2021-22	2	973

List of Some Major Activities:

1. Intra College Fest - MIRTH 2K19
2. National Level Event - SPARKZ 2020
3. Online Intra College Fest - MIRTH 2020

C. Annual Students Activities.

i. Freshman Induction Programme (FIP) : Freshmen Induction Programme (FIP) is conducted every year. An orientation programme about KARE's academic system, hostel residency, placement and other details are given by Vice Chancellor and respective Deans. The FIP is a full-time on-campus fully residential program conducted for one full week. It starts with yoga classes in the morning, and throughout the day students are trained in various aspects on personality development as expected for a budding Engineer. In the FIP, the students are given in the training on the topics:

- English for Engineers, Presentation Skills, Communication Skills, Socializing and Etiquette, Learning Focus, Career Planning, Team Building, Goal Setting, Success through Inner Journey, Aptitude Test, Computer Skills, Voice and Accent and Personality Tests.

**ii. Club activities**

The student's activity is planned for various students club such as NSS, NCC, Sports, Nature club, Tamil Mandram, YRC, Fine Arts, Green Army, Photography and others by director of students affairs for every semester. This plan of activity will be disseminated to the students community through HoD's and Faculty Advisors. Students are encouraged to participate in the club activities to improve their skills and show their talents.

Table 9.7.10 Annual events conducted by all Clubs

S.No	Event Name	Club Name
1.	Online Blood donation Awareness Program	NSS
2.	Online AIDS Awareness Program	
3.	Online Health Awareness Program	
4.	International Peace Day	
5.	National Road Safety month 2022	
6.	NSS Day	
7.	Yoga Awareness Program	
8.	National Blood Donation Day	
9.	Communal Harmony Day	
10.	First Year Registration	
11.	UBA Program	
12.	Swatch Bharat program	
13.	National Integration Day	
14.	World AIDS Day	
15.	World Human Rights Day	
16.	One student one Tree	
17.	Unnatbharatabhiyan	
18.	REPUBLIC DAY	
19.	Blood donation Awareness camp	
20.	Pulse Polio awareness program	



S.No	Event Name	Club Name
21.	Climate Change Education and Awareness	
22.	Unnatbharatabhiyan	
23.	Global warming awareness program	
24.	Swatch Bharath Awareness program	
25.	International Women Day	
26.	Anti-Terrorism Day	
27.	7 days NSS Camp	
28.	National Sports Day & Fit India Movement Celebration	Sports
29.	AnandamAmmal& Kalasalingam Memorial State level Swimming Competition	
30.	State level Inter Collegiate Volleyball Men Tournament	
31.	KARE- ANNUAL SPORTS DAY	
32.	State level Inter Collegiate Kabaddi Men Tournament	
33.	NON-CGPA Sports Registration	
34.	Commencement of Non –CGPA Sports Class for UG and PG Course Students.	
35.	Fit India Movement Activities	
36.	38th Annual Sports Day Registration	
37.	1st Tamil Nadu State KalvivallalThiru.T.Kalasalingam Memorial Swimming Competition.	
38.	Intramural Sports and Games	
39.	NON CGPA Sports Practical	
40.	NON CGPA Result	
41.	KARE - 38th Annual Sports Day	
42.	Kalasalingam Sports Festival (Kabaddi, Volleyball, Taekwondo)	
43.	Fit India Movement Activities	
44.	Swimming Summer Coaching Camp for School Kids	
45.	Fit India Movement Activities	



S.No	Event Name	Club Name
46.	Independence Day Celebration	NCC
47.	Enrollment for 1st year students	
48.	Health awareness program	
49.	Swachh week celebration	
50.	Sadar Patel Jayanthi	
51.	SamvidhanDiwas (Constitution Day)	
52.	NCC day	
53.	Swachh Pakhwada	
54.	Flag day	
55.	CATC Camp – 3rd year	
56.	CATC Camp – 2nd year	
57.	National Youth Day Celebration	
58.	Republic day celebration	
59.	Blood donation camp	
60.	B certificate Exam	
61.	C certificate exam	
62.	Traffic Awareness Program	
63.	Zero Emissions Day-Celebration	Nature club
64.	World FOOD Day Celebration	
65.	World Soil Day Celebration	
66.	Envirofest	
67.	H2ODay	
68.	Ozonus	
69.	Healthify	
70.	Teachers' Day Celebration	Tamil Mandram
71.	International Literacy Day	
72.	Gandhi Jayanthi	



S.No	Event Name	Club Name
73.	Thai Pongal Thiruvizha	
74.	International Mother Language Day (Tamizhi)	
75.	World Poetry Day	
76.	Valam (Tamil New Year)	
77.	May Day (Kalanjiyam)	
78.	Yureon	YRC
79.	Mathara	
80.	Born to Win	
81.	Blood donation and Social Awareness Camp	
82.	YuReCa	
83.	Fantasy	Fine Arts
84.	Aarambh	
85.	Intra College Cultural Fest	
86.	Club Event	
87.	Net Zero Buildings	Green Army
88.	Strategies for energy conservation in Buildings	
89.	Energy auditing – Methodolgy	
90.	Reduce Heat Island Risks	
91.	Energy Conservation in Academic Campus – Guest Lecture	
92.	Global Warming & Plastic Ban – Awareness campaign at Srivilliputhur	
93.	Energy Auditing at KARE	
94.	Vehicle Free Day at University Campus	
95.	Carbon Footprint Calculation – Guest Lecture	
96.	'My Waste, My Responsibility' – Essay competition for Secondary School students	
97.	Tree Plantation – Watrap Taluk Government and Aided Schools	
98.	Trekking – Sadhuragiri Hills	



S.No	Event Name	Club Name
99.	WORLD PHOTOGRAPHY DAY	Photography Club
100.	NOSTALGIA	
101.	FOTOGRAPHIA 3.0	
102.	KAPTURED	
103.	ATTAIN 3.0	
104.	PHOTOPEDIA	
105.	Kaptured	
106.	Enfoque	
107.	Trekking	
108.	Kameraia	
109.	Awareness Program on Anti-Ragging Law Ragging Menace – Awareness Campaign Anti-Ragging and Anti-Drugs	Anti-Ragging Committee
110.	Awareness Program on Anti-Ragging Law Ragging Menace – Awareness Campaign Anti-Ragging and Anti-Drugs	Anti-Discrimination Committee
111.	Legal Empowerment of Women in India's Changing Scenario	Internal Complaint Committee
112.	Sexual Harassment of women at Workplace-Act & Rules	
113.	Sexism- a Psychological Perspective	
114.	Women Health & Hygiene	Women Empowerment Cell
115.	Cancer Prevention: Strategies for the younger generation	
116.	Violence against Women	
117.	International Women's Day 2022	



Annexure 9.1

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION

(Deemed to be University)

Anand Nagar, Krishnankovil-626126

Office of Director (IQAC)

STUDENT FEEDBACK FORM-Phase 1 2018-19 (Odd) (Theory courses)

Name of the Faculty & Dept:

Name of the Course:

Year/Sec:

Name & Reg No of the Student:

I. Course Plan /Text Books

1. The course teacher given the course plan as prescribed by the University
 - (a) Course plan was given on first day itself.
 - (b) Course plan was given during first week
 - (c) Course plan was given after one week.
2. Classes conducted as per course plan
 - (a) All classes was conducted as per course plan
 - (b) Most Classes were conducted as per course plan with some deviations.
 - © Not allowed as per course plan
3. Course plan having innovative Teaching learning methods /assignments /projects are
 - (a) Course plan includes Innovative Teaching learning methods/assignments/projects etc.
 - (b) Course plan has minimal innovative Teaching learning methods.
 - © Course plan do not have any innovative component.
4. Has the Text book/Xerox material issued on time?
 - (a) Materials and books received on first day of class
 - (b) Materials and books received during first week
 - © Materials and Books received after first week

II Teaching Learning

1. Punctuality of the Course teacher
 - (a) Always comes punctually to the classroom.
 - (b) Mostly comes punctually to the classroom.



- (c) Rarely comes punctually to the classroom.
- 2. Basic concepts are taught clearly.
 - (a) Concepts are taught at the level understood by all students
 - (b) Concepts are taught at the level understood by fast learners
 - (c) Mostly dictation from notes/book and concepts not taught clearly
- 3. Adequate numbers of questions are discussed to explain concepts.
 - (a) Sufficient questions are discussed.
 - (b) A few questions and examples discussed.
 - (c) Questions are not discussed adequately.
- 4. Flipped mode of teaching is adopted.
 - (a) Practical case study based question are discussed for flipped class
 - (b) Only review questions are discussed for flipped class
 - (c) No flipped classroom mode of teaching is adopted.

III Testing and Evaluation

- 1. Regular Class tests/unit tests are conducted (before SE -1)
 - (a) At least 2 class tests were conducted
 - (b) One class test was conducted
 - (c) No class test conducted
- 2. Teacher gives input to improve based on class tests/unit tests.
 - (a) Gave inputs to fast, average& slow-learners
 - (b) Gave inputs to slow-learners only.
 - (c) No input was given
- 3. Assignments are given
 - (a) At least two assignments per unit given
 - (b) One assignment per unit given
 - (c) No assignment was given
- 4. Assignments are evaluated on timely manner
 - (a) Within 2 days, assignments are evaluated and returned back
 - (b) Within a week, assignments are evaluated and returned back
 - (c) After a week, assignments are evaluated and returned back

IV Communication Skill



1. Teacher uses only English as language of Communication
 - (a) Always uses English as language of communication
 - (b) Mixing of English and local language of communication
 - (c) Mostly local language used for communication
2. Teacher adopts ICT (like LCD, animation etc) to communicate different topics.
 - (a) All difficult topics are covered by using ICT methods
 - (b) Only a few topics are covered by using ICT methods
 - (c) No topics covered by using ICT methods
3. Audibility and clarity in speech
 - (a) Clearly audible up to last benchers.
 - (b) Clearly audible up to 2nd to 3rd benchers only.
 - (c) Clearly audible for first benchers only.



Annexure 9.2

Kalasalingam Academy of Research and Education

(Deemed to be University)

Anand Nagar, Krishnankoil-626126

Office of Director (IQAC)

STUDENT FEEDBACK FORM – Phase I (Lab Courses)

Name of the Faculty & Dept:

Name of the Course:

Year/Sec:

Name &Reg.No. of the

Student:

I. Conduction of Lab Experiments

1. Has the teacher given the course plan for experiments as prescribed by the University?

- (a) Course Plan was given on first day.
- (b) Course Plan was given within one week
- (c) Course Plan was given after one week.

. Are Experiments conducted as per the course plan?

- (a) All the experiments conducted as per course plan
- (b) Most experiments conducted as per course plan with some deviations
- (c) Not followed as per course plan

II. Explanation about Lab Experiments

3. Lab Experiments are explained properly

- (a) Experiments explained by course teacher
- (b) Experiments explained partly by course teacher and partly by lab technician
- (c) Experiments explained by lab technicians or not explained at all

4. Teacher uses only English language of communication

- (a) Always uses English as language for communication
- (b) Mixing of English and local language for communication
- (c) Mostly local language for communication

5. Lab Technician has knowledge about experiments

- (a) Well knowledgeable about all experiments
- (b) Well knowledgeable about few experiments
- (c) No knowledge about experiments



6. Flipped mode of conducting lab experiments is adopted
 - (a) More than 2 experiments were explained using flipped mode of teaching
 - (b) At least 1 experiment was explained using flipped mode of teaching
 - (c) Not flipped mode of teaching was adopted

III. Support offered for results/Calculations

7. Teacher gives constructive comments on results/calculations
 - (a) Constructive comments given for all experiments
 - (b) Constructive comments given for few experiments only
 - (c) No specific comments given for any experiments

IV. Working Condition of Lab equipments

8. Working Condition of Lab equipments
 - (a) All equipments are in good condition
 - (b) Some experiment setups are not working properly
 - (c) Most of the equipments are not working properly

**Annexure 9.3****SAMPLE FORM OF STUDENT FEEDBACK ON FACILITIES WITHIN THE KARE CAMPUS**

Date:

Name :

Degree :

Department :

Year/Semester: (.....) I/II/III/IV

Address :

.....

.....

Mobile :

Email :

Feedback on Facilities within the KARE campus. [Please tick (✓) in the relevant cell]

Sl.No	Item	Very good	Good	Average	Poor	Very poor
1	Lab Facilities					
2	Library Facilities					
3	Computer Facilities					
4	Hostel Facilities					
5	Food quality in the hostel					
6	Recreational facilities					
7	Extra-curricular activities					
8	Sport Facilities					
9	Bus Facilities					
10	Wi-Fi Facilities within the campus					
11	Food facility in the canteen					
12	Mineral water facility in campus					
13	Availability of wash rooms					

Signature of the student

CRITERION 10	GOVERNANCE, INSTITUTIONAL SUPPORT AND FINANCIAL RESOURCES	120
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10.1 Organization, Governance and Transparency (55)

10.1.1 State the Vision and Mission of the Institute (5)

Response:

Vision:“ To be a University of Excellence of International Repute in Education and Research.”.

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.

10.1.2 Availability of the Institutional Strategic Plan and its Effective Implementation and Monitoring (25)

Response:

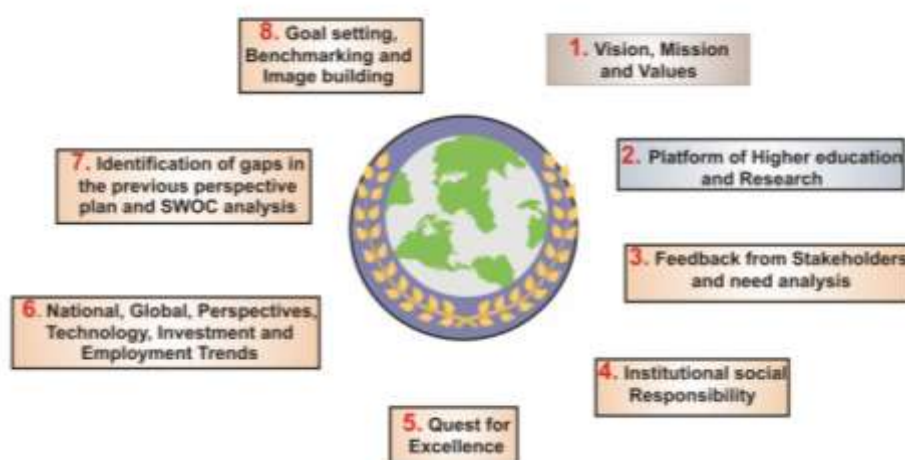
The Strategic Plan-2026 and a Case Study report for effective implementation of strategic plan on Research Activities are given below:

STRATEGIC PLAN FOR THE NEXT 10 YEARS – 2017- 2026

KARE reflect its commitment to:

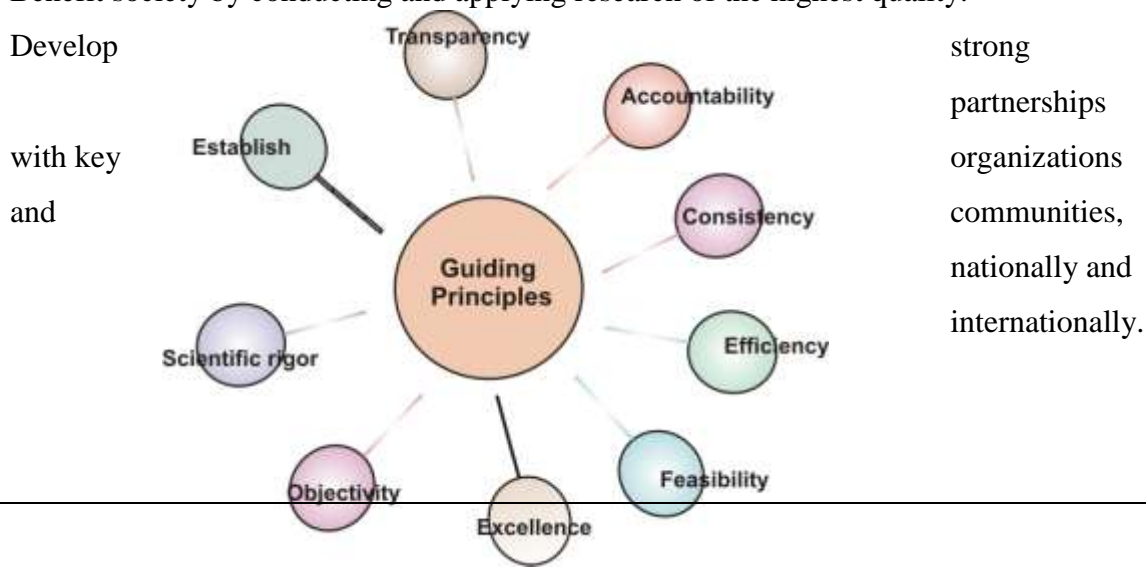
- ❖ Conserving, advancing and disseminating knowledge through teaching, learning, research and creative work of the highest standard.
- ❖ Creating a diverse, mutually respectful academic community with rational and high ethical standards.
- ❖ Placing a strong emphasis on serving our student body.

- ❖ Working to advance the intellectual, cultural, environmental, economic and social wellbeing of the people of state, country and abroad.
- ❖ Providing equal opportunities to all who have the potential to succeed in an Institution of international grade.
- ❖ Engaging with national and international scholars for both education and research to enhance intellectual development, educational quality and research productivity.
- ❖ The development and commercialization of enterprise based on the University's research and creative works.



KARE aims to:

- ❖ Be a community of highly accomplished and well supported academic and professional faculty and staff.
- ❖ Attract students of high academic potential and give them an outstanding Institution experience so that they become successful and influential graduates and loyal alumni.
- ❖ Benefit society by conducting and applying research of the highest quality.
- ❖ Develop



- ❖ Be a Institute of global standing that serves India, Asia and the World.

Objective 1: FACULTY and STAFF

A work environment is clear expectations, development of potential, extensiveness, high achievement and rewarding performance

We have to use innovative employment practices to attract and retain outstanding academic and professional staff from India and internationally experienced staff. We need to provide staff with an environment that develops rewards their talents, and community responsibilities. These things must be achieved in the face of intense national and international competition for staff. However, we will be better placed to do this as the Institute becomes more successful through the achievements of its staff.

Measures:

- Student: academic staff ratio.
- Academic: Professional staff ratio.
- Increasing Postgraduate students
- Introduce many Postgraduate Research program
- Increasing Doctoral students with KARE fellowship.
- Increasing Peer-reviewed publications
- Citations per Scopus.
- Number of prestigious awards held by staff.
- Number of national teaching excellence awards held by staff.
- Proportions of equity group staff in academic and professional positions by expertise and seniority.
- Equal opportunity to women employees
- Creating corpus fund for supporting the young faculty members

Key actions:

- Use innovative employment practices to recruit and retain high performing academic and professional staff, including those from diverse backgrounds.
- Ensure that all staff has clear performance expectations aligned to their roles and prospects of career development in the context of the University's strategy.
- Ensure that all staff has effective and regular performance feedback that links to reward, recognition and future development planning.
- Enhance staff research through fund generation, guiding graduate students, and peer publications.
- Provide career development opportunities and practices that support the aspirations of staff.

Objective 2: Decentralized

An environment in which distributed leadership is developed and valued

As a complex and highly devolved organization, the Institute relies on staff providing excellent leadership in relation to a number of activities, academic and administrative, in all parts and at all levels of the organization. It is also important to the University's role as a leading organization that staff provide leadership in their professional capacities outside the Institute and to the wider community, nationally and internationally.

Measures:

- Proportion of staff positive about leadership in staff surveys.

Key actions:

- Develop a clear understanding of leadership expectations at all levels in the University.
- Embed leadership expectations in processes for appointment of staff.
- Determine professional development needs of those progressing to leadership roles and invest in appropriate leadership development opportunities.

Objective 3: student

A diverse student body of the highest possible academic potential

Leading universities must attract students who have high academic potential, are prepared for

Institute study, have the ability to take advantage of degree study involving critical thinking, problem solving, and research-based teaching, and have a desire to learn and be challenged intellectually.

Measures:

- Proportion of school levels entering with 80% of minimum marks and secured scoring of Kalasalingam engineering entrance examination (KEEE).
- Scholarship from Institutional, national (State and Central) and private bodies (including first graduate, Sports quota students).
- Students will be admitted from other state and abroad
- Proportions of domestic students from equity groups at undergraduate and postgraduate levels.
- Numbers of students successfully transitioned into Institute through student equity support initiative.

Key actions:

- To provide KARE student fellowship of highly successful of both education and athletes.
- Ensure that the characteristics, aspirations and expectations of the students of high academic potential we wish to attract and retain within the Institute are well understood.
- Ensure that our processes for promoting the Institute to such students and for securing their interest and enrolment respond to their needs and are based on sound research.
- Ensure that we provide the kind of environment, both academic and extracurricular, that is particularly attractive to students of high academic potential.

Objective 4: Student community

A substantial increase in annual completions of taught undergraduate, masters, research masters and doctorates

As the major national centers of higher education, universities have a particular role in UG, PG and graduate education. As the largest and highest ranked Research Institute in the country, KARE will be a pre-eminent place in this regard. The number and achievements of our graduates have a significant bearing on the University's reputation and ranking, and on our contribution to society.

Measures: The following targets

Programs	2017	2026
Undergraduate	6,000	25,000
Postgraduate	1,000	10,000
Doctoral	125	1000

Key actions:

- Enhance processes for staff-student enthusiastic interactions such as faculty advisory system / training mentors and allocating students to them so as to maximize the quality of supervision and probability of student success.
- Provide students with clear expectations as to the scope and duration of their studies.
- Support proper mentoring of both undergraduate and postgraduate students to ensure that they complete their programs within the allotted time.



Objective 5: Teaching and learning environment

A high quality learning environment that maximizes the opportunity for all our students to succeed and provides them with comprehensive, intellectually challenging and transformative educational experience

Our reputation with students, their parents and families, and our communities rests significantly on the quality of our teaching and learning. We expect our graduates to be independent and critical thinkers, open to new ideas, possessing intellectual curiosity and integrity, and to have a mastery of a body of knowledge and professional skills. Our distinctive learning environment, we bring different insights into our classrooms, drive innovation in learning and research, and

ensure our society remains open to the experience of other countries.

Curriculum design, enrichment and academic flexibility



Measures:

- Course completions.
- Qualification completions.
- Outcomes of student satisfaction and engagement surveys (academic).
- Number of UG and PG degrees accredited by professional associations / NBA, and ABET accreditation bodies.
- Increase learning environment in the campus.
- Teaching and Learning Process
- Students Participation in Research Projects
- Summer fellowships
- Earning an International Certification
- Internships in industry
- Appearance and securing scores in GATE, GRE and other standardized tests

Key actions:

- Ensure that our curricula reflect the relevant graduate profiles and deliver high quality programs that meet national needs and international standards in an efficient manner.
- Enrich teaching, learning and outreach activities by drawing on international best practice in the use of new technologies.

- Provide all students with the opportunity at each level of study to interact with senior staff and researchers, and ensure that they gain the educational benefits of research informed and research-based teaching and learning.
- Develop a coordinated, research-informed suite of programs to support equity students to succeed in their studies at all levels in the University.
- Develop objective measures and benchmarks of an outstanding teaching and learning environment and review

Objective 6: Extracurricular

A distinctive, high quality extracurricular experience that maximizes the value to our alumni of their Institute experience

As well as achieving world-ranked qualifications, our students acquire increased independence, lifelong friends, a much broadened world view and – if we get it right – an enduring interest in and affection for their University. These are critical components of the student experience as a whole, and we must be very aware of their importance not only to our students and future alumni, and to the communities they will serve, but also to the reputation and standing of the University. The ability to access University-supported accommodation and to participate in shared extracurricular activities is crucial to the engagement of students with the University, as well as to their academic success. Engagement will in turn lead to lifelong, reciprocal relationships with alumni that connect them to the Institute and to one another.

Measures:

- Outcomes of student satisfaction surveys (extracurricular).
- Outcomes of graduate destination surveys.
- Proportions of graduates who have participated in international learning and research activities abroad and in India.
- -Alumni with whom the Institute is actively engaged.
- Philanthropic support per alumnus.

Key actions:

- Ensure that we have graduate profiles which clearly lay out the desired attributes of graduates and the value that students will obtain from their extracurricular, as well as their academic, university experiences.
- Encourage activities and events that engage students in campus life, and in the unique cultural attributes of Tamil Nadu, India and the Asian Pacific region.
- Collaborate with undergraduate and postgraduate student representatives as requirements for facilities and services that support the social, recreational, cultural and spiritual needs of students are determined.
- Actively engage with alumni to seek their financial, political and societal support for the Institute to benefit future generations of students.

Objective 7: Research Perspective



A growing output of excellent research across all our disciplines

High quality research which is reflected through guiding graduate students, peer-reviewed publications, and grant in full range of disciplines. This recognition of research excellence will in turn support the recruitment and retention of high quality staff and students, and enhance Indian's international standing and connectedness.

Measures:

- Increasing number of Ph.D students with URF, CSIR, UGC - JRFs/SRFs

- Number of peer-reviewed research and creative outputs.
- Consecutive increase in high-impact research articles every year
- Proportion of publications authored jointly with international colleagues.
- Increasing the success rates of research grants from both national and International funding agencies such as DST, SERB, DBT, CSIR, DHR, DRDO, ICMR, IEDC, NIH, WHO etc.,
- Increasing community service based research and enhances betterment of both students and state community.

Key actions:

- Establishment of new Research Centers and modern research laboratories
- Ensure that research quality and productivity are key attributes evaluated when academic staff are employed, continued or promoted.
- Invest in professional development activities that will enhance the quality and quantity of research performance across the University.
- Ensure that the importance of maximizing citations and impact is recognized across the Institute and is reflected in publishing behaviors.
- Ensure that our infrastructure is appropriate for the support of research.



Objective 8: Create vibrant and unique research group

Establishment of New Research Laboratories

The establishment of International Research Center at Kalasalingam University has greatly increased our identity and reputation as a research institution. To further strengthen our research activities, in the next five years we will establish at least four more research centers besides strengthening the existing centers.

- Energy particularly alternate energy and Smart Grid
- Water Technology
- Drug Design and Development
- Computing Sciences with a focus on Security and Big Data Analytics

Center for Energy

As Energy is the need of the hour and the country and the world are looking for alternate source of energy. The thrust areas of the center would be:

- Development of Technology for Performance enhancement of Solar PV System
- Development of Embedded Processor based Smart meter
- Energy Auditing and Energy Management
- Modeling and Controller Design

Center for Water Technology

The existing Center for Water Technology would be further strengthened. The research at this Center will focus on water resources and waste water treatment.

Center for Drug Design and Development

The need for potential new drugs is increasing as there is still a lack of suitable medicines for many diseases. The drug discovery research has taken a new avenue in the post-genomic era. The Center for Drug Design and Development will carry out research in the following dimensions.

- Target Identification and validation
- Lead Identification using Computer Aided Drug Design
- Identification of Lead compounds from natural resources
- Synthesis of novel lead molecules using organic synthesis route

- Lead Optimization

Objective 9: partnerships

Strong partnerships with key organizations and communities which have a positive impact on both parties

An international, research-intensive Institute has many communities which contribute to and draw upon its research, teaching and ideas. The Institute engages with a variety of communities. Reputed research and academic institutes from both national and international are the key partners for national and local employers and businesses. The Institute must continue to strengthen its links with Asia, and enhance engagement with increasingly important Asian communities.

Measures:

- Number of engaged MoU with reputed Institute.

Key actions:

- Identify key partners with whom the University has or can develop strong relationships from within the very wide group of potential partners (including business communities, professional organizations, artistic and creative communities, and partner universities).
- Make available the expertise of the University to key partners.
- Keep partners well informed of the University's strategic direction and performance, and give them the opportunity to play a part in its future development.
- Develop a comprehensive, University-wide alumni engagement program.

Objective 10: infrastructure facility

An infrastructure of the highest quality possible to support our teaching, learning, research, and community engagement

The infrastructural elements that support our core academic and administrative activities –

buildings, grounds, plant, equipment, information systems, and libraries – are also crucial enablers of our success. We have committed ourselves to refurbished and new buildings, and of investment in library collections, research and teaching equipment, commensurate with that of the Asia.

Measures:

- Space benchmarks.
- Utilizations benchmarks.
- Benchmarked construction of buildings

Key actions:

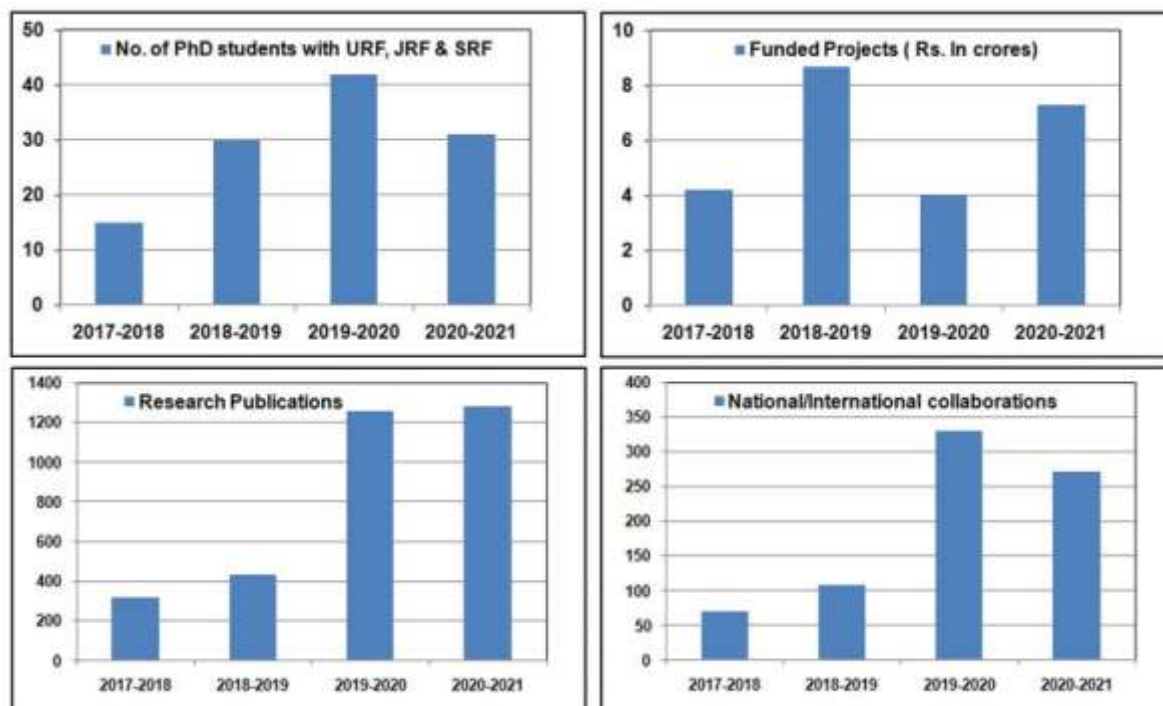
- Construction of 3000 seated Auditorium for campus activities
- Construction of tower buildings for faculty and staff quarters for create vibrant research communities
- Ensure that the University's capital planning is guided by appropriate benchmarks of the nature and extent of physical infrastructure provided by peer international universities.
- Ensure that all existing infrastructure is maintained and used as efficiently as possible.
- Continue investment in buildings, plant and equipment at an appropriate level, allowing for the proper maintenance of existing infrastructure and replacement of assets for teaching and research activities.

CASE STUDY ON RESEARCH

KARE providing a growing output of excellent research across all our disciplines

This case study shows that how KARE improved in Research and Development activities yearwise. KARE has significant improvement by offering University Research Fellowship (URF) for doing Ph.D. students every year along with government-funded projects (CSIR, SERB, DBT, DRDO, and MOEF). In 2017-18 contributed 15 URF and gradually increased 103 Ph.D. students in 2021-22. The 4.22 crores are received during 2017-18, 8.67 crores in 2018-19, 4.25 crores in 2019, and 7.30 crores in 2020-21. Altogether past four years received 24.22 crores from both government and non-government organizations. The output of research publications also gradually increased every year from 2017 (317), 2018 (432), 2019 (1256), 2020 (1278). Therefore, 4 folds of publications are increased over the four years. The faculty with

international collaborations are 2017-18 (70), 2018 (107), 2019 (329), 2020 (271), and the collaborations are increased 3 folds during this period.



10.1.3 Governing body, administrative setup, functions of various bodies, service rules, procedures, recruitment and promotional policies (10)

(List the governing, senate, and all other academic and administrative bodies; their memberships, functions, and responsibilities; frequency of the meetings; and attendance therein, in a tabular form. A few sample minutes of the meetings and action-taken reports should be annexed.

The published rules including service rules, policies and procedures; year of publication shall be listed. Also state the extent of awareness among the employees/students.)

Response:

1. Chancellor of the institution holds the highest office and is involved in the furtherance of the objectives of the institution.
2. The Vice-Chancellor functions as the Ex-officio Chairperson of all statutory bodies which have specific functions. The Vice-Chancellor exercises powers relating to the governance and administration of the institution and functions as prescribed by the regulations and byelaws and is ably assisted by the Registrar, Finance Officer, Controller of Examinations, Directors, Deans, HOD's, and other teaching and non-teaching staff.
3. The Registrar is the ex-officio Secretary of the Board of Management, the Academic Council and the Planning and Monitoring Board. The Registrar directly reports to the Vice-Chancellor. The Registrar is responsible for the smooth conduct of all administrative

activities such as record maintenance, official correspondence, convening meetings and represents the institution in all official meets and legal proceeds

4. The Director-Student Affairs guides and coordinates the activities of the students.
5. The Director (Research and Development) coordinates the research and consultancy activities
6. The Controller of Examinations is responsible for organizing examinations and evaluations.
7. The Director-Accreditation and Ranking carries out the works related to Accreditation and Ranking.
8. The Director-Faculty Affairs and IQAC coordinates the Quality Related activities and Faculty empowerment strategies.
9. The Finance Officer is responsible for the preparation of annual estimates, statements of account for submission to the Finance Committee and ensures mobilization of funds and its proper utilization.
10. The Estate Officer oversees the maintenance and upkeep of the infrastructure facilities. The Public Relations officer ensures communication with the public and press.
11. Every one of the Directors of the Institution is assisted by Deputy Directors.
12. The Heads of the Department Coordinate the Department level Academic and administrative activities.
13. The Class Coordinator of each class is responsible for the overall development of students in his/her class such as organizing seminars/workshops, etc.,
14. , The Class Committee Chairperson reviews periodically the progress of the classes, monitors the progress of syllabi coverage and resolves issues related to slow-learners.
15. For a group of 20-25 students, there is a Faculty Advisor who helps the students in getting general advice on the academic programme. Faculty Advisor maintains regular contact with the parents/guardians of their wards.
16. The practice of rotation of HoDs and Deans is taking place once in three years.
17. Every faculty member gets a chance to organize Faculty Development Programmes (FDP), National Conferences/Seminars/Workshops.
18. The faculty members also play a role as Programme Coordinator, Module Coordinator, Course Coordinator, Assistant Wardens and Deputy Wardens to facilitate academic and administrative needs.

Various Statuary Bodies:

1. Board of Management
2. Academic Council
3. Planning and Monitoring Board
4. Finance Committee
5. Internal Quality Assurance Cell

Non-Statuary Bodies:

1. Library Committee
2. Board of Studies

The grievance redressal mechanism comprises of:

3. Anti-ragging cell
4. Women's Empowerment Cell
5. Internal Complaints Committee
6. Anti-Discrimination Committee

7. Grievance Redressal Committee
8. EMGRC

Frequency of Meeting

SNo	Name of the Authority	Frequency of meetings
1	Board of Management	4 meetings per Annum
2	Finance Committee	2 meetings per Annum
3	Planning & Monitoring Board	1 meeting per Annum
4	Academic Council	3 meetings per Annum
5	Internal Quality Assurance Cell	4 Meetings per Annum
6	Anti-Ragging Committee	At least One meeting per Annum
7	Internal Complaints Committee	At least One meeting per Annum
8	Anti-Discrimination Committee	At least One meeting per Annum
9	Grievance Redressal Committee	At least One meeting per Annum
10	Board of studies	2 Meetings per Annum
11	Women Empowerment Cell	At least One meeting per Annum
12	Library Committee	2 Meetings per Annum
13	EMGRC	Whenever Required

Composition of Board of Management:

S.No	MEMBERS	DESIGNATION
1.	Thiru. K. Sridharan	Chancellor
2	Dr. S.Arivalagi, Pro Chancellor	Member – Representing Sponsoring Society
3	Dr. R. Nagaraj, Vice Chancellor,	Vice Chancellor

	Kalasalingam Academy of Research and Education	
4	Dr. G. Swaminathan Retd. Dean, Madurai Medical College, Madurai	Trust Chairman
5	Dr. Chandrakant Kokate Vice Chancellor KLE Academy, Belgaum, Karnataka	Member- Chancellor's Nominee
-6	Dr. Rajkamal Former Vice Chancellor Devi Ahila University, Indore	Member- Chancellor's Nominee
7	Dr. H. Devaraj, Former Vice Chairman UGC	Member – Representing Sponsoring Society
8	Dr. Shasi Anand, Director, Kalasalingam Academy of Research and Education	Member – Representing Sponsoring Society
9	Mr. S. Arjun Kalasalingam Director, Kalasalingam Academy of Research and Education	Member – Representing Sponsoring Society
10	Dr. C. Ramalingan, Dean - FE, Kalasalingam Academy of Research and Education	Member
11	Dr. R. Viji, Dean – KBS, Kalasalingam Academy of Research and Education	Member
12	Dr. B. Subathra, Professor, Department of EIE, Kalasalingam Academy of Research and Education	Member
13	Dr. V. Aruna Janani, Associate Professor, Department of Chemical Engineering Kalasalingam Academy of Research and Education	Member
14	Dr. V. Vasudevan Registrar Kalasalingam Academy of Research and Education	Member Secretary

Rules and Responsibility of Board of Management (BOM):

1. The Board of Management shall be the principal executive authority of the University and, as such, shall have all powers necessary to administer the University subject to the provisions of the University Act and the Statutes made there under; and may make regulations for that purpose and also with respect to matters provide hereunder.
2. The Board of Management shall have the following powers and functions, namely:-

1. To recommend the names of three persons to the Chancellor for appointment as Registrar of the University on the recommendations of the selection committee constituted for that purpose by it and headed by the Vice-Chancellor;
2. A report on the working of the University;
3. Audited Statement of accounts;
4. Budget proposals for the ensuing academic year;
5. To manage and regulate the finances, accounts, investments, properties, business and all other administrative affairs of the University and for that purpose, constitute committees and delegate the powers to such committees or such officers of the University as it may deem fit;
6. To invest any money belonging to the Institution, including any unapplied income, in such stock, funds, shares or securities, as it may, from time to time, think fit, or in the purchase of immovable property, with the like power of varying such investments from time to time; except land acquired or building constructed with the assistance of the Government, in which cases the prior approval of the Government shall be required;
7. To enter into vary, carryout and cancel contracts on behalf of the University and for that purpose to appoint such officers as it may think fit;
8. To provide the buildings, premises, furniture and apparatus and other means needed for carrying on the work of the Institution ;
9. To entertain, adjudicate upon, and if it think fit, to redress any grievances of the officers, teachers, students and employees of the University;
10. To create teaching, administrative, ministerial and other necessary posts, to determine the number and emoluments of such posts, to specify the minimum qualifications for appointment to such posts on such terms and conditions of service as may be prescribed by the Regulations made in this behalf;
11. To appoint examiners and moderators, and if necessary to remove them and to fix their fees, emoluments and travelling and other allowances, after consulting the Academic Council ;
12. To select a common seal for the University;
13. To exercise such other powers and to perform such other duties as may be considered necessary, or imposed on it by or under the University Act.
14. The Board of Management shall meet, at least, once in three months and not less than fifteen days' notice shall be given of such meetings.
15. The meeting of the Executive Council shall be called by the Registrar under instructions of the Vice-Chancellor or at the request of not less than five members of the Board of Management.
16. One-half of the members of the Board of Management shall form the quorum at any meeting.
17. In case of difference of opinion among the members the opinion of the majority shall prevail.
18. Each member of the Board of Management shall have one vote and if there be equality of votes on any question to be determined by the Board of Management, the Chairman of the Board of Management or as the case may be, the member presiding over that meeting shall, in addition, have a casting vote.
19. Every meeting of the Board of Management shall be presided over by the Vice-Chancellor and in his absence by a member chosen by the members present.

20. If urgent action by the Board of Management becomes necessary, the Vice-Chancellor may permit the business to be transacted by circulation of papers to the members of the Board of Management. The action so proposed to be taken shall not be taken unless agreed to by a majority of members of the Board of Management. The action so taken shall be forthwith intimated to all the members of the Board of Management. In case the authority concerned fails to take decision, the matter shall be referred to the Chancellor whose decision shall be final.

Composition of Academic Council:

S.No	Name of the Person	Designation	
1	Dr. Nagaraj Ramarao	Vice - Chancellor	Chairperson, Ex-officio
Dean(s) of Faculties:			
S.No	Name of the Person	Designation	Member
1	Dr. N. Lakshmi Thilagam	Dean - Kalasalingam School of Architecture	Ex-officio
2	Dr.R.Rajam	Dean - School of Bio, Chemical and Processing Engineering	Ex-officio
3	Dr.P.Sivakumar	Dean - School of Electronics, Electrical and Biomedical Technology	Ex-officio
4	Dr.P.Deepalakshmi	Dean - School of Computing	Ex-officio
5	Dr.N.Rajini	Dean - School of Mechanical, Aero, Auto and Civil Engineering	Ex-officio
6	Dr. Jesu Edward George	Dean - Kalasalingam School of Agriculture & Horticulture	Ex-officio
7	Dr.R.Viji	Dean - Kalasalingam Business School	Ex-officio
8	Dr. Dattatri. K. Nagesha	Dean - School of Advanced Sciences	Ex-officio
9	Dr.V.Pandiyarajan	Dean - School of Liberal Arts and Education	Ex-officio
10	Dr. C. Ramalingan	Dean – School of Freshman Engineering	Ex-officio
Heads of the Department			
S.No	Name of the Person	Designation	Member
1	Dr.Jagmohan Meher	HoD - Agricultural Engineering	Ex-officio
2	Dr.Vasumathi	HoD - Agriculture	Ex-officio
3	Mr.H.Ahamed Fazeel Akram	HoD - Architecture	Ex-officio
4	Dr.S.Arunvinthan	HoD - Aeronautical Engineering	Ex-officio

5	Dr.Thirumalaikumaran	HoD - Automobile Engineering	Ex-officio
6	Dr.T.Kathiresan	HoD - Biotechnology	Ex-officio
7	Dr.G.Vishnuvarthanan	HoD - Biomedical Engineering	Ex-officio
8	Dr. P. L. Meyappan	HoD – Civil Engineering	Ex-officio
9	Dr.V. Aruna Janani	HoD - Chemical Engineering	Ex-officio
10	Dr.K.K.Praneeth	HoD - Chemistry	Ex-officio
11	Dr.K.Kartheeban	HoD - Computer Applications and Computer Science & Information Technology	Ex-officio
12	Dr.S.Karthik	HoD - Commerce	Ex-officio
13	Mr.J.Prabhu	HoD - Catering Science and Hotel Management	Ex-officio
14	Dr.A. Ramkumar	HoD - Electrical and Electronics Engineering	Ex-officio
15	Dr. V.Yogeshwar Chakrapani	HoD - Electronics and Instrumentation Engineering	Ex-officio
16	Dr. S. Remadevi	HoD - English	Ex-officio
17	Ms. A.V. Surabhi	HoD - Forensic Science	Ex-officio
18	Dr. Selvarani	HoD- Horticulture	Ex-officio
19	Dr.S.Dhanasekaran	HoD - Information Technology	Ex-officio
20	Dr.S.Kameshwari	HoD - Mathematics	Ex-officio
21	Dr.V.Arumuga Prabhu	HoD - Mechanical Engineering	Ex-officio
22	Dr. B. Selvakumar	HoD - Physics	Ex-officio
23	Dr.M.Maria Antony Raj	HoD - Social Work	Ex-officio
24	Mr.D.M.Rajan	HoD - Special Education	Ex-officio
25	Dr. K. Karthigadevi	HoD – Ship	Ex-officio
26	Mr.Prabhakar	HoD - Visual Communication	Ex-officio

Professor

S.No	Name of the person	Designation	Member
1	Dr.S.Sampath	Professor - Computer Science and Information Technology	Member
2	Dr.D.Devaraj	Professor - Electrical and Electronics Engineering	Member
3	Dr.B.Subathra	Professor - Electronics and Instrumentation Engineering	Member
4	Dr.V.Yegna Narayanan	Professor - Mathematics	Member
5	Dr.S. Asath Bahadur	Professor - Physics	Member

Associate Professors

S.No	Name of the person	Designation	Member
1	Ar.L.Vinu Pandian	Associate Professor -	Member

		Architecture	
2	Dr.Muthukumaran	Associate Professor - Biotechnology	Member
3	Dr.G.Delina	Associate Professor - Business Administration	Member
4	Dr.M.Kalpana	Associate Professor - Electronics and Communication Engineering	Member
5	Dr.K.Suthendran	Associate Professor - Information Technology	Member
Assistant Professors			
S.No	Name of the person	Designation	Member
1	Dr.E.V. Ramkumar	Assistant Professor - English	Member
External Members - Academia			
S.No	Name of the person	Designation	Member
1	Prof.Maniklal Das	Professor, Computer Science, Dhirubhai Ambani Institute of Information and Communication Technology (DA-IICT), Gandhinagar, India	Member
2	Prof.Jagadeesh Gopalan	Professor, Department of Aerospace Engineering, Indian Institute of Science, Bangalore, India	Member
3	Dr.Sharad Mhaikar	Pro Vice Chancellor · NMIMS University	Member
External Members - Industry			
S.No	Name of the person	Designation	Member
1	Shri Vithal Madyalkar	Country Manger - IBM Innovation, Centre for Partners at IBM India Ltd.	Member
2	Shri Venkatesh Prasad	Nanochip Solutions Pvt. Ltd.	Member
Secretary			
S.No	Name of the person	Designation	Member
1	Dr.V.Vasudevan	Registrar	Ex-officio
Permanent Invitees			
S.No	Name of the person	Designation	Member
1	Dr. A. Koteswararao	Director Academics	Ex-officio
2	Dr.M.Pallikonda Rajasekaran	Director - Research and Development	Ex-officio
3	Dr.P.Sarasu	Director - International Relations and Industry Interactions	Ex-officio
4	Dr.M.Muthukannan	Director - Student Affairs	Ex-officio
5	Dr.T.R.Neelakantan	Director - Ranking and	Ex-officio

		Accreditation	
6	Dr.S.Seshadhri Srinivasan	Director - International Research Centre	Ex-officio
7	Dr.C.Sivapragasam	Director - FALT	Ex-officio
8	Dr. R. Ramalakshmi	Director – Centre for Distance and Online Education	Ex-officio
9	Dr.J.T.Winowlin Jappes	Controller of Examinations	Ex-officio

The Academic Council is principal academic body of the Institute and shall subject to the provisions to the Memorandum of Association and the Rules and Bye-Laws shall have the control over and be responsible for the maintenance of standards of education, teaching and training, inter departmental co-ordination, research, examinations and tests with in the Institute and shall exercise such other powers and perform such other duties and functions as may be imposed or conferred upon it by the Rules and Bye-Laws.

Composition of Finance Committee:

S.No	MEMBERS	DESIGNATION
1.	Dr. K. Sridharan, Chancellor, Kalasalingam Academy of Research and Education	CHANCELLOR,
2	Dr. R. Nagaraj Vice Chancellor, Kalasalingam Academy of Research and Education	CHAIRMAN Finance Committee
3	Dr. S. Shasi Anand, Vice President, Kalasalingam Academy of Research and Education	MEMBER Nominated by Trust
4	Mr. T. Krishnamoorthy, No.30, 1 st Cross Street, Kasturba Nagar, Adyar, Chennai 600 020.	MEMBER Nominated by Board of Management
5	Dr. G. Swaminathan Retd. Dean, Madurai Medical College, Madurai	MEMBER Nominated by Board of Management
6	Dr. V. Vasudevan Registrar, Kalasalingam Academy of Research and Education	Special Invite
7	Mrs. Sundari Ramakrishnan, Finance Officer	Member Secretary Finance Committee

	Kalasalingam Academy of Research and Education	
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1. The functions and duties of the Finance Committee shall be as follows:-

1. to examine and scrutinize the annual budget of the Institution and to make recommendations on financial matters to the Board of Management;
2. to consider all proposals for new expenditure and to make recommendations to the Board of Management;
3. To consider the periodical statements of accounts and to review the finances of the Institution from time to time and to consider re-appropriation statements and audit reports and to make recommendations to the Board of Management;
2. The Finance Committee shall meet at least, twice in every year. Three members of the Finance Committee shall form the quorum.
3. The Vice- Chancellor shall preside over the meetings of the Finance Committee, and in his absence, a member elected at the meeting shall preside. In case of deference of opinion among the members, the opinion of the majority of the members present shall prevail.
4. The constitution, powers and functions of the other authorities which may be declared by the Statutes to be the authorities of the Institution, shall be such as may be prescribed.

Composition of Planning and Monitoring Board:

S. No.	Name and Address	Designation
1.	Prof. R. Nagaraj Vice Chancellor Kalasalingam University	Chairman
2.	Dr. S. Shasi Anand, Vice President, Kalasalingam University	Member – Nominated by Board of Management
3.	Prof. S.K. Singh, Professor & Dean (AA), Department of Civil and Environmental Engineering, Delhi Technological University, New Delhi 110 042.	Member - UGC Nominee
4.	Prof. P. Gunasekaran Vice Chancellor VIT Bhopal University, Bhopal	Member – Nominated by Board of Management
5.	Prof. S. Sivasubramanian, Former Vice Chancellor, A-3, Lake View Apartment, 1, Anna Nedunchalai, Perungudi, Chennai 600 096.	Member – Nominated by Board of Management
6.	Prof. G. Arumugam, Former Professor, Dept. of Computer Science,	Member – Nominated by Board of

	MKU, 7/64, Punnagai Illam, Wellington Road, NGGO Colony, Nagamalai, Madurai - 625 010.	Management
7.	Dr. D. Devaraj, Dean - SEET & Director – Academics, Kalasalingam University	-do-
8.	Dr. K. Sundar, Dean – SBCE & Director - IRC Kalasalingam University	-do-
9.	Dr. S. AsathBahadur, Director – Student Affairs, Kalasalingam University	-do-
10.	Dr. S. Balamurali, Director – R & D Kalasalingam University	-do-
11.	Dr. C. Sivapragasam, Director (IQAC) Kalasalingam University	-do-

1. The Planning Board shall be the principal planning body of the University and shall have the following powers and functions:

- to prepare and recommend short-term and long-term plans of the University;
- to conduct periodic impact assessment of the educational programmes offered by the University;
- to recommend new structures to be created in the Institution such as Schools / Centres;
- to frame structures, rules, norms and processes to facilitate smooth functioning and quality enhancement;
- to identify and recommend to the Academic Council / Board of Management on new areas of study keeping in view the vision and mission of the University;
- to develop financial models and recommend ideas for resource mobilization, funding initiatives and fund management;
- to recommend the principles and policy framework for financial and human resource planning and norms for allocation for various activities of the University;
- to develop and recommend modes, designs and strategies of instruction, and structures required for these;
- to plan and review the infrastructure development of the University;
- to plan and recommend the design framework of comprehensive information system covering all aspects of the functioning of the University;
- any other work that the Planning Board can take for itself, or which other statutory bodies assign the Planning Board.

EMPLOYEE SERVICE RULE

Employees appointed in KARE are governed solely by the rules and regulations laid down by the Board of Management.

1. Authority

KARE is wholly administered by a Trust and its Board of Management reserves its right to alter or amend or repeal or annul any or all of the rules and regulations.

2. Appointment

1. Qualifications for various posts shall always be in accordance with the norms prescribed by the Board of Management from time to time.
2. Employees appointed shall deposit all the original certificates of their academic qualifications with KARE on the date of joining duty. In cases where original certificates cannot be deposited due to reasons beyond their control, a security deposit equivalent to three months salary and allowances will have to be made on the date of joining. The deposit will be refunded on the date when the employee submits all original certificates.
3. When the employee has to necessarily produce the originals to an external body, the employee shall produce the proof of such a requirement and deposit a sum equivalent to 3 months gross salary (including allowances) of the employee and collect the originals from KARE. The holding of the certificates by the employee in such cases shall not exceed one month from the date of such withdrawal. The deposit amount will be refunded on surrendering all the certificates to KARE.

3. Accountability and Responsibility

1. Employees should maintain punctuality always. They should not leave the campus before the closing time of work for the day without obtaining the permission from the concerned authority.
2. Every faculty shall complete the syllabus for the courses as prescribed by KARE.
3. Every faculty is normally held responsible for the results of the students taught by him.
4. Absence from duty without obtaining prior sanction of leave, or habitual late attendance will amount to gross misconduct attracting summary termination of service.

4. Salary

1. Salary payable to any employee is formulated by KARE from time to time.
2. Salary is credited to the account maintained in the Bank by the employee within 7 working days in the succeeding month.

5. Provident Fund

1. Employees are governed by the Employees Provident Fund Miscellaneous Act 1952.

6. Promotions and Increments

1. Promotions shall be made only on the basis of 'merit and performance.'
2. The Board of Management has the right to prescribe the mode to assess the performance of the employee. Faculty members desires of promotion should apply when the application is called for in the proper format.

3. The eligibility criteria for applying promotion are given in the table below. For Arts and Management, 2 papers in SCIE journal can be equated to 1 book publication through a reputed national level or international publisher. For higher categories of promotion, student feedback and examination results are not mentioned explicitly assuming that the aspirants are experienced teachers.

Minimum Expectation for Promotion

Category	Engineering / Technology	Science/Arts/Management
ACP to Professor	Any three of the below <ul style="list-style-type: none"> • 10 papers in SCIE indexed journals maintaining undisputed quality and having impact factors • 2 Ph.D.s produced • 2 research grants received • 4 years of service as ACP 	Any three of the below <ul style="list-style-type: none"> • 10 papers in SCIE indexed journals maintaining undisputed quality and having impact factors • 4 Ph.D.s produced • 2 research grant received • 6 years of service as ACP
APIII to Associate Professor (ACP)	Any three of the below <ul style="list-style-type: none"> • 5 papers in SCIE indexed journals maintaining undisputed quality and having impact factors • 2 Ph.D.s guiding • 1 research grant • 4 years of service as APIII 	Any three of the below <ul style="list-style-type: none"> • 7 papers in SCIE indexed journals maintaining undisputed quality and having impact factors • 1 Ph.D. produced • 1 research grant • 6 years of service as APIII
APII to AP-III	Any three of the below <ul style="list-style-type: none"> • Good feedback from students and 90% results in examinations • Ph.D. qualification • 2 papers in SCIE indexed journals maintaining undisputed quality and having impact factors • 4 years of service as APII 	Any four of the below <ul style="list-style-type: none"> • Good feedback from students • 90% results in examinations • 2 Ph.D.s guiding • 4 papers in SCIE indexed journals maintaining undisputed quality and having impact factors • 6 years of service as APII
API to APII	Any four of the below <ul style="list-style-type: none"> • Good feedback from students • 90% results in examinations • Ph.D. registration confirmed • 2 papers in scopus indexed journals with SNIP • 4 years of service as API 	Any four of the below <ul style="list-style-type: none"> • Good feedback from students • 90% results in examinations • Ph.D. qualification • 2 papers in SCIE indexed journals maintaining undisputed quality and having impact factors • 5 years of service as API

4. When the authorities realise extra-ordinary contributions from a faculty member, fast-track promotion will be conferred without separate application and processing. Fast-track promotion is possible in the case of extra-ordinary performance of faculty member in teaching and/or research and/or administration.

5. DA revisions and increments are decided based on the prevailing situations frequently.

7. Leave

Leave cannot be claimed as a matter of right. The essence of the leave regulations is to enhance the sense of responsibility in a faculty member to impart, without any break, credible and effective teaching to the students given to his or her charge during the academic session. Hence, any leave application expected to state alternative arrangements made for the academic activities. Wherever suitable, the necessity of granting the leave in terms of benefits to the student community and administration of KARE is also to be stated. Granting of any leave is at the discretion of KARE.

1. Faculty members can apply for on-duty leave on their own for a period not exceeding 10 days in an academic year. On-duty leave may be granted to a staff member for attending conferences, Faculty Development Programmes, undertaking examiner-ship in a university, etc. On-duty leave can be availed after getting approval from HoD, Dean and Director-Accreditation and Ranking. During academic teaching session, applying for on-duty leave shall be avoided.
2. By completion of a month of service, an employee is eligible for a casual leave of one day. Employees are permitted to avail 12 days of casual leave in a year (July to June). Casual leave counting start afresh from July of every year and Casual leave is not carried over. However, staff working for admission and administration may be allowed to avail casual leave in special circumstances by the approval of the Vice-Chancellor.
3. The maximum period for which casual leave can be taken is not more than 3 days at a time, except under special circumstances. For more than 3 continuous days of casual leave approval is to be obtained from Vice-Chancellor. Sundays and holidays, when prefixed or suffixed to casual leave, will not count towards casual leave.
4. Employees are expected to avail casual leave with prior approval. Casual leave availed without prior sanction, or refusal of sanction by the competent authority or leave extended beyond the sanctioned period can be treated as leave on loss of pay and repeated such incidents may result in disciplinary action. Employees, after exhausting the casual leave, if required to proceed on leave on loss of pay, shall get prior sanction from the Vice-Chancellor through proper channel, clearly stating the emergency. The Vice-Chancellor treat appropriately the leave on loss of pay availed by the faculty without prior sanction.
5. Those who did not exhaust their casual leave at the end of June of every year are entitled for earned leave equal to $\frac{1}{3}^{\text{rd}}$ of the remaining casual leave + 2 day in a year. While casual leave is not carried over to the next year, earned leave can be accumulated to a maximum of 30 days. Earned leave can be encashed at a minimum interval of two years and the approval will be based on budget allocation.
6. Leave on medical grounds with full pay shall be granted to any Employee subject to (i) availability of casual and earned leaves at his credit and (ii) production of a medical certificate from a registered medical practitioner. Such a medical certificate should accompany the requisition for leave. At the time of rejoining duty, a certificate of fitness issued by a registered medical practitioner should be produced. KARE reserves the right to instruct that employee to appear before any medical practitioner for medical examination, before sanctioning the leave and for fitness verification to rejoin.
7. Employees with more than 5 years of service can apply for the earned leave for any unavoidable reasons other than sickness with prior permission. Members of the teaching

faculty cannot avail the earned leave while the academic session is in progress. Earned leave can be availed at a maximum of one occasion in a year.

8. Generally circular for vacation leave is issued by the end of odd and even semesters. Faculty member attending to teaching work who have completed three years of services as on 30th June of the year are entitled to vacation leave which shall not exceed 30 days (20 days in summer and 10 days in winter) in an academic year. However, if duties assigned during vacation-leave should be given priority and attended. Faculty members who did not teach at KARE, and those who availed leave on loss of pay in any one or both of the immediate earlier semesters are not entitled for vacation. HoD need to submit and get approval of the vacation leave proposal of all faculty members of the department and ensure that at least 1/3 of the faculty members are available anytime.
9. Faculty members can be granted study leave and deputed for higher studies. Such a leave shall not exceed 36 months in the whole of the employee's career. In such cases, the employee has to execute an agreement, as prescribed by KARE, to serve KARE for a minimum period which will be not less than three times of the leave availed of from the date of re-joining.
10. Sabbatical leave for research work shall be granted for faculty members with more than 3 year of experience at KARE. The maximum period of sabbatical leave can be 2 weeks. Leave for post doctoral fellowship shall be granted for a maximum of 1 year for faculty members with more than 1 year of experience at KARE. Once availed, the next sabbatical leave may be granted after a minimum period of 2 years considering the outcomes of previous sabbatical leave.
11. No employee shall remain absent after the expiry of his leave period without obtaining prior sanction for extension of leave. Such overstay will be treated as dereliction of duty and attract penalty.
12. All married female employees with more than 3 years of experience at KARE are eligible for maternity leave. Maternity leave with full pay for a maximum of 26 weeks at each instance can be availed by female employees with less than two surviving children.
13. Staff can avail a maximum of 5 days of compensation leave for 'Work on Holiday' (WH) in a year. If a staff is to be assigned WH beyond 5 days in a year, prior written permission should be obtained from Vice-Chancellor stating necessity and the history of WH of the staff in the year.

8. Code of Conduct

1. Employees should maintain absolute integrity and absolute devotion to duty at all times.
2. Those holding responsible posts should maintain independence, and impartiality in the discharge of their duties.
3. Report to superiors the fact of your arrest or conviction in a Criminal Court and the circumstances connected therewith, as soon as it is possible to do so.
4. If any legal proceedings are instituted for the recovery of any debt due from employee or for adjudging employee as an insolvent, is to be reported to the immediate authority.
5. Employees are expected to maintain high ethical standards and honesty; promote the principles of merit, fairness and impartiality in the discharge of duties; maintain accountability; and use resources efficiently, effectively and economically.
6. Employees are expected to refrain from doing anything which is or may be contrary to any law, rules, regulations and established practices.
7. Employees are expected to use the IT infrastructure and facilities for official use only.

8. Employees are expected not to engage in canvassing business of Life Insurance Agency, Commission Agency or Advertising Agency owned or managed by family members or others.
9. Employees are expected to keep away from demonstrations organized by political parties in the vicinity/neighbourhood of Government offices and maintain political neutrality.
10. Employees are expected not to receive gifts from students, parents and subordinates.

9. Seeking other employments, part time work etc.

1. No employee shall accept a paid employment either on part time or advisory basis in any company, educational KARE, mutual benefit societies or any other society or firm or act as an agent either on salary or commission basis.
2. No employee shall, except with the prior sanction of KARE, own wholly or in part, conduct or participate in any business activities including private tuition.
3. Employees applying for higher education and employment in other KAREs should route their application through the proper channel.
4. In cases where applications have been routed through the proper channel, before attending any interview, employee should obtain prior permission from the Vice- Chancellor, through the proper channel. A photo copy of such call letter shall accompany his request.
5. In an academic year only 2 applications seeking employment elsewhere will be forwarded, with a ceiling of 6 applications in his service in this KARE.

10. Publications, Public Utterances etc

1. Employee should not use official position or influence for publication or the sale of books and other publications (written, audio and video) that contain political or other aspersions, objectionable material and views against the policies of the Government.
2. No employee shall be a member of, or be associated with any political party or any organization which takes part in politics nor shall he take part or subscribe or associate or assist in any manner in political movements or activities.
3. No employee shall be a member, representative or office bearer of any association representing or purporting to represent the employee member unless the association shall not indulge in any activities detrimental to the interests, growth and functioning of KARE and the association shall not indulge in any activities defaming KARE or other colleagues or superiors.
4. No employee shall engage himself or participate in any activity that is anti-secular or which tends to create disharmony in any society, or in any demonstration which is prejudicial to the interest of the sovereignty and integrity of India, security of the State and the relationship between State and the Centre, relationship between KARE and the Government both at the Centre and the State.
5. Any employee involved in criminal or civil proceedings shall inform KARE of such proceedings.
6. No employee shall associate and / or participate in any strike or incitement thereto or in similar activities, which shall also include absence from work or instigating others or neglect of duties with the aim of getting a demand accepted by the superiors or KARE.
7. If any question arises, as to whether a membership or activity falls within the scope of this rule, the decision of KARE shall be final and binding.

11. Marriage and Morality

1. No employee shall enter into or contract a marriage with a person having a living spouse. No employee, having a living spouse, shall enter into or contract a marriage with another person.
2. No employee shall engage himself in the activities of a tout.
3. Employees shall endeavour to avoid habitual indebtedness, loss or insolvency. No employee shall indulge in money lending business in KARE.
4. No employee shall involve himself in any act of moral turpitude on his/her part which may cause embarrassment or bring discredit to KARE.
5. As KARE is an educational institution, all employees are forbidden from consuming liquor or narcotics either in the campus or outside the campus while on duty or otherwise. Employee should be a role model to students.
6. Every employee shall maintain absolute integrity and attention to duty at all times and shall do nothing which is unbecoming of an employee of KARE.
7. Employees have a bounden responsibility to protect the dignity and modesty of the employees and students. Any act of moral turpitude reported on any employee shall entail summary termination, after an enquiry. The service certificate shall carry a due endorsement of such moral turpitude.

12. Disclosure of documents and information

No employee shall in the performance of the duties assigned to him release or disclose, directly or indirectly, any official documents or any part thereof or information to any other person to whom he is not authorized to communicate such information or documents.

13. Plagiarism / Intellectual Property Rights

Disciplinary proceedings will be initiated against an employee indulging in plagiarism, violation of intellectual property rights, copyrights and other unlawful activities. If found necessary, such case will be referred to the law-enforcing authority.

14. Strike and Demonstrations

No employee shall associate and / or participate in any strike or incitement thereto or in similar activities, which shall also include absence from work or instigating others or neglect of duties with the aim of getting a demand accepted by the superiors or KARE.

15. Age of Superannuation

1. The age of superannuation shall be 65 years and the member will be relieved from the services at the end of that academic year.
2. KARE reserves its right to extend the service of a superannuated employee on yearly basis and / or appoint superannuated candidate on contract basis.

16. Suspension

KARE has the absolute right to place any employee under suspension for any breach of rules. During the period of suspension, KARE shall pay him subsistence allowance every month at the rate of 1/4 of the basic pay which the employee was drawing at the time of suspension. The pay does not include DA or any other allowance payable to him.

17. Disciplinary Proceedings

1. The Registrar shall be the Disciplinary Authority in respect of all employees and the Vice-Chancellor shall be the Appellate Authority.

2. In case of the Registrar, the Vice-Chancellor shall be the Disciplinary Authority and the Board of Management shall be the Appellate Authority.
3. Any employee aggrieved by the order of the Disciplinary Authority may prefer an appeal to the Appellate Authority within 30 days from the date of the order of the Disciplinary Authority. The Appellate Authority shall pass an order within 45 days on receipt of an appeal from the aggrieved employee. If in any case the delinquent employee seeks adjournment of personal hearing, the ceiling of 45 days shall not apply.
4. If an enquiry is found necessary, an Enquiry Officer shall be appointed by the Vice-Chancellor who shall conduct the proceedings of the enquiry in a venue chosen by the Enquiry Officer. If the venue is other than the campus the delinquent employee shall be entitled to TA as admissible. In the course of an enquiry, the employee has to defend himself. Enquiry Officer may be appointed either from among the members of staff or from outsiders.

18. Punishment

Violation of any of the above rules or regulations in force and are to be framed and implemented from time to time, shall entail termination of service or dismissal without notice.

19. Resignation and Termination

1. The notice given by any employee who intends to leave the service of KARE should be co-terminus with the end of a semester. The end of the semester is generally taken as 30th November or 30th April of every year. However, faculty member should carry out the work of the whole term during the semester to justify the allocation of the students or project.
2. During the first year of service at KARE, any member of staff can leave the service by giving 30 days notice or on payment of 30 days salary in lieu thereof to KARE. Similarly KARE shall also be at liberty to terminate the services of members of staff by serving 30 days notice or on payment of 30 days salary in lieu thereof.
3. After a service of one year, employee can get relieved from services by serving 3 months advance notice to KARE of his intention to leave the services, or by remitting 3 months salary in lieu thereof. The Appointing Authority may either reduce this period or call upon the employee concerned to continue till the end of the academic session in which the notice is received. Similarly KARE shall also be at liberty to terminate the services of members of staff by serving 3 months notice or paying 3 months salary in lieu thereof.
4. Any employee who is desirous of leaving the services when the academic session is in progress (ie. before 30th November or 30th April) will have to pay to KARE an additional compensation of one month salary.
5. The employee who applied for relief from service shall not be granted any leave except casual leave during the notice period.
6. Any employee dismissed or terminated from services for gross misconduct or for inefficiency or insubordination or causing loss of reputation or monetary loss to KARE is not entitled to any Gratuity and / or Superannuation benefits.
7. The Appointing Authority has the power to dismiss or terminate the services of a member for reasons such as gross misconduct, repeated inefficiency records in discharging duties, insubordination, causing loss of reputation, causing monetary loss to KARE, retention in service is considered undesirable due to medical reasons, anytime without any notice and without any payment.
8. The Appointing Authority reserves the right to terminate the services of any employee at anytime without giving prior notice and without assigning any reason thereto.

20. Saving Clause

These rules framed for the conduct of KARE shall supersede the earlier rules if they are not in consonance with the rules presently framed. The rules in force shall be applicable to all the paid employees of KARE.

10.1.4 Decentralization in working and grievance Redressal mechanism (5)

(List the names of the faculty members who have been delegated powers for taking administrative decisions. Mention details in respect of decentralization in working. Specify the mechanism and composition of grievance redressal cell including Anti Ragging Committee & Sexual Harassment Committee.)

Response:

1. KARE follows a decentralized and participative management in decision making.
2. A bottom-up approach is adopted including all stakeholders in planning and execution of activities. In its constant endeavor towards ensuring quality education, the Board of Management, provides valuable suggestions and advice towards holistic growth of the Institution.
3. There are 10 Schools and 27 Departments. Each school is headed by the Dean, while the Departments by the HoD. Schools and Departments are autonomous entities which are entitled to create/amend course curriculum, conduct PAB and BoS meetings, organize regular classes, continuous assessment, student progression, research workshops, guest lectures, approve staff/student leaves, collect feedback from various stakeholders, recommend purchase of required hardware/software and maintenance of Department Association Finances in a completely decentralized manner
4. ERP software modules developed in-house like Exam Administrative System (EASY), Faculty Information System (FIS), Smart SMS (SSMS), Parents Corner (PACO), Attendance Information and Maintenance System (AIMS), Staff Attendance and Leave Tracking (SALT) and Student Information System (SIS), helps the university in extending the autonomy further in administering various day to day activities seamlessly.
5. The hostel management committee, comprising of student members plays an active role in formulating various hostel policies leading to the comfort of inmates.
6. Class committee comprising of student members and faculty helps the department in efficient deployment and utilization of its resources and time. Students' council further strengthens the process of decision making by providing timely suggestions.
7. Alumni Association contributes its might in various policy making committees such as curriculum review, placement training, IQAC etc.,
8. Various statutory committees such as Anti-ragging, Grievance redressal, Gender equity cell, Women empowerment cell etc., contribute towards framing of policies as prescribed by AICTE/UGC. In addition to the above, Board of Management, Academic Council, Planning and Monitoring Board and Finance Committee comprises of members drawn out from various stakeholders and these committees take active role in nurturing the growth of the university as per its strategic plan.

Functions of Board

List the names of the faculty members who have been delegated powers for taking administrative decisions:

S.No	Name of the Schools	Dean	Departments	Head of the Department
1	Kalasalingam School of Architecture (KSOA)	Dr. N. Lakshmi Thilagam	Architecture	Ar. H. Ahmed Fazeel Akram
2	School of Bio, Chemical and Processing Engineering (SBCE)	Dr. R. Rajam	Biotechnology	Dr. T. Kathiresan
			Chemical Engg	Dr. V. Aruna Janani
			Food Tech.	Dr. R. Rajam (i/c)
			Agri Engineering	Dr. Jagmohan Meher
3	Dean – School of Electronics, Electrical and Biomedical Technology (SEET)	Dr. Sivakumar Pothiraj	ECE	Dr. Sivakumar Pothiraj (i/c)
			EEE	Dr. A. Ramkumar
			EIE	Dr. Yogeshwar Chakrapani
			BME	Dr. G. Vishnuvarthanan
4	Dean – School of Computing (SoC)	Dr.P.Deepalakshmi	CSE	Dr. P. Deepalakshmi (i/c)
			Stream Coordinators	
			1	Dr. B. S. Murugan
			2	Dr. N. C. Brintha
			3	Mr. R.Rajasubramaniam
			4	Dr. C. Balasubramaniam
			Information Tech	Dr. S. Dhanasekaran
			Computer Applications CS & IT	Dr. K. Kartheeban
5	Dean – School of Mechanical, Aero, Auto and Civil Engineering (SMACE)	Dr. Rajini Nagarajan	Mechanical	Dr. V. Arumugaprabhu
			Automobile	Dr. S. Thirumalaikumaran
			Aeronautical	Dr. S. Arunvinthan
			Civil	Dr. P. L. Meyappan
6	Kalasalingam School of Agriculture & Horticulture (KSAH)	Dr. Jesu Edward George	Horticulture	Dr. K. Selvarani
			Agriculture	Dr. S. Vasumathi

7	Dean – Kalasalingam Business School (KBS)	Dr. R. Viji	Business Administration	Dr. R. Viji (i/c)
			Commerce	Dr. S. Karthik
			Social Work	Dr. M. Maria Antony Raj
			SHIP	Dr. K. Karthiga Devi
8	Dean – School of Advanced Sciences (SAS)	Dr. Dattatri Nagesha	Mathematics	Dr. M. Kameshwari
			Physics	Dr. B. Selvakumar
			Chemistry	Dr. K.K. Praneeth
			Forensic Sc	Ms. A. V. Surabhi
9	Dean – School of Liberal Arts and Education (SLASE)	Dr. V. Pandiyarajan	English	Dr. S. Rema Devi
			Visual Communication	Mr. K. Prabakar
			Catering Science & Hotel Management	Mr. J. Prabhu
			Special Education	Mr. D. M. Rajan
10	Dean – School of Freshman Engineering	Dr. C. Ramalingan		

Administrative Portfolio:

S.No	Portfolio	Position	Incharge
1	Registrar Office	Deputy Registrar (Public Relations)	Dr. P. G. Gurusamy Pandian
		Deputy Registrar (Nodal Officer)	Dr. B.S. Murugan
		Deputy Registrar (Legal)	Dr. S. R. Srikumar
2	Academics	Director	Dr. Koteswara Rao Anne
3	Student Affairs	Director	Dr. M. Muthukannan
		Deputy Director (Extn. Activities & CCE)	Dr. S. Rajesh (MECH)
4	IQAC, Accreditations & Rankings	Director	Dr. T. R. Neelakantan
		Deputy Director	Dr. V. Pandiyarajan
5	Research and Development	Director	Dr. M. P. Rajasekaran
		Deputy Director	Dr. S. Karthikeyan
6	FALT	Director	Dr. C. Sivapragasam

		Deputy Director	Dr. K. Rajesh (EEE)
7	Examinations	Controller of Examinations	Dr. J.T. Winowlin Jappes
		Deputy CoE (Examinations)	Dr. E. V. Ramkumar
		Deputy CoE (Evaluation)	Dr. Jayato Nayak
8	Corporate Relations	Director	Dr. A. Alavudeen
9	IRC	Director	Dr. S. Seshadri Srinivasan
10	Industry/International Relations/General Administration	Director	Dr. P. Sarasu
		Deputy Director (Branding and Media)	Dr. S. Suprakash
		Deputy Director (Online Marketing)	Dr. T. Senthil Muthukumar
		Deputy Director (Innovation and Entrepreneurship Development Cell)	Dr. J. Deny
11	Admissions	Director	Mr. A. Lingusamy
12	Centre for Distance and Online Education (CDOE)	Director	Dr. R. Ramalakshmi
13	Campus Residence	Director	Dr. J. T. Winowlin Jappes
		Deputy Director (Boys)	Dr. S. P. Balakannan
		Deputy Director (Girls)	Dr. C. Sangeetha

Grievance and Redressal Mechanism:

A Grievance Redressal Committee has been constituted for the redressal of the problems reported by the Students of the Institution with the following objectives:

- Upholding the dignity of the Institution by ensuring strife free atmosphere in the Institution through promoting cordial Student-Student relationship and Student teacher relationship etc.
- Encouraging the Students to express their grievances / problems freely and frankly, without any fear of being victimized.
- Suggestion / complaint Box have been installed in front of the various Blocks in which the Students, who want to remain anonymous, put in writing their grievances and their suggestions for improving the Academics / Administration in the Institution.
- Advising Students of the Institution to respect the right and dignity of one another and show utmost restraint and patience whenever any occasion of rift arises.

The Committee formally meets to review all cases, prepares a statistical reports about the number of cases received, attended to and the number of pending cases, if any, which require

direction and guidance from the higher authorities.

In the case, the complainant not satisfied with the decision of the Committee, they may send their appeals to the “OMBUDSMAN” of the University. The OMBUDSMAN will fix a date for hearing the Complainant which shall be communicated to the Institute and the aggrieved person.

ANTI-RAGGING COMMITTEE

RAGGING IN ANY FORM IS A CRIME

Ragging is totally banned and punishable as per the government order. If any student is found indulging in any sort of ragging or harassment to juniors or other fellow students, inside or outside the campus, bus, hostel, he/she will be dismissed immediately from the university and criminal action will be taken against them as per the rules. Excerpts of TAMILNADU PROHIBITION OF RAGGING ACT 1997 for general

Information

This Act is called the Tamil Nadu Prohibition of Ragging Act 1997. It extends to the whole of the State of Tamil Nadu

Definition

In this Act, unless the context otherwise requires, “ragging” means display of noisy, disorderly conduct doing any act which cause or is likely to cause physical or psychological harm or raise apprehension or fear or shame or embarrassment to a student in any educational institution and includes

- a) Testing ,abusing of playing practical jokes ,on causing burt to such student
Or
- b) Asking the students to do any act or perform something which such students will not in the ordinary course willingly do

Prohibition of ragging

Ragging within or without any educational institutional is prohibited

Penalty for Ragging

Whoever directly or indirectly commits, participates, in abets or propagates “ragging” within or without any educational institution, shall be punished with imprisonment for a term which may extend to two years any shall also be liable to a fine which may extend to ten thousand rupees.

Dismissal of student

Any student convicted of an offence under section 4 shall be dismissed from the educational institution and such student shall not be admitted in any other educational institution.

Suspension of student

- 1) Without prejudice to the foregoing provisions, whenever any student complains of ragging to the Hand of an Educational Institution, or to any other person responsible for the management of the educational institution he/she shall inquire in to the same immediately and if found true shall suspend the student who has committed the offence, from the educational institution.
- 2) The decision of the Head of the Educational institution or the person responsible for the management of the Educational Institution that any student has indulged in ragging under subsection (1) shall be final

DUTIES OF ANTI-RAGGING COMMITTEE

Anti-ragging committee to take all necessary steps require to enforce provision of UGC

regulations 2009 in this regard as well as the provision of any law for the time being in force concerning ragging, and also to monitor and oversee the performance of the anti-ragging squad in the prevention of ragging in the institution

DUTIES OF ANTI-RAGGING SQUAD

1. To carryout surprise raids in the hostels and any other places vulnerable to incidents of ragging.
2. To conduct an on-the-spot enquiry into any incident of ragging referred to it by Head of the Institution, members of faculty, members of staff, any student, any parent or guardian, any employee of service provider or any other person. The enquiry report along with recommendations shall be submitted to anti-ragging committee. The anti-ragging squad shall conduct such an enquiry observing a fair and transparent procedure based on the principles of natural justice and after giving adequate opportunity to the student or students accused of ragging and other witnesses to place before it the facts, documents and views concerning the incident of ragging, and considering such other relevant information as may be required.

Composition of Anti Ragging Committee:



KALASALINGAM

ACADEMY OF RESEARCH & EDUCATION

(DEEMED TO BE UNIVERSITY)

Under sec. 3 of UGC Act 1956. Accredited by NAAC with "A" Grade

Amud Nagar, Krishnankott - 626126. Srivilliputhur (Vil), Virudhunagar (Dt), Tamil Nadu | info@kalasalingam.ac.in | www.kalasalingam.ac.in



Ref No: KARE/SA/GR/Circular/20-21/1

Date: 10.07.2020

Circular

An Anti-Ragging Committee consisting of the following is reconstituted for the academic year 2020 – 2021, to prevent the menace of ragging in the University premises.

Sl.No	Name of the Faculty	Designation	Role in ARC
1.	Dr. V. Vasudevan	Registrar	Convener
2.	Dr. P. Sivakumar	Director (Student Affairs)	Co-Convener
3.	Dr. K. Suthendran	Warden	Member
4.	Dr. C. Ramalingam	Dean/ SAS	Member
5.	Dr. S. P. Balakannan	Deputy Director (Campus Life)	Member
6.	Mrs. S. Kavitha	Deputy Director (Student Affairs)	Member
7.	Dr. V. Muneeswaran	Assistant Professor, ECE	Member
8.	Ms. S. Banupriya	Assistant Professor, English	Member
9.	Deputy Superintendent of Police	Srivilliputtur	Member
10.	Tahsildar	Srivilliputtur	Member
11.	Mr. M. Jeyaraj	Reporter, Thinakaran & Tamil Murasu, Srivilliputhur	Member
12.	Mr. D. Jagaveera Pandian	District Information and Public Relation Office Collectorate, Virudhunagar	Member
13.	P. Gokul	IV Year B. Tech / ECE	Member
14.	A. Ragasree	III Year B. Tech / Civil	Member
15.	R. Karthiga Chandran	IV Year B. Tech / Biotech	Member
16.	Gopu Siva Rama Reddy	III Year B. Tech / Mech	Member
17.	Saddikuti Jeevan Reddy	III Year B. Tech / CSE	Member
18.	R Bhuvhanesan	III Year B. Tech / EEE	Member
19.	Mr. R. Jeyakumar	Estate Engineer	Member
20.	Dr. B.S. Murugan	Associate prof, IT	KARE UGC Nodal Officer

To
The Members concerned
cc: to KARE – website i/c. to update the above committee in our website immediately.

VICE CHANCELLOR

Composition of Anti Ragging Squad:



KALASALINGAM

ACADEMY OF RESEARCH & EDUCATION
(DEEMED TO BE UNIVERSITY)



Under sec. 3 of UGC Act 1956. Accredited by NAAC with "A" Grade
Kandaswamy, Krishnaswami - 626129, Krishnaswami (Viz), Villupuram (Dist), Tamil Nadu | info@kalasalingam.ac.in | www.kalasalingam.ac.in

Ref No: KARE/SA/GR/Circular/20-21/2

Date: 10.07.2020

Circular

An Anti-Ragging Squad Committee consisting of the following is reconstituted for the academic year 2020 – 2021, to prevent the menace of ragging in the University premises.

Sl.No	Name of the Faculty	Designation	Role in ASC
1.	Dr. V. Vasudevan	Registrar	Convener
2.	Dr. P. Sivakumar	Director (Student Affairs)	Co-Convener
3.	Dr. S. P. Bala kannan	Deputy Director (Campus Life)	Member
4.	Mrs. S. Kavitha	Deputy Director (Student Affairs)	Member
5.	Dr. Viji	HoD/ MBA	Member
6.	Dr. K. Suthendran	Warden	Member
7.	Dr. M. Sivasubramanian	Dy. Warden – Bhagath Singh Hostel	Member
8.	Dr. P. Aruna Jayanthi	Dy. Warden – Sarojini Naidu Ladies Hostel	Member

To

The Members concerned

cc: to KLU – website i/e. to update the above committee in our website immediately.


VICE CHANCELLOR

Sample Minutes on Anti Ragging Committee(Action Taken Report):



KALASALINGAM

ACADEMY OF RESEARCH & EDUCATION

(DEEMED TO BE UNIVERSITY)

Under sec. 3 of UGC Act 1956. Accredited by NAAC with "A" Grade

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Anti-Ragging Committee (ARC)

No. KARE/SA/ARC/Circular/2019-20/1

Date: 15.7.2019

Circular

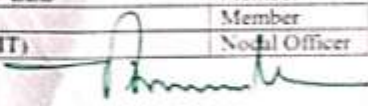
This is to inform the Anti-Ragging committee members that a meeting is scheduled on 16.7.2019 at 4.00 pm in the meeting hall, Admin Block. All the members of the committee are requested to make themselves convenient to attend the meeting.

Agenda:

Discussion about the issues related to ARC

Committee Members:

S.No	Name	Designation	
1	Dr. V. Vasudevan	Registrar	Convener
2	Dr. P. Sivakumar	Director (Student Affairs)	Member
3	Dr. C. Ramalingam	Dean / SAS	Member
4	Dr. S. P. Balakannan	Deputy Director (Student Affairs)	Member
5	Mrs. S. Kavitha	Deputy Director (Student Affairs)	Member
6	Dr. K. Subendran	Deputy Warden	Member
7	Deputy Superintendent of Police	Virudhunagar	Special invitee
8	Tahsildar	Virudhunagar	Member
9	Mr. M. Jeyaraj	Reporter, Thinakaran & Tamil Murasu, Srivilliputhur	Member
10	Mr. R. Jaya Arulpathi	District Information and Public Relation Office Collectorate, Virudhunagar	Member
11	Mr. K. Balasubramanian	Member, Executive Committee, Parents Teachers Association, KARE	Member
12	Mrs. R. Rajalakshmi	Member, Executive Committee, Parents Teachers Association, KARE	Member
13	Mr. M. Prakash	IV Year B.Tech / ECE	Member
14	Ms. M. Vinayadharsini	II Year B.Tech / ECE	Member
15	Ms. R. Gurupreya	III Year B.Tech / Biotech	Member
16	Mr. R. Rajesh Kanna	IV Year B.Tech / Mech	Member
17	Ms. P. Struthi	IV Year B.Tech / CSE	Member
18	Mr. S. Srinivas	IV Year B.Tech / EEE	Member
19	Mr. R. Jeyakumar	Estate Engineer	Member
20	Dr. B. S. Murugan	Associate prof (IT)	Nodal Officer


Convener
Anti-Ragging Committee (ARC)



KALASALINGAM

ACADEMY OF RESEARCH & EDUCATION

(DEEMED TO BE UNIVERSITY)

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Anti-Ragging Cell (ARC)

No. KARE/SA/ARC/Minutes/2019-20/1

Date: 17.7.2019

Minutes of the meeting of Anti-Ragging Committee

The meeting of Anti-Ragging Committee of Kalasalingam Academy of Research and Education was held on 16.7.2019 at Admin Block Meeting hall. Dr.V.Vasudevan, Registrar, Convener of the committee chaired the meeting to review and strengthen the measures to reduce the threat of ragging in the university for the odd semester 2019-20. In this regard, the ARC has been reconstituted for implementing the same with the following institutions, press media, parents and students as members. The following members attended the meeting.

S.No	Name	Designation	
1	Dr. V. Vasudevan	Registrar	Convener
2	Dr. P. Sivakumar	Director (Student Affairs)	Member
3	Dr. C. Ramalingam	Dean / SAS	Member
4	Dr. S. P. Balakannan	Deputy Director (Student Affairs)	Member
5	Mrs. S. Kavitha	Deputy Director (Student Affairs)	Member
6	Dr. K. Suthendran	Deputy Warden	Member
7	Deputy Superintendent of Police	Virudhunagar	Special invitee
8	Tahsildar	Virudhunagar	Member
9	Mr. M. Jeyaraj	Reporter, Thinakaran & Tamil Murasu, Srivilliputhur	Member
10	Mr. R. Jaya Arulpathi	District Information and Public Relation Office Collectorate, Virudhunagar	Member
11	Mr. K. Balasubramanian	Member, Executive Committee, Parents Teachers Association, KARE	Member
12	Mrs. R. Rajalaksmi	Member, Executive Committee, Parents Teachers Association, KARE	Member
13	Mr.M.Prakash	IV Year B.Tech /ECE	Member
14	Ms.M. Vijayadharsini	II Year B.Tech /ECE	Member
15	Ms.R.GuruPreya	III Year B.Tech / Biotech	Member
16	Mr.R.Rajesh Kanna	IV Year B.Tech /Mech	Member
17	Ms.P.Shruthi	IV Year B.Tech / CSE	Member
18	Mr.S.Srinivas	IV Year B.Tech / EEE	Member
19	Mr. R. Jeyakumar	Estate Engineer	Member
20	Dr. B.S. Murugan	Associate prof (IT)	Nodal Officer

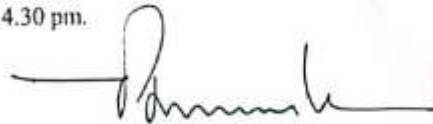
The committee was noticeable that UGC regulations on curbing the menace of ragging in higher educational institutions 2019. And other instructions issued as per the directions of the Honorable Supreme Court of India and the Regulations of State Govt. have already been implemented. UGC and State regulations along with measures to be taken for curbing the menace of ragging were circulated to all the UTDs/institutes. Instructions in this regard were also issued to the affiliated/maintained colleges by the Dean of Colleges.

Important points discussed in this meeting are summarized below:

1. To display Flex Boards carrying anti-ragging message along with relevant Telephone Nos at various prominent places on the University Campus. And steps to be taken in our university for curbing the menace of ragging.
2. All Heads, Deans, and Director on the campus of the university will be the responsibilities and take the self-declaration from the enrolled students and their parents during the time of admission.
3. Heads and senior faculty members of the university will address their students and to create the awareness of the anti-ragging mechanism and preventive measures in the university.
4. ARC keep a continuous watch and vigil over ragging to prevent its occurrence and recurrence. And to provide students with the information of contact address and telephone numbers of the person(s) identified to receive complaints/distress calls;
5. ARC consider the complaints received from the students and conduct enquiry and submit a report to the Anti- Ragging Committee along with punishment recommended for the lawbreakers. Oversee the procedure of obtaining an undertaking from the students in accordance with the provisions
6. ARC will periodically review the situation and the information supplied by the ARS and recommended actions as per UGC regulations.
7. Nodal officer will take all necessary measures for prevention of ragging inside the Campus/ Hostels from time to time are properly implemented.
8. Chief warden convenes the meeting to the deputy wardens/ assistant wardens of all the hostels and bring to their notice the necessity of their active involvement in "No Ragging" Programme and put them on 24 hours visit to ensure that no incident of ragging takes place on the campus.

9. CSO will have periodical meetings with their staff to review the position from time to time and to put the information to the Anti-Ragging Committee.

10. With a vote of thanks to the chair, the meeting ended at 4.30 pm.



Convener

Anti-Ragging Committee (ARC)

Copy of the minutes, duly approved by the Vice Chancellor is forwarded to the following for the information and further necessary action:-

- All the members of the committee
- Deans and Directors
- COE and HODs
- Chief Warden and Chief Security Officer

Composition of Grievance Redressal Committee:

Sample Minutes on Grievance Redressal Committee:




OFFICE OF THE STUDENT AFFAIRS
STUDENTS GRIEVANCES REDRESSAL COMMITTEE
Ref: KLU/SA/SGRC/2018-19/ Circular/004 Date: 7.1.2019

Circular

As per VC instructions, the following committee members are requested to attend SGRC meeting regarding grievances received from the students dated on 8.1.2019. The HODs and Deans are requested to inform the faculty and Student members of their department to attend the SGRC meeting without fail.

Sl.No	Name of the Faculty	Designation	Role in SGRC
1	Dr.P.Venkumar	Professor, Mechanical, Nodal Officer	Member
2	Mr.Jeyakumar	Estate Officer	Member
3	Dr. S. Balasubramanian	Warden, Hostel	Member
4	Tadiboina Chandra Sekhar (9918028029)	I Year B. Tech / AGRI	Student Representative
5	Rasik Ranvir Ramana V (9918001037)	I Year B. Tech / BIO	Student Representative
6	Shaik Astubaigari Sohel Basha (9917005158)	II Year B. Tech / ECE	Student Representative


Dr.S.AsathBahadur
Convener - SGRC

Copy Submitted to the Chancellor & Director – for Kind Information
CC: to Registrar and Academic – for Kind information
CC: to all Deans, Directors and Head of Departments – for Information
CC: to Committee Members



KALASALINGAM

ACADEMY OF RESEARCH & EDUCATION

(DEEMED TO BE UNIVERSITY)

Under sec. 3 of UGC Act 1956. Accredited by NAAC with "A" Grade

Assad Nagar, Krishnankottai - 626125, Tirunelveli (Tamil Nadu), India. Email: info@kalasalingam.ac.in | www.kalasalingam.ac.in



OFFICE OF THE STUDENT AFFAIRS

STUDENTS GRIEVANCES REDRESSAL COMMITTEE

Ref: KL.U/SA/SGRC/2018-19/ Minutes/004

Date: 9.1.2019

Minutes of Student Grievances Redressal Committee

The fourth SGRC meeting of the academic year 2018-19, held on 8.1.2019 at 4.10 pm in Director Student affairs office, First floor, Administrative Block, to discuss the grievances received from students regarding availability of north Indian food inside university premises. The following members of the SGRC attended the meeting.

Sl.No.	Name of the Member	Designation	Role of the SGRC
1	Dr.S.AsathBahadur	Director - Student Affairs	Convener
2	Dr.P.Venkumar	Professor, Mechanical, Nodal Officer	Member
3	Mr.Jeyakumar	Estate Officer	Member
4	Dr. S. Balasubramanian	Warden, Hostel	Member
5	Tadiboina Chandra Sekhar (9918028029)	I Year B. Tech / AGRI	Student Representative
6	Rasik Ranvir Ramana V (9918001037)	I Year B. Tech / BIO	Student Representative
7	Shaik Astubaigari Sohel Basha (9917005158)	II Year B. Tech / ECE	Student Representative

Initially the convener welcomed all the members. Afterwards the nature of the grievance received from students was briefed by the chair to the committee members of the SGRC.

Nature of the Grievance: Students requested to provide north Indian food menu in our university mess. Grievance mail received from students dated: 4.1.2019.

The chair put forth the grievance raised by students before SGRC members for open discussion.

- Warden briefed about the day by day North Indian food menu in our university mess and the issue of food to the North Indian inmates.
- Student requested to revise the menu of the North Indian food.
- The chair informed to the hostel wardens and student members to form a mess committee in all hostels and conduct a meeting with group members and come out with


the new North Indian food menu. The food menu must accommodate the food items represented and agreed by the majority of members in the group.

- The dead line for the submission of the revised menu is two weeks from the date of this meeting.
- Hostel warden consented to be the in-charge for conducting meeting and prepare the new North Indian food menu in details.
- Other members of the committee also accepted for the proposed to implement the north Indian food menu in our university hostel.

Resolution:

From the open discussion in the SGRC meeting it is resolved that to provide the North Indian menu food for our hostel students those who are adopted north Indian menu. Breakfast, lunch and dinner menu and timing also be displayed on every hostel mess. The Chair informed the student members that they have to take responsibility on individual hostels and proper mess timing must be followed.

Finally the meeting ended with vote of thanks.


29.01.2019
Dr.S.AsathBahadur
Convener - SGRC

10.1.5 Delegation of financial powers (5)

(Institution should explicitly mention financial powers delegated to the Principal, Heads of Departments and relevant in-charges. Demonstrate the utilization of financial powers for each of the assessment years.)

Response:

The Board of Management of Kalasalingam Academy of Research and Education is empowered to delegate any of its powers to the Vice-Chancellor, Registrar, Directors and Controller of Examination, Deans of Schools and Faculty Members.

The Finance Committee of the Institution had approved the delegation of financial powers in its meeting held on 23.12.2016 and the same was ratified by the Board of Management.

The exercise of these powers shall be subject to observance of the prevailing rules and regulations and general or special, conditions prescribed or which may be issued by the Competent Authority.

1. No expenditure on a 'New Item' can be sanctioned without prior approval of the competent authority
2. All purchases exceeding Rs.25000 shall be made through Registrar.
3. All purchase proposals would be processed as per the procedure prescribed in the Purchase Procedures.
4. The Deans of Schools and Heads of Departments will submit the proposals to the Vice-Chancellor/Registrar for administrative approval.

General Powers of Authorities:

SNo	Authority	Extent of Power
1	Vice Chancellor	Upto Rs.5,00,000
2	Registrar	Upto Rs.2,00,000
3	Directors of Various offices	Upto Rs.50,000
4	Deans of Various Schools	Upto Rs.25,000
5	Head of the Departments	Upto Rs 10,000

10.1.6 Transparency and availability of correct/unambiguous information in public domain (5)

(Information on policies, rules, processes and dissemination of this information to stakeholders is to be made available on the web site)

Response:

The effective governance, leadership and management are evident from its long history of disturbance-free performance in imparting quality technical education. It is mainly because of the highly responsive compact management which gets constant inputs and feedback from the

administrative and academic heads, external experts, alumni, faculty, students, and supporting staff.

The Institution has its own website, URL is: www.kalasalingam.ac.in. The Institution ensures to publish their Vision, Mission and various Quality policy rules, achievements, Mandatory Disclosure as per AICTE etc., in the website.

The Student details such as intake and admitted details and details of Teaching and Non Teaching also published in the website.

The Below table gives the information about various policies published in the website.

No.	Policy	Link
1.	Admission policy	http://admissions.kalasalingam.ac.in/
2.	Reservation policy	http://kalasalingam.ac.in/site/reservation-policy/
3.	Cancellation of admission and refund policy	http://kalasalingam.ac.in/site/wp-content/uploads/2020/08/REFUND_UGC-NOTI.pdf
4.	Document retention policy	http://kalasalingam.ac.in/site/wp-content/uploads/2018/03/DOCUMENT-RETENTION-POLICY.pdf
5.	Quality policy	http://kalasalingam.ac.in/site/quality-policy/
6.	Energy Policy	http://kalasalingam.ac.in/site/wp-content/uploads/2019/01/Energy-Policy.pdf
7.	Sustainability Policy	http://kalasalingam.ac.in/site/wp-content/uploads/2019/01/Sustainability-Policy.pdf
8.	Water Conservation Policy	http://kalasalingam.ac.in/site/wp-content/uploads/2019/01/Water-Conservation-Policy.pdf
9.	Recycle Policy	http://kalasalingam.ac.in/site/wp-content/uploads/2019/01/Recycle-Policy.pdf
10.	Transportation Policy	http://kalasalingam.ac.in/site/wp-content/uploads/2019/01/Transportation-Policy.pdf
11.	IPR Policy	http://kalasalingam.ac.in/site/wp-content/uploads/2019/01/IPR-Policy.pdf
12.	Research policy	http://kalasalingam.ac.in/site/wp-content/uploads/2019/06/KARE_Research-Policy.pdf
13.	Consultancy Policy	http://kalasalingam.ac.in/site/wp-content/uploads/2019/01/ConsultancyPolicy.pdf
14.	IT Policy	http://kalasalingam.ac.in/site/wp-content/uploads/2020/02/KARE_IT_POLICY.pdf
15.	Rules and regulations – hostels	http://kalasalingam.ac.in/site/photo-gallery/hostels/
16.	E-Waste Policy	http://kalasalingam.ac.in/site/wp-content/uploads/2019/05/e-waste_policy.pdf
17.	Maintenance Policy	http://kalasalingam.ac.in/site/wp-content/uploads/2019/12/Maintenance-Policy.pdf

10.2 Budget Allocation, Utilization, and Public Accounting at Institute level (15)

Summary of current financial year's budget and actual expenditure incurred (for the institution exclusively) in the three previous financial years. Total Income at Institute level: For CFY, CFYm1, CFYm2 & CFYm3 CFY: Current Financial Year – CFYm1 (Current Financial Year minus 1), CFYm2 (Current Financial Year minus 2), CFYm3 (Current Financial Year minus 3)

Total Income at Institute level: For CFY,CFYm1,CFYm2 & CFYm3

CFY : (Current Financial Year),
CFYm1 : (Current Financial Year minus 1),
CFYm2 : (Current Financial Year minus 2)
CFYm3 : (Current Financial Year minus 3)

Table 1 CFY 2021-22

Total Income:				Actual Expenditure (Till):			Total no of Students: 6465
Fee:	Govt:	Grants	Other Sources:	Recurring including Salaries:	Non Recurring	Special Projects/Any other, specify	Expenditure per student:
702738015	Nil	Nil	98073102	643710072	229136877	Nil	135011

Table 1 CFYm1 2020-21

Total Income:				Actual Expenditure (Till):			Total no of Students: 6465
Fee:	Govt:	Grants	Other Sources:	Recurring including Salaries:	Non Recurring	Special Projects/Any other, specify	Expenditure per student:
643354128			8084692	600676890	195175378		123101

Table 2 – CFYm2 2019-20

Total Income:				Actual Expenditure (Till):			Total no of Students: 6639
Fee:	Govt :	Grants	Other Sources:	Recurring including Salaries:	Non Recurring	Special Projects/Any other, specify	Expenditure per student:

59223853 9			1948627 7	58739068 5	136537715. 5		109042
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Table 3 – CFYm3 2018-19

Total Income:				Actual Expenditure (Till):			Total no of Students: 6500
Fee:	Govt :	Grant s	Other Sources:	Recurring including Salaries:	Non Recurring	Special Projects/Any other, specify	Expenditur e per student:
63550834 1			822677 1	58982733 7	148050247. 8		113519

Table 4 – CFYm4 2017-18

Total Income:				Actual Expenditure (Till):			Total no of Students: 6670
Fee:	Govt :	Grant s	Other Sources:	Recurring including Salaries:	Non Recurring	Special Projects/Any other, specify	Expenditur e per student:
62127221 3			953354 7	62799146 0	168513452. 5		119416

Items	Budgeted in 2021- 22	Actual Expenses in 2021- 22 till	Budget ed in 2020- 21	Actual Expenses in 2020- 21 till	Budgete d in 2019-20	Actual Expenses in 2019- 20 till	Budgete d in 2018-19	Actual Expense s in 2018-19 till	Budgeted in 2017- 18	Actual Expenses in 2017-18 till
Infrastructu re Built-Up	10250000 0	1019237 55	86000 000	85877166	890000 00	8874951 5	100000 000	947521 59	97500000	101108072
Library	81500000	8094382 2	79000 000	79585227	730000 00	7963212 4	750000 00	774771 46	79000000	81243501
Laboratory equipment	70000000	7051927 0	60000 000	58552613	375000 00	3413442 9	450000 00	444150 74	55000000	58979708
Laboratory consumabl es	6500000	6401895	60000 00	5742530	450000 0	4594024	700000 0	612536 5	3500000	3309760
Teaching and non- teaching staff salary	44000000 0	4518210 66	40000 0000	39729235 8	370000 000	3669011 44	339000 000	331658 742	36500000 0	363318972
Maintenanc e and spares	17500000	1829054 7	27000 000	27345307	300000 00	2843991 3	495000 00	497187 40	37500000	35581880
R&D	13000000 0	1299048 77	11925 0000	12335710 2	109500 000	1042456 90	112500 000	113633 148	13430000 0	135405835

Training and Travel	10000000	10129863	14500000	14656797	14500000	14338171	16000000	15931301	14500000	13386122
Miscellaneous Expenses*	2000000	2911854	3250000	3443168	2000000	2893391	6000000	4165909	3700000	4171062
Others, specify	0	0	0	0	0	0	0	0	0	0
Total	860000000	872846949	795000000	795852268	730000000	723928401	750000000	737877585	790000000	796504913

10.2.1 Adequacy of budget allocation (5)

(The institution needs to justify that the budget allocated over the years was adequate)

Year	Budget	Sanctioned	Utilized
2020-2021	795000000	795000000	795852268
2019-2020	730000000	730000000	723928401
2018-2019	750000000	750000000	737877585
2017-2018	790000000	790000000	796504912

10.2.2 Utilization of allocated funds (5)

(The institution needs to state how the budget was utilized during the last three years)

The overall budget for the Institution is approved by the Finance Committee and Ratified by Board of Management at the end of each financial year. The budget includes the recurring and non-recurring expenses of various section and departments for the whole year. Finance office takes care of Preparation of purchase orders for purchase of laboratory equipments, teaching aids, furniture, payment of bills and maintaining the various section/ department budget allocation and expenditure etc.,

10.2.3 Availability of the audited statements on the institute's website (5)

(The institution needs to make audited statements available on its website)

The Institution conducts internal and external audits regularly. KARE has qualified Auditors to supervise the Internal Audit Functions and they ensure that all the functions and procedures decided in the Finance Committee/ Board of Management are strictly adhered.

KARE also has qualified external auditors to audit in terms of, transaction audit and compliance audit and submit their reports annually. The reports of both internal and external Auditors are discussed at length in the Finance Committee meeting and recommendations submitted to the perusal of the Board of Management for ratification.

A Compliance report will be prepared based on the Objections and Comments given by the External Auditors. This report will be ratified in the Board of Management every year.

The Audited Statements are displayed on the institution website.

10.3 Program Specific Budget Allocation, Utilization (30)

Total Budget at program level: For CFY, CFYm1, CFYm2 & CFYm3 CFY: Current Financial Year – CFYm1 (Current Financial Year minus 1) CFYm2 (Current Financial Year minus 2) CFYm3 (Current Financial Year minus 3)

Total Income at Institute level: For CFY,CFYm1,CFYm2 & CFYm3
 CFY: (Current Financial Year),
 CFYm1 : (Current Financial Year minus 1),
 CFYm2 : (Current Financial Year minus 2) and
 CFYm3 : (Current Financial Year minus 3)

Table 1 :: CFY 2021-22

Total Budget: 49303779		Actual Expenditure: 48303359		Total no of Students: 220
Non Recurring:	Recurring	Non Recurring:	Recurring	Expenditure per student
3090000	39300000	3085467	3828312	112054

Table 2: CFYm1 2020-21

Total Budget: 24389016		Actual Expenditure: 24354116		Total no of Students: 217
Non Recurring:	Recurring	Non Recurring:	Recurring	Expenditure per student
2100000	22289016	2100000	22254116	112230.95

Table 3: CFYm2 2019-20

Total Budget: 26299054		Actual Expenditure: 25936914		Total no of Students: 253
Non Recurring:	Recurring	Non Recurring:	Recurring	Expenditure per student
2700000	23599054	2604549	23332365	102517.45

Table 4: CFYm3 2018-19

Total Budget: 31490190		Actual Expenditure: 30093604		Total no of Students: 344
Non Recurring:	Recurring	Non Recurring:	Recurring	Expenditure per student
4500190	26990000	4499349	25594255	87481.41

Table 5: CFYm4 2017-18

Total Budget: 41660000		41440654		Total no of Students: 436
Non Recurring:	Recurring	Non Recurring:	Recurring	Expenditure per student
7000000	34660000	6990250	34450404	95047.37

Items	Budget ed in 2021-2022	Actual Expe nses in 2021-2022	Budget ed in 2020-21	Actual Expen ses in 2020-21 till	Budgete d in 2019-20	Actual Expens es in 2019-20 till	Budget ed in 2018-19	Actual Expense s in 2018-19 till	Budgete d in 2017-18	Actual Expenses in 2017-18 till
Laborat ory equipme nt	3090000	3085467	2100000	2100000	2700000	2604569	4500190	4499349	7000000	6990250
Softwar e	0	0	0	0	0	0	0	0	0	0
Laborat ory consuma ble	1300000	1203769	900000	895600	950000	904510	2000000	1999390	2155000	2150000
Mainten ance and spares	600000	596920	440000	430000	529000	508901	800000	799990	900000	898085
R & D	1080000	1078900	789010	789010	856709	738910	1250000	1239992	1600000	1599949
Training and Travel	450000	449123	300006	280006	305000	256910	450000	449123	800000	793450
Miscella neous Expense s	500000	499600	300000	299500	305000	289045	350000	349090	600000	598450
Total	7020000	6913779	4829016	4794116	5645709	5302845	9350190	9336934	13055000	13030184

10.3.1 Adequacy of budget allocation

(Institution needs to justify that the budget allocated over the assessment years was adequate for the program)

Year	Budget	Sanctioned	Utilized
2021-2022	7020000	7020000	6913779
2020-2021	4829016	4794116	4794116
2019-2020	5645709	5302845	5302845
2018-2019	9350190	9336934	9336934
2017-2018	13055000	13030184	13030184

10.3.2 Utilization of allocated funds (20)

(Institution needs to state how the budget was utilized during the last three assessment years)

10.4 Library and Internet (20)

10.4.1 Quality of learning resources (hard/soft) (10)

- Relevance of available learning resources including e-resources
- Accessibility to students
- Support to students for self-learning activities

RESPONSE:

The Central Library is a two storied building with a built-up area of more than one lakh square feet and fully air-conditioned with a seating capacity for 1000 users. It functions between 9.00 a.m. to 9.00 p.m. A well-equipped stacking of books in various domains to meet the institution's objective of providing high quality education is available. Library services have been automated using the Open-Source Integrated Library Management Software *Koha*. The library is providing an evolving technology environment with effective tools and services for the discovery and delivery of information to our users and comfortable space for individual study and learning, equipped with appropriate infrastructure. Also, CCTV security system and a fire alarm system for protection against fire are available.

The library provides 37800 sq. ft space for reading area, 3150 sq. ft. space for E-Library and Media Resource Centre, 2800 sq. ft. for Video conferencing Hall, 560 sq. ft for printing and reprography, 360 sq. ft. for Discussion room and the remaining space for stack of reading materials and other sections for the effective functioning of the library.

The faculty members can borrow 10 books (5 books for 14 days with 2 renewals and 5 books for 180 days without renewal), UG students can borrow 4 books for 14 days with one renewal, PG students, Research scholars are allowed to borrow 5 books for 14 days with one renewal and non-teaching staff are allowed to borrow 4 books with one renewal.

Facilities and Services

Print resources

- Stacking more than 99000 volumes of books in engineering, management, advanced sciences, agriculture, architecture, arts, humanities and general.
- 282 national and international print journals and magazines are subscribed.
- For reference of research scholars, 255 Ph.D. theses, 3900 bound volumes of periodicals and 5708 Project Reports are available.
- Newspapers in English and Tamil languages to keep our users abreast with the news and current affairs of national and international importance are subscribed.
- Resource cell for competitive examinations.

E-Resources

E-resources comprising of 4700+ e-journals from IEEE, Science Direct, DLINE, SAGE etc and

71000+ e-books from ProQuest, Springer and ScienceDirect are subscribed.

- Access to Scopus, India Business Insight database (IBID), RAXter Research Assistant (Literature review and analysis tool) and DELNET discovery portal is facilitated.
- Access to the free resources provided through National Digital Library of India.
- Video and web courses developed by IITs under NPTEL have been procured and access to the contents is provided over the campus network.
- 32 DTH Channels under Swayam Prabha for MOOC Courses.
- E-Library and Media Resource Centre for accessing online resources.

Access to E-Resources

- IP based unrestricted access is given to the e-resources through intranet so that the content can be accessed by the users from anywhere in the campus.
- Remote access facility is provided to the e-resources through *Shibboleth* authentication to access them outside the campus.

Digital Library

- The library has 67 computers to support the users to search and read documents.
- Institutional Digital Repository – has been created using Open-Source Software ‘DSpace’ for disseminating the scholarly contents created at our institution and access is given through intranet.
- The digital versions of the Ph.D. theses submitted to the institution are uploaded in the INFLIBNET *Shodhganga* repository, a reservoir of Indian theses, to provide seamless access to the research community.
- Bulk registration of faculties and students as members of National Digital Library of India.
- Universal Digital Library (UDL) Project - Our institution is one of the partners of the UDL project led by Carnegie-Mellon University (CMU), USA. Under this project, we digitised more than 4000 rare-books and palm leaves ([click here for list](#)) which are now available online for free in the UDL website (<http://ulib.isri.cmu.edu/ULIBAboutUs.htm#partnersBkMark>).

Institutional Memberships

- DELNET membership for resource sharing under Inter Library Loan and access to the free e-resources available at its portal.
- Shodhganga membership for uploading theses submitted by the research scholars in the Shodhganga thesis repository for supporting open access initiative.
- eShodhSindhu membership for subscribing e-resources in the prices negotiated by the consortium.

- National Digital Library of India (NDLI) membership for having access to the free resources available at NDLI.

Automation

- Library services have been automated using Koha ILMS.
- The books have been barcoded due to its speed, accuracy and reliability in the circulation system.
- WebOPAC (Online Public Access Catalogue) facility for accessing the availability of the books, renewing books online and submitting purchase suggestions through ILMS.
- Alert services for new arrivals of books and journal issues.
- Online Renewal
- Koha OPAC provides other details such as links to e-resources, memberships, details of borrowing facility, borrowing rules, etc.

Plagiarism Detection System

- Plagiarism detection systems such as URKUND and iThenticate are made available for promoting authentic, genuine and quality research works.

Reprography facilities

- Printing, reprography and document scanning.

Other facilities

- Discussion room
- Own book reading
- Video conferencing cum virtual learning hall

10.4.2 Internet (10)

- Name of the Internet provider: JIO and BSNL
- Available bandwidth: 2GBPS
- Wi-Fi availability: Whole Campus is enabled with Wi-Fi including Hostel and Library.
- Internet access is available in labs, classrooms, library and offices of all Departments
- Security arrangements:

Firewall:

1. The campus network of KARE is protected by the state of the art SOPHOS firmware system to protect our network traffic.
2. Every user of network is provided with username and password so as to have privacy and security while accessing data.
3. Content filtering is enabled through firewall to protect students from accessing illegal and

malicious contents thereby securing the system.

4. Students and employees who are doing projects which needs a bypass from firewall are given access through proper channel.

5. Dynamic Host Configuration (DHCP) is enabled inside KARE for addressing majority of internet users. Sensitive users are given with Static IP addresses. Backup of rules and policies in firewall is automatically taken on daily basis thereby providing disaster recovery.

6. The network traffic and bandwidth inside the sensitive centers inside KARE is managed through firewall. Dedicated personnel are available to maintain Firewall firmware.

Security through Software Usage

1. Pirated Softwares bring the risk of data insecurity. So KARE encourages to go for Standard proven Open source technologies and Freeware.

2. In cases where there is a need to purchase proprietary softwares, licensed software purchase is encouraged for all department specific softwares.

3. SOPHOS antivirus software is available in KARE to protect the standalone systems.

4. Piracy in operating system is prohibited in KARE, so that every system has an updated version of state of the art OS, thereby secures the data and reduces the risk of failure.

5. KARE provides official email to all students and employees. KARE email uses Google email server GMAIL, which is very much secured and proven email server, thereby email communication and recovery of email content is made easy and secure.

6. KARE encourages extensive use of proven software products from Google such as forms, classroom, and drives for storing sensitive information and sharing information. Information sharing through whatsapp is also encouraged inside campus since it comes with highly secured encryption technology.

Disaster Prevention and Recovery

1. Servers, Firewall firmware, network switches and other IT hardware of KARE are periodically serviced.

2. RAID backup and needed cloud back up is enabled in servers so that recovery is made easy in case of any disasters. Firewall rules and policies are also backed up periodically.

Power Backup for IT Infrastructure

1. Entire academic area of KARE campus is supported by total 7 Diesel Generators with capacity (380kVA – 1no, 250kVA – 2nos, 180kVA – 3nos and 125kVA– 1no)

2. All IT infrastructure of campus comes under dedicated power backup supported by Diesel generators and Battery Powered Uninterrupted Power Supply Systems (UPS).

3. Estate personnel of campus maintain the power backup infrastructure of the campus.