Faculty of Engineering and Technology

COMPUTER SCIENCE AND ENGINEERING

STRATEGIC PLAN 2019-24

RAMA UNIVERSITY
UTTAR PRADESH, KANPUR

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Section-1

Executive Summary:

The Computer Science and Engineering (CSE) Department of Rama University continues to lead in research and education. Throughout the past few years, the CSE Department has influenced society at levels that remain without parallel among academic institutions.

With this strategic plan, CSE Department lays out its direction for the next five years of research and education. The plan is the result of a unified vision, by which CSE is becoming *extensive* in all of society. This important development creates new challenges and opportunities for CSE research and education.

The three pillars of extensive computing are as follows:

Extensive computer systems
Physical and virtual environments
Computational foundations for other academic disciplines

This strategic plan identifies four primary changes relevant to the future leadership role of the CSE Department.

Faculty hiring: We recommend that the Computer Science Department strengthen its research in nearly all aspects of extensive computing, as laid out in more detail in this document. As extensive computing is inherently interdisciplinary, the department needs to continue to form alliances with other departments. It needs to promote joint hires and continue to attract exceptional students whose interests cut across multiple disciplines. At the same time, the department needs to retain its identity as a CSE department and continue to strengthen the core of computer science and Engineering.

Interdisciplinary initiatives: We recommend the CSE department create "lightweight" mechanisms to facilitate interdisciplinary research and teaching, without the creation of additional administrative structures. This can be achieved by supporting interdisciplinary laboratories in which faculty from multiple areas share resources. The department should also provide moderate incentives for faculty and students to engage in high-risk interdisciplinary research and education, and seed-start activities in areas that outside the boundary of existing activities.

Educational reform: We recommend that the department update its educational program to meet the requirements of a multi-disciplinary workforce in the extensive computing age. The educational programs need to provide additional flexibility (CBCS) for students to pursue nontraditional, interdisciplinary education. Especially at the undergraduate level, we recommend the formation of a smaller core, augmented with tracks that provide students with freedom to specialize in several different areas of computing. We also recommend that the department strengthen the communication and collaboration skills of its graduates, and that the department take active steps towards reducing its gender and minority imbalance.

Research funding: We recommend that the department actively pursue new funding models. For example, the department could increasingly draw on Government/Non Government organizations and foundational initiatives in the interdisciplinary life sciences. The department should also consider growing its industrial supporter base,

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through strengthening its existing industry affiliates programs Rama University , FET , CSE Department   has been recognized by some of the national and international rankings. This is a promising start for an institution which aspires to break into the league of top 500 institutions in the world in the next 5 years.

Ranked by National Institutional Ranking Framework

Ranked in BRICS QS Ranking

Ranked in ASIA QS Rankings

Ranked in THES World Rankings

Ranked in THES Asia Rankings

RAMA UNIVERSITY , FET, CSE Department vision to become an institution of eminence

To become the epicenter of education, research and innovation by creating and disseminating knowledge across the globe influencing and impacting the better future of beings.

Vision:

To create the most conducive environment for quality academic and research oriented undergraduate and postgraduate education in computer science and engineering and prepare the students for a globalised technological society and orient them towards serving the society.

To achieve the above vision and to break into top 500 world university rankings in the next 5 years, Rama University, FET, CSE Department will formulate strategies around the following key pillars:
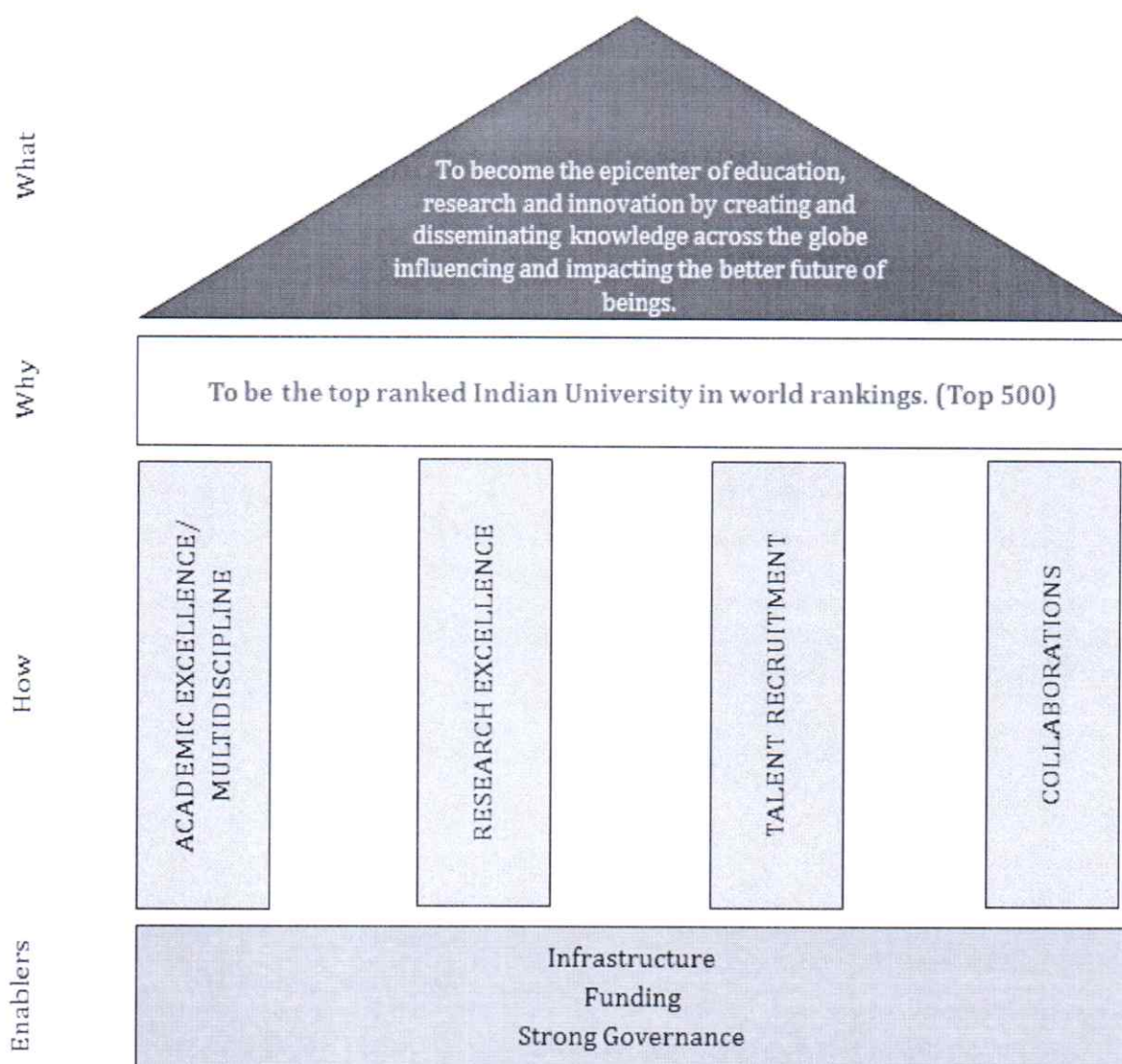
1. Academic Excellence

2. Research Excellence
3. Talent Recruitment
4. Collaborations

These strategic pillars will be enabled by the presence of a robust governance structure in the university, an enabling infrastructure and availability of sufficient funding.

In the implementation of our Strategic Plan, we look to our core values to steer us through decision-making:

- Excellence, Integrity, and Academic Freedom
- Global Vision and Local Commitment
- Inclusiveness, Diversity, and Respect

What

To become the epicenter of education, research and innovation by creating and disseminating knowledge across the globe influencing and impacting the better future of beings.

Why

To be the top ranked Indian University in world rankings. (Top 500)

How

ACADEMIC EXCELLENCE/ MULTIDISCIPLINE

RESEARCH EXCELLENCE

TALENT RECRUITMENT

COLLABORATIONS

Enablers

Infrastructure
Funding
Strong Governance

Section-2

Vision:

To create the most conducive environment for quality academic and research oriented undergraduate and postgraduate education in computer science and engineering and prepare the students for a globalised technological society and orient them towards serving the society.

Multi-disciplinarily is a common theme across the key strategic pillars of Rama University , FET, CSE Department and is critical to achieving its vision.

Academic Excellence	• Rama University, FET, CSE Department will **launch schools that are multi-disciplinary** in nature such as **School of Design** and modify existing schools such as School of Science and Humanities to make it a **School of Liberal Studies** to bring in more multi-disciplinary learning
	• **Launch new programs which are at the cross section of various disciplines.** While these programs would be firmly grounded in a particular discipline, they would have significant elements of other disciplines as well. For eg. The School of Management would launch programs in Agri-Business Management, Technology Management for society 4.0
	• Pedagogical innovations and changes in curriculum to promote more inter-disciplinary learning. This would include allowing students to pursue an area of study by **opting for a minor degree or a double major degree;** including elements of **research and design experience in courses**

Research Excellence	• Launch COEs which are aligned to the National Priorities, having a large social impact and which predominantly requires multiple disciplines to come together and work for creating impact. • CoEs such as **Public Health, Urban Infrastructure and Smart Cities, Transport and Mobility, Bionics** will leverage Rama University , FET, CSE Department capabilities in engineering, science and humanities, management to create lasting impact
Talent Recruitment	• Attract **researchers and faculty who have interests in multi-disciplinary research**. This could be through opportunities to develop the CoEs and by launching specialized inter disciplinary programs offered by the CoEs • Build scale in PG, PhD programs to **ensure health mix of UG, PG students in the student body.** Build scale in non-engineering programs particularly in Science and Humanities to promote an ecosystem with complementary thought processes and skill sets. • **Attract students from diverse communities and backgrounds**, reward meritorious students to build a diverse and strong talent pool, which will be crucial to achieving research and academic excellence
Collaborations	• **Each CoE to partner with industry, think tanks, NGOs,** funding agencies, Government agencies and work collaboratively to promote a multi-disciplinary ecosystem of learning and research
Infrastructure	• The academic infrastructure in Rama University , FET, CSE Department will be **redesigned to academic villages comprising Centres of Excellence and housing multiple related disciplines together in a cluster.** • This will facilitate not only formal collaboration but also frame informal casual **engagement between multiple disciplines in dynamic, flexible, and effective "non-classroom" environments** across the campus
Governance	— **Board representation to have academicians and experts from multiple disciplines** to ensure spirit of multi-disciplinarity is captured in strategic decision making

Section-3

GOALS:

Growth in vibrant economies of the world has been fuelled by innovation, disruptive technology, and product development, which have roots in state of the art research and education in academic institutions. Such institutions are strategic assets of a nation, contributing to both, national prosperity and national security. Successful institutions have strong links with local communities and industry, and contribute to the city, the region and the nation's development and growth. It is recognized that technology has a major role in transforming lives. Creating an enabling ecosystem for innovation and entrepreneurship is thus a key activity for progressive educational institutes.

The overall goals of the Department are broadly related to its three missions of Instruction/Learning, Research/Innovation and Outreach/Engagement.

3.1: Mission-

- To create an ambience in which new ideas, research and scholarship flourish, and from which the leaders and innovators of tomorrow emerge. T
- To provide an education that transforms students through rigorous coursework and by providing an understanding of the needs of society and industry.
- To collaborate with other academic and research institutes around the world to strengthen the education and research ecosystem.
- To impart high quality professional training at the postgraduate and undergraduate level with an emphasis on basic principles of computer science and engineering.
- To engage in cutting-edge research, and to lead society into the new age of pervasive computing.
- To contribute to an array of important open problems that define the society of tomorrow, including quality of life, health, environment, and energy.

3.2: Core Values-

The core values adopted by the University as enduring principles are Integrity, Eminence, Responsibility, Transparency, and Sympathy.

- **Integrity:** Research and teaching shall be carried out in an environment of academic freedom and honesty. The department will adhere to the highest standards of ethics in all its activities.
- **Eminence:** The department is committed to eminence in all spheres of its activities, and through internal and external reviews, and will work towards continuous improvement. The department will recognize exceptional efforts through awards and honors.
- **Responsibility:** Rama University, an University passed by Vide U.P. Act No. 1 of 2014 as passed by State Legislature and Recognized by UGC U/s 2(f), has been a recipient of public funds and recognizes that it is accountable to the people of India (through the Rama University Council and Board of Governors of Rama University) and to all its immediate stakeholders including students, staff, faculty, alumni, industry.
- **Transparency:** The Institute will function according to defined procedures and rules, which will be informed to all stakeholders. The University will make public all important information related to its functioning.
- **Sympathy:** An awareness of the conditions of the weaker sections of our society and contributions towards solution of their problems will form an integral part of the research and education programmes of the University.

3.3: Academic Excellence and Learning-

OBJECTIVES:

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Objective 3.3.1: Develop the curriculum that enhances the academic reputation, to attract and admit students from all backgrounds with outstanding academic potential and the ability.

Objective 3.3.2: Modernize and strengthen curriculum and offer Industry-oriented courses.

Objective 3.3.3: Prepare the students of RU Computer Science Engineers with a strong sense of responsibility and social awareness to serve as engineers and leaders in the state, nation and the global workplace, to adapt to a world with continually changing technology and a diversity of interests.

Strategic Action:

Prepare students for critical thinking skills and holistic approach to problem solving through multi-disciplinary and core knowledge classes spanning the program. Impart life-long self-learning skills that utilize fundamental concepts to solve problems.

Offer modern and flexible curriculum (CBCS) that expose students to the latest trends, ideas and techniques, and which afford students opportunities for specialization, breadth in the field, and multidisciplinary work.

We have to focus on strategically important subjects areas including Artificial Intelligence, IoT, Data Science, High Performance Computing, Block chain Technology, Web Development, Secure System, Automation, Android, etc.

Provide opportunities to develop communication and leadership qualities and imbue entrepreneurial spirit.

Increase financial support for graduate students.

Increase the retention rate and numbers in terms of students in all the programs offered by department.

Address national and International needs for Computer Science and Engineers through improved ties with industry and government partners for addressing research problems, capstone designs, student internships and solving society's problems.

We will focus on online platform/online teaching for global learning.

3.4: Research and Innovation Ecosystem

To achieve goals related to raise the quantum of research and innovation output and improving its quality, we have to adopt a multi-pronged strategy addressing the issues of enhancing the number of research scholars and the faculty strength and of augmenting resources.

Objective 3.4.1: Sponsored Research and Industrial Consultancy.

Objective 3.4.2: A major initiative is a plan to develop focused Centre of Excellence.

Strategic Action:

Seek active collaboration with other units in the campus and elsewhere including national centers and laboratories and industrial partners

We will develop the Centre of Excellence, which could also be multi-institutional, involving

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partnerships with the IITs, IISc and NITs. Research at the centre will be carried out through an industrial membership programme and an Advisory Board consisting of representatives from the various stakeholders including key industry partners. Deployment of professional management and contract staff will be a feature of the centre.

Recruit outstanding research faculty when opportunities arise

Increase the quality and quantity of graduate, post graduate students and research scholars.

We will design and develop Industry Connect Programme wherein faculties spend a few weeks embedded in industry with a view to discovering.

We will focus on new research projects of relevance to the nation and of interest to industry and to build relationships research challenges of mutual interest.

Encourage and assist graduate students in applying for nationally–recognized scholarships and funded research opportunities.

Research Thrust Areas in Computer Science and Engineering @ RU:

1. **Unity projects (AR/VR)**
   a. Unity allows development of a unique interactive content with virtual reality and augmented reality. Till now all the content developed for student lack intervention and student interaction. A project "learning suite" can be developed for the students starting from first standard. This will use adaptive artificial intelligence to support user specific learning. If a student is not able to grasp a specific topic or concept then the artificial intelligence will select a new lesson plan to deliver the same content in a fresh delivery. User can get new example sets to solve with the assistance. The project will tune itself in such a way that in next assignment or practice question the level of assistance will be reduced. The user will see the outcome of learning and key focus areas where revision is required.
   b. A 3-D tour application to enhance the marketability of the university. In this project any admission enquiry or visitor, while sitting in the office chair would be taken into augmented reality and can take the tour of our university. This could enhance productivity of marketing team, increase the turnout and retention ratio. This will be using Hololens.
   c. A 3-D Skype meeting telecommunications application. Any user with Skype on his or her regular devices like PC, Mobile etc. can dial user on HoloLens and communicate with each other. With Video call On, the user on PC will see the view HoloLens user is seeing and HoloLens user will see view captured by PC / Mobile device user camera.
   d. Hololens Medical. A unique solution can be developed for medical students that will assist them in studies and make our medical course unique in India. All the students can see the anatomy and related medical problems. This give 3-D view of organs and their working.
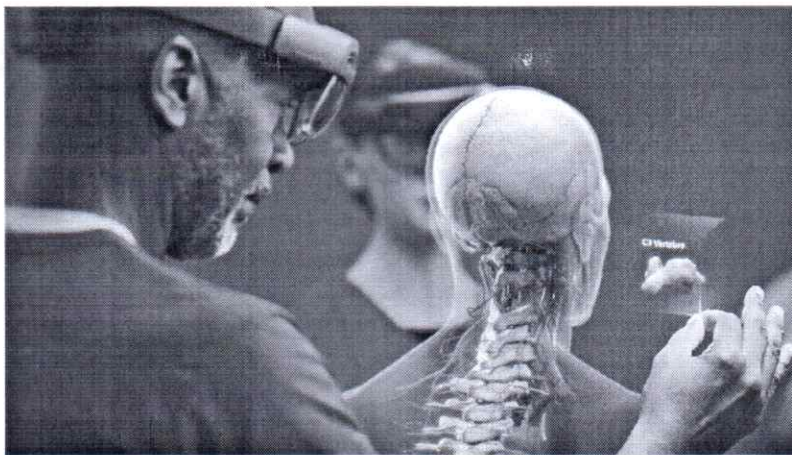
2. IOT & AI

a. A swarm intelligence based nano bots which can collaborate in the situation like war, fire or disaster. These bug soldiers can identify the targets and eliminate them, give real time updates, create enemy position maps, overcome geographical hurdles, assist our troops by reconnaissance and avoid unnecessary risks. Are capable of search & rescue by collaborating through swarm intelligence. They can be deployed in a vast area in less time and also help to check infiltration. This will impact the future of scientific research in India as it cover a lot of field like swarm intelligence, insect locomotive, efficient power consumption in machines, material science and miniaturization of machines.

b. IoT can be used in Medical sector to save many lives. The aim of developing this project is to monitor the health condition of a person anywhere and send the information to a specialized doctor to check up. Also it could keep track of patient in ICU and connect to a specialist in case of emergency without human intervention. This would give a prompt medication to the patient. Using this project you can detect the heartbeat, Blood pressure, hemoglobin content etc., All these reports can be used for analyzing a person's health.

c. Energy consumption and management is a major task for people to lighten up our next generation future. A lot of electricity is wasted while lighting the street lights even when there is no traffic, to reduce power consumption by only switching the poles when someone passes by. Project Street light intensity gets changed along with the environment. If you walk at night the intensity will be high and morning it falls to the minimum.

d. Monitoring the brain parameters by using Brain-Computer Interface technology is innovated to the analysis of the brain to predict the human thoughts or to control applications using the brain. As the next stage of analysis based on Machine Learning to our Brain, we need data logs of our Brain parameters, so we need the logs of data which should contain Brain values.

e. In this proposed system, we are having database of authorized person list by registering their faces by entering OTP, so that non authorized person can't able to enter the home until they enter the correct OTP. Whenever some person pressing calling bell switch, the camera gets triggered and capture the image of the intruder and checks that the image to the database, if that face is not matching with the database, it sends an email containing that intruder image and OTP, when intruder type the OTP by the owners' knowledge then it authenticate the user to enter.

3. Deep Learning & Big data analytics

a. Drowsiness Detection, it can be helpful to raise alarm to driver whenever he or she is feeling drowse. This would request the drive to take the vehicle off the road and take a break, thus preventing the accidents.
b. Natural Language Understanding and deep learning to make a bot to assist the students to opt a curriculum and admission enquiry
c. Medical assistant to help doctor to diagnose a disease and suggest medicine will be help full for MBBS and homeopathy.
d. Voice augmentation with lip movement and prediction.

4. Computational Intelligence and Machine Learning

In this theme we investigate in computational environments natural intelligent systems at different levels, ranging from populations and societies, to nervous systems and brains, and to genes, proteins and metabolites.

Topics include:

- Meta-modeling in evolution in dynamic environments, multi-objective optimization
- Multi-objective evolutionary learning
- Semi-supervised learning, graph-based learning, and active learning.

Research Clubs:

At the heart of The Research Club is our desire to connect people within the University and Market Research Industry. Department of Computer Science and Engineering working on student research club and our permanent academic staff is distributed on the research clubs.

Artificial Intelligence Club
Robotronic Club
Cryptography and Security Club
Data Science Club
Logix Club

3.5: Human Resource

Human resources are the most important assets needed to realize its aspirations and the quality of our academic, research, professional and support staff is vital to our future.

Recruit and retain top faculty and staff:
Increase the number of t faculty positions proportional to the increase in students and research.
Promote the environment where faculty and staff can achieve their potential.
Increase professional development for all employees.

3.6: Diversity and Outreach

Objective 3.6.1: To strike and strengthen relations with industry

Objective 3.6.2: To contribute directly to society at large and to spread awareness in the community about the important contributions of CSE of Rama University.

Objective 3.6.3: Proactively seek diversity in students, faculty and staff.

Objective 3.6.4: One important objective of our outreach effort is to diversify the student population and promote aspirations to study at Rama University for CSE.

Strategic Action:

Enhance the department web presence and communicate regularly with stakeholders through newsletter and other means.

Improve national ranking and reputation of graduate and professional programs.

Increase efforts in conjunction with the College for recruiting of students from local and other schools and partner schools in the region and abroad.

Establish a system of student Ambassadors to local schools to form a long-term relationship.

Focus communication efforts to all department stakeholders including alumni, friends, industrial partners, academic partners, government offices and peers. Proactively work with the department efforts to establish an active recruiting pipeline of high quality.

We will offer short courses and workshops for professionals, particularly in industry, to enable them to stay up-to-date and get qualified further.

Providing technical solutions to pressing issues of public importance

Providing technical expertise to individuals and organizations involved in socially relevant Projects.

Playing vital roles during emergencies and after disasters.

3.7: Training and Placement:
As the diversity of incoming students increases, the department will take several proactive measures to make it easier for first-year students to adjust to the academic and social life on campus.

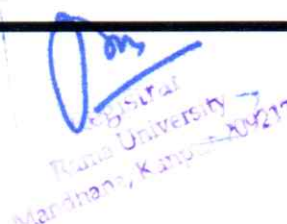**Objective 3.7.1:** Improving Communication skills of students
Objective 3.7.2: Improving Technical skills of students
Objective 3.7.3: Personality development is considered very important for all students
Objective 3.7.4: Placement Initiatives

Strategic Action:

- Investigate ways to better integrate core communications courses with each of our degree curricula. And enhance curriculum so that communications skills are reinforced throughout the program.
- We will develop the capsule training for weak students and implement in phase manner.
- We will focus on practical/technical training rather than theoretical part as per industry requirement.
- We will train the students and give them opportunities to choose the club as per their technological interest.
- We will provide the multidimensional training to become future leader.

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- We will train/motivate our student to become entrepreneur.
- The department placement cell creates a meticulous database and assists the students in getting placed in national & multinational companies through centralized placement department.

3.8: Internationalization and Partnership:

The Department seeks to increase the quantum of exchange of both undergraduate students and research scholars. Build strategic partnerships and alliances to support the teaching, research, and service mission of the department.

Objective 3.8.1: Increase the number of working partnerships with other departments and institutes on campus.
Objective 3.8.2: Forge and strengthen relationships with other institutions, labs, funding agencies, and industry.
Objective 3.8.3: International and National MoU for Faculty/Student/Technology exchange.

Strategic Action:

Work with Federal Agency counterparts in their efforts to identify key challenge problems to galvanize the computer science research community.

Promote working relationships with other Institutes, departments, and the Rama Hospital.

Nurture relations with government labs and federal agencies.

Develop funds to invite visitors from other institutions, labs, and agencies for short and extended stays.

Increased involvement of faculty in advising industry, agencies, and other institutions.

Research interest mapping: Faculty across leading academic institutions will be paired with CSE faculty based on overlapping research interests in order to collaborate and co-supervise the research work of exchange scholars. Joint Ph.D. programmes will be set up with universities that have a thriving exchange programme with the Institute. Such programmes will serve as magnets for research scholars.

Engagement with industry: This will be in the form of three-way interactions (RU, academic partner and industry) and joint projects.

Facilitation of faculty and research scholar mobility: Funding mechanisms to facilitate exchanges of scholars and faculty will be identified. Support will be enlisted from industry and alumni sources.

1. **Academic Excellence:**

Rama University, FET, CSE Department when founded, was primarily a science and technology institution, it has steadily branched out into other disciplines such as humanities, medicine and management. With one of the largest student intake in the country, the institution has the potential to be a world-class institution of higher learning offering interdisciplinary courses across various schools of learning. Multi-disciplinarily will be the key driving factor for academic excellence. The following are the key strategies to be undertaken by Rama University, FET, CSE Department in pursuit of academic excellence:

i) **Launch market relevant and interdisciplinary programs**: Rama University, FET, CSE Department envisions to launch disciplines and courses which are market relevant and futuristic and addresses emerging trends and needs locally and globally to ensure its graduates are equipped with knowledge and skill sets which are most in demand. Rama University, FET, CSE Department will also leverage the presence of multiple disciplines in its campus to launch courses and programs that are inter-disciplinary in nature.

a. A separate **School of Design** will be launched that will promote collaboration of engineering, science and art. The School of Design will cut across disciplines in the true spirit of multi-disciplinary education offered in Rama University, FET, CSE Department

b. Rama University, FET, CSE Department **will collaborate with mentor institutions as knowledge partners globally for each of its schools to produce graduate outcomes of a global standard.** There partner institutions will assist in curriculum planning and development of programs and courses, defining learning approaches and outcomes. They will also assist in creating an integrated learning environment encompassing technology; content; labs and spaces.

c. A number of **courses which are market relevant and futuristic which will address the emerging trends both nationally and globally will be launched**. This will include courses such as Urban Infrastructure and Smart Cities in the Department of Civil Engineering, Artificial Intelligence and Machine Learning in Department of Computer Science, etc.

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d. Rama University, FET, CSE Department will also strive to **promote inter-disciplinary learning** in a big way. Courses which are at the intersection of different disciplines such as Health Economics, Data Sciences, Bioinformatics, etc. will be launched. SRM will also offer the option to students to pursue a minor in their chosen field of interest or to give them a career edge. **25% of SRM's programs will be interdisciplinary by 2022(around 3 programs) and 30% by 2025 (around 5 programs).**

Case in Point : Rama University, FET, CSE Department Launching Inter-disciplinary and market relevant programs

Interdisciplinary Programs:

— Rama University, FET, CSE Department has introduced Interdisciplinary Experiential Active Learning (IDEAL) in 2020. As a first step towards creating this IDEAL environment, SRM offers the option of pursuing minors and specializations to students joining B.Tech degree programme. This allows students to pursue an area of higher study in their field of interest. **Students have an option to choose from over different minor programs in Rama University, FET, CSE Department .**

— Rama University, FET, CSE Department has already introduced a number of inter-disciplinary programs in the last 5 years including **B Tech in Biomedical Engineering/ Robotics/AI/ML, M.Tech in Biomedical Engineering/ Robotics/AI/ML**

Market Relevant and Futuristic Courses

— Rama University, FET, CSE Department has already launched course such as M Tech in Internet of Things /Pervasive Computing. These courses have been offered given their massive research potential in the coming years

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ii) **Curriculum/ Pedagogical Innovations and use of technology in delivery of teaching and learning:** will be crucial to the successful implementation of the multi-disciplinary academic plan. There would a shift from the traditional learning methodologies followed today to more contemporary learning approaches embracing experiential learning (learning through doing) and technology-enabled active learning.

a. Hybrid learning (combination of online and offline), active learning and flipped classroom techniques would be employed to make learning more experiential and student centric. Rama University, FET, CSE Department is already an early adopter of such learning techniques in India.

b. The University is also in the process of establishing Active Learning Classrooms (ALCs) in the Faculty of Engineering and Technology to promote more collaborative approaches to learning.

c. The University is also redesigning its curriculum to include **components of Research and Design Experience such as Under Graduate Research Opportunities Program (UROP), internships, capstone project or thesis.** This will ensure students graduate with better employability skills

d. Rama University, FET, CSE Department will build on such initiatives and hopes to achieve **40% of teaching and learning through active learning/hybrid learning**.

iii) **Continuous Professional learning/ Development**: Rama University, FET, CSE Department would leverage its faculty strength, network of relationships with the industry, international partnerships to enter into Continuous Professional Education.

a. Rama University, FET, CSE Department would offer short-duration courses of less than a year targeted at working professionals looking at enhanced career growth, professionals whose skill sets are affected by technology disruption, students seeking short duration professional development programs.

b. The courses would be offered by Rama University, FET, CSE Department senior faculty on a standalone basis or in collaboration with industry partners/ international academic institutions.

c. These courses will be a means for Rama University, FET, CSE Department to expand its academic offerings to international markets such as Africa, SAARC, and South East Asia.

d. These Continuous Professional Learning courses for working professionals would be a combination of both classroom and online certification courses

e. Rama University, FET, CSE Department **plans to cater to 500 students each year by 2022, 1,000 students by 2025 and 20,000 professionals by 2032(online mode)** . The programs will initially be launched in Rama

University, FET, CSE Department areas of strengths such as Engineering and Technology and subsequently in areas such as Management, Science and Humanities.

f. Focus on National and Global Accreditations: As a measure of ensuring continuous quality assurance and improvement, Rama University, FET, CSE Department will strive to obtain institution wide and program level accreditation. These accreditations would be both national and global

    i. Continue to be NBA accredited as per NBA accreditation cycles.

Progress in Academic Excellence in RAMA UNIVERSITY, FET, CSE Department would be tracked on the following parameters

End state Outcomes for Academic Excellence			
Particulars	2021 Target	2023 Target	2025 Target
KRA 1 : Course Offerings			
% of specialized or inter-disciplinary programs	20%	25%	30%
KRA : 2 Pedagogical Innovations			
% of UG programs with embedded research component	20%	30%	40%
% of Digital component in course curriculum	20%	30%	40%
KRA 3 : Continuous Professional Learning			
No. of working professionals enrolled	500	700	1200
KRA 4 : Graduate Outcomes			
Graduate Employment Rate	65%	80%	80%
Academic Progression – Further Study	10%	15%	20%

2. **Research Excellence:**

Achieving research excellence would be key to addressing national and global challenges such as like development of cost-effective healthcare, ecologically and socially sustainable transport planning, space technology, and agricultural innovation among others. RAMA UNIVERSITY, FET, CSE Department will set up Centres of Excellence (COE) in areas which address critical issues and cuts across multiple

disciplines. It aims to improve the quality of research publications by investing in faculty development, increasing the number of post graduate and doctorate students and extensively building a network of partnerships with leading local and global institutions.

i) **Setting up of new and transformation of existing CoEs, aligning with national priorities**: RAMA UNIVERSITY, FET, CSE Department will setup Centres of Excellence to focus on research areas that are of national importance and which will need collaboration from multiple disciplines. **The CoEs that will setup will be a combination of existing CoEs being transformed to make it more holistic and new CoEs in emerging areas of research.**

The Centres of Excellence chosen above are aligned to the National Priorities of India and hence RAMA UNIVERSITY, FET, CSE Department will make a deep impact in the country through its CoEs.

Moreover most of the national priorities such as **Make in India, Digital India, Swacch Bharat, and Smart Cities** are not uni-disciplinary but requires multiple disciplines to work together to ensure the necessary social impact is created. For example, **Smart Cities would involve solving problems like intelligent traffic control, multimodal street design and planning (engineering), wellness and quality of life (behavioral sciences and health), policy making for sustainable initiatives (public policy)**. RAMA UNIVERSITY, FET, CSE Department is well positioned to address such challenges given its presence across the various disciplines. Also the work done in the **CoEs also address most of the Sustainable Development Goals such as Quality Education, Good Health, No Hunger, Affordable and Clean Energy, Sustainable Cities and Communities, Climate Action, Peace, Justice and Social Institutions**

Registrar
Rama University
Mandhana, Kanpur-209217

- The CoEs have been carefully chosen to ensure RAMA UNIVERSITY, FET, CSE Department will work on applied research and also solve societal problems in conjunction with Government, funding agencies, industry players

- The CoEs will be setup in the initial five years. To begin with RAMA UNIVERSITY, FET, CSE Department will invest in those CoEs which are in core areas of engineering, medical and health sciences. Also the investments in these CoEs will be phased out over a period of 5 years.

- To ensure fund availability the COE will be supported with Intramural grants to promote research culture and will also attract Industry sponsored projects, Government and other grants, endowments.

- The COEs will be led by distinguished researchers and will have high concentration of researchers and access to cutting edge equipment and research material.

- Setting up of these CoEs will result in:

1	*High quality journal publications* which will result in increase in number of citations per publication and thereby increase academic reputation of the university. The total number of publications per faculty per year is expected to be 7 by 2032 and the citations per publication would be 10 per publication.	
2	*High value consulting projects* with industry which will strengthen relationships with the industry and thereby improving employer reputation Annual earnings from sponsored projects and consultancy projects is expected to be INR 900 crores by 2032.	
3	*Joint research projects with leading international academic institutions* and faculty thereby leading to increased academic reputation	
4	Finding innovative products which will result in *increase in number of patents granted and can be commercialized* to bring revenue to the university in future. SRM IST would also file around 250 patents every year which is a tenfold increase from current levels of patent activity.	
5	*Startups which will result in new ventures* coming to life from market-oriented research	

ii)   **Multi-pronged, deep industry relationships/ partnership to build industry research model:** Engagement with industry is crucial to

understand the needs of industry, leverage their expertise, and attract funding to build solutions that cater to the needs of the market.

    a. Research centers across metropolitan cities such as Delhi, Bangalore and Mumbai would be set up in collaboration with the industry to deepen engagement with industry.

    b. Annual earnings from sponsored projects and consultancy projects is expected to be INR 10 crores by 2025.

iii) **Strong focus on international collaborations and interdisciplinary research:**

Over the span of next 5 years, RAMA UNIVERSITY, FET, CSE Department will have a sustained focus on developing meaningful collaborations with leading local and global institutions in the areas of research.

    a. Around 100 MoUs would be signed for collaborative research and 30% of these collaborations would be with universities in the top 200 global rankings.

    b. Over 25% of the research publications are expected as a result of the institution's collaborative work with their international partner institutes by 2025.

iv) **Develop institutional capabilities to create new technology/patent:** Development and investment to build new capabilities will result in increase of research output by the faculty and give impetus to produce more publications, patents and citations.

    a. A central **Research Directorate** will support with grant writing, attracting collaborative projects and research databases. Tracking of sponsors and grants for specific research areas industry sponsorships, CSR funds for research, alumni sponsorships/endowments would be done to source extramural grants. Extramural grant per faculty would stand at INR 15 lakh by 2025.

    b. RAMA UNIVERSITY, FET, CSE Department will be setting up the **Office of Technology Transfer** to actively engage with industry in commercialization of technology and innovation.

    c. **Incubation centers** and grants to enable germination and nurturing of Startups would be set up.

v) **Attract Specialist Researchers/ Eminent Thinkers**: Introduction of futuristic and interdisciplinary courses, setting up of CoEs, encouraging research exchange programs would help build a world-class research pool.

   a. RAMA UNIVERSITY, FET, CSE Department to recruit globally acclaimed scientists/ researchers to head the individual CoEs.

   b. Institutionalize Distinguished Visiting Professorship/ Fellowship schemes and tap into Government fellowship schemes to attract eminent thinkers in the fields relevant to the CoEs

   c. To attain global standards the percentage of researchers i.e. **PhD faculty would be increased to 60% in 2025**.

End state Outcomes for Research Excellence			
Particulars	2021 Target	2023 Target	2025 Target
KRA 1: Research Capacity / Centres of Excellence			
No of Centre of Excellence	2	4	10
KRA 2: Availability of Researcher Pool			
Number of faculty with PhD	60%	75%	90%
Number of PhDs	5	10	20
KRA 3: Research Output			
Average publications per faculty per year	3	5	7
Average Citations per publication	5	8	10
Patents filed	20	50	100
Revenue from industry projects/ grants (INR Crore)	2	5	10
No. of startups incubated	2	5	10
KRA 4 :Research Collaborations			
% of research publications through international collaborations	10%	20%	25%

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3. Talent Recruitment:

To emerge as a world class institution, it is important for the university to have a strong pool of students and faculty. Currently, the university has over 55,000 student who are predominantly concentrated in the UG disciplines (>90%) and around 2500 faculty members.

To emerge as a world class institution, RAMA UNIVERSITY, FET, CSE Department will strive to increase the intake of PG and PhD students. While RAMA UNIVERSITY, FET, CSE Department currently has students from across other states it needs to increase intake of students from across the globe too to strengthen its diversity quotient. Equally important would be to create an enabling environment for students be it in academics, research, sports or arts depending on their talent and aptitude.

The faculty in RAMA UNIVERSITY, FET, CSE Department are currently concentrated at junior levels – Assistance Professors and Lectures and more than 65% of faculty do not have a PhD. By 2025, RAMA UNIVERSITY, FET, CSE Department expects to maintain a faculty student ratio of 1:10 RAMA UNIVERSITY, FET, CSE Department would also focus on increasing the intake of faculty with PhD and recruiting faculty at a senior level – Professors and Associate Professors. It is important that faculty is hired from diverse and global background to ensure that the faculty blends in world class curriculum and pedagogy and the students are imparted education which is in line with global standards. It is important that the institution also works on a faculty development and retention strategy to harness their talent.

Faculty Recruitment and Retention

i) **Queen Bee Strategy for attracting high quality senior faculty:** "Queen Bee" strategy focuses on recruiting high quality and experienced faculty from across the globe. This includes faculty with experience in top 100 globally ranked universities, 15+ years of experience in specific domain. Through this strategy, RAMA UNIVERSITY, FET, CSE Department can hire an adequate number of experienced scientists living overseas and in India with established global reputations. These faculty in turn would successfully attract a large number of talented young scholars in their disciplines. RAMA UNIVERSITY, FET, CSE Department would have a **round 10 % of the faculty at an overall university level as "Queen Bees" by 2025**

ii) **SRM Young Leader Professorship (SRM YLP) Scheme** - The SRM YLP scheme will help RAMA UNIVERSITY, FET, CSE Department attract outstanding young researchers and scholars who aspire research leadership

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roles from some of the prestigious institutions in the world from QS top 100. RAMA UNIVERSITY, FET, CSE Department YLP scheme will provide startup grants to new faculty members as Research Grant of INR 1 crore for R&D initiatives. Additionally, the scheme will also provide attractive remuneration package including assistance and dedicated research environment.

iii) **Hiring of Adjunct Faculty:** Of the total faculty base, RAMA UNIVERSITY, FET, CSE Department will strive to have around 85% as full-time faculty and 10% can be visiting/adjunct faculty with 50% coming from foreign exchange and another 50% from industry.

    a. **Faculty exchange programs** are one of the ways in which RAMA UNIVERSITY, FET, CSE Department can attract visiting faculty from top ranked educational institutions. RAMA UNIVERSITY, FET, CSE Department can facilitate foreign exchange programs with universities from countries with high researcher mobility. Presence of interdisciplinary research centers will act as a major driver for faculty from those universities to come and collaborate with RAMA UNIVERSITY, FET, CSE Department

    b. **Industry Adjunct Faculty :** RAMA UNIVERSITY, FET, CSE Department will also leverage its network of relationships with industry and its alumni network to bring in industry professionals as adjunct faculty from the industry

iv) **Tenure Track System:** RAMA UNIVERSITY, FET, CSE Department would institutionalize a tenure track system to ensure recruitment of top notch assistant professors from across the globe. This would be institutionalized by RAMA UNIVERSITY, FET, CSE Department from 2022 onwards in their faculty of engineering and technology once a significant base of high quality faculty is in place. The tenure track system would be institutionalized in other streams such as management and science and humanities would be in place from 2025.

v)   Faculty Engagement and Retention:

Develop continuous 360 degree feedback and evaluation for faculty members.

The institution would launch *Faculty Climate Surveys* and use results from these surveys in drafting policies and practice in the domain of faculty mentoring, retention, satisfaction, development and encouragement initiatives.

Launch mentorship program for newly recruited faculty members via formal and informal group/ individual discussions, workshops, face-to-face interactions and have faculty exchange program in association with universities across the globe.

Succession planning: Identification and development of faculty for key positions mainly leadership roles. The process will increase the availability of experienced and capable faculties that can fill positions as per university's requirement, help reduce the knowledge lost when an employee exits the institution.

Launch mentorship program for newly recruited faculty members in association with universities across the globe.

End state Outcomes for Faculty Excellence			
Particulars	2021 Target	2023 Target	2025 Target
KRA 1: Faculty Capacity			
Total Number of Faculty	10	15	25
Faculty Student Ratio	1:10	1:10	1:10
% Faculty with PhD	60%	75%	90%
Cadre Mix (Professor: Associate : Assistant professor)	1:2:6	1:2:6	1:2:4
KRA 2: International Faculty			
% of international faculty	2%	5%	10%
KRA 3: Industry Faculty			
Faculty from industry	2	4	6

Student Intake:

vi)   **Increase Intake in PG Programs and Doctoral Programs:** Master and Doctorate students' strength at RAMA UNIVERSITY, FET, CSE Department forms 11 percent of overall student strength, this ratio needs to increase to 30 percent by 2025. A total of 100 students would be Post Graduate program and 50 students would purse PhD per year by 2025. To increase the share of students in PG and PhD programs, RAMA UNIVERSITY, FET, CSE Department would undertake the following :

   a.   RAMA UNIVERSITY, FET, CSE Department would offer integrated Masters and PhD programs.

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b. Offer unique, innovative interdisciplinary PG/PhD programs in association with this Centre of Excellence along with key academic and industry partners of CoE

c. The institution would also make available research grants and dedicated fellowships for PhD students.

d. Joint PhD programs with international universities and partners.

vii) **Attract international students and promoting diversity: 10% of its entire undergraduate student population and 30% of post graduate would be international by 2032.**

a. This would be done by introducing scholarships for meritorious candidates from communities or countries with high potential and low representation. **Focused scholarship programs for international students will be introduced such as SAARC merit-cum-means scholarship, ICCR (The Indian Council for Cultural Relations)** merit-cum-means scholarship, scholarship schemes for countries in which SRM is trying to build inroads.

b. The institute would enter into **strategic tie-ups with banks to provide financial assistance** for students in the form a student loan.

c. Focus on aggressively **building its brand outside India** through initiatives like opening regional office which will be responsible for attending school contact program and national admission fairs in those countries.

d. Launch long duration joint degree programs/ twinning programs to increase international student population.

e. Providing better hostel facilities for international students.

End state outcome for Talent Recruitment			
	2021 Target	2023 Target	2025 Target
KRA 1: Student Enrollment			
Total Enrollment	200	1000	5000
UG: PG: PhD Mix	80:15:05	75:17:8	70:20:10
KRA 2: Student Diversity			
% International students	7%	12%	15%
KRA 3: Need blind Admission			
% of scholarships provided	5%	10%	15%

4. Collaborations:

In today's globalized world, in order to excel it is crucial to forge partnerships and develop network and alliances. For an institution aspiring to be world-class it has to partner with the best for knowledge development and exchange and talent management. Increased engagement with community, industry and universities locally and globally would help RAMA UNIVERSITY, FET, CSE Department in providing a holistic learning and research experience for its students and faculty.

— **Engaging with community** to enhance experiential learning for the students and helping alleviate communities that need help will help shape holistic learning for students.

— **Industry alliances** would ensure their inputs would help in designing a market-relevant curriculum and help in placements.

— **Collaboration with world-class universities/ research institutes** will help RAMA UNIVERSITY, FET, CSE Department with knowledge development which can happen through students and faculty exchange programs and research collaboration, besides helping them build their reputation and brand value.

i) **Academic Collaborations:** RAMA UNIVERSITY, FET, CSE Department would connect to the world by establishing links for students, staff, faculty and program with **partner universities around the world**.

— The institution will deepen its engagementwith already established network of global universities such as MIT, UC –Berkeley and NTU. Deepening of collaboration will entail increase in number of joint research projects with faculty from international university, curriculum development, online course development and student and faculty exchange programs. It is expected the number of collaborations with universities which figure in QS top 200 universities would increase to 10 by 2025.

— RAMA UNIVERSITY, FET, CSE Department will establish corridor programs with US/Canada, UK, Oceania, Europe and South East Asia to engage with world class universities/institutions in those regions. RAMA UNIVERSITY, FET, CSE Department will also leverage India's strong bilateral relations with countries in these corridors focusing on priority

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research areas to improve engagements with academic institutions

— The institution would identify future higher education destinations and initialize collaborations with those countries and make a mark for RAMA UNIVERSITY, FET, CSE Department globally. These would typically be with institutions in low middle income and emerging economies.

Academic collaboration for RAMA UNIVERSITY, FET, CSE Department will be done at 3 different levels depending on their intensity of relationship:

a) **Strategic Partnerships:** This will on relationship building with RAMA UNIVERSITY, FET, CSE Department in areas of **curriculum planning** and development of programs and courses, defining learning approaches, help in resource management including technology, laboratories, design labs, and spaces. **Collaborative research** which will ensure setting cluster of research labs and centers that will be multi-disciplinary in nature in RAMA UNIVERSITY, FET, CSE Department to promote joint research and offer joint PhD programs. RAMA UNIVERSITY, FET, CSE Department will try to identify international universities to be targeted for **twinning programs** by creating a mechanism to enable the transfer of credits and launch of these programs by 2022.

b) **Mobility Programs: Medium intensity collaborations: Student exchange programs** to facilitate short-term visits (typically of 1 or 2week) of exchange students and research scholars in between semesters. **Faculty exchange programs to teach or conduct research** for one semester or an academic year at other university. **Faculty members of the foreign universities could be nominated to be Area Leaders** of the different departments with a view to assist in the development of curriculum and content at RAMA UNIVERSITY, FET, CSE Department.

c) **Future Market Programs:** These will focus on knowledge transfer between both the institutions through **conferences, guest lectures.**

d) **Increased Industry engagement** by showcasing universities work and its impact on research areas of national priority by leveraging combined time, talents and treasure of industry experts to advance RAMA UNIVERSITY, FET, CSE Department Engagement with industry is crucial to understand the needs of industry, leverage their expertise, access their data, and attract funding to build solutions that cater to the needs of the market. With dynamic

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technological changes the role of industry in the envisioned CoEs, curriculum development and research becomes crucial.

End state outcome for Collaboration			
Particulars	2021 Target	2023 Target	2025 Target
KRA 1: COLLABORATIONS WITH ACADEMIA			
No. of collaborations (with global top 200 institutes/universities)	5	10	20
% students outbound through semester exchange	5%	10%	20%
KRA 2: COLLABORATIONS WITH INDUSTRY			
% of faculty sourced from industry (adjunct Faculty mode)	3%	5%	10%
KRA 3: COLLABORATIONS WITH ALUMNI			
Funds from alumni (Cumulative till date) (INR in Lakhs)	5	10	20

Collaborations for Societal Impact: RAMA UNIVERSITY, FET, CSE Department will work for community development and create societal impact given the presence of multiple disciplines and strong student base.

a. Community development will be largely driven through its Centres of Excellence setup in areas such as **Public Health, Education, Public Policy, Cultural Diversity, Environment, Habitat and Sustainability.**

b. The institution will promote long-term relationship with local community including district of Chennai and nearby areas to promote RAMA UNIVERSITY, FET, CSE Department as a hub of knowledge-based activities through community outreach programs. For example it will partner with NGO's to organize health campus in nearby villages to promote health drives in association with COE with public health.

c. The institution will undertake activities that improve association of local community with the institution and build its reputation as one that **integrates community development along with education**

Key Enablers

These strategic pillars will be enabled by the presence of a robust governance structure in the university, an enabling infrastructure and availability of sufficient funding.

Infrastructure:

A dynamic learning environment as envisioned in the 5 year strategic plan of the institution will also need infrastructure that supports the innovative teaching and learning environment.

i. **Pedagogy enhancement infrastructure-** Today, learning happens everywhere: in and out of the classroom, on and off campus, in formal and informal settings. RAMA UNIVERSITY, FET, CSE Department academic infrastructure will be evolved to foster a new culture of learning that is increasingly multi-dimensional, global, social, experiential, and interactive. In line with the changing pedagogy that will incorporate the concepts of active and blended learning, flipped classrooms, and technology enabled classrooms, etc., the conceptual design of the interiors of the buildings will change. The structure of the classrooms would move away from a single focal point that is the teacher at the blackboard / presentation slides to focal points which would be congregation of students who have group specific deliberations on each topic.

ii. **Infrastructure to promote inter-disciplinary learning and experience:** Knowledge creation, knowledge dissemination, and community engagement are at the heart of RAMA UNIVERSITY, FET, CSE Department . Colleges and universities are essential environments that bring together faculty, staff, researchers, and students both formally, in traditional learning environments, and informally, outside of the classroom. The academic infrastructure in SRM will be redesigned in such a manner that not only facilitate formal collaboration but also frame informal casual engagement in dynamic, flexible, and effective "non-classroom" environments across the campus, both inside and out. An area, the knowledge hub will be conceptualized and developed which will be the center for inter- disciplinary activity in the institution.

iii. **Sustainable Infrastructure Strategy:** Adaptive re-use is one of the most sustainable strategies available in infrastructure development in higher education. When appropriately planned, the repurposing of an existing building can support a university's sustainability goals and reduce capital costs. RAMA UNIVERSITY, FET, CSE Department will revamp its infrastructure in such a way that the new buildings can be rejuvenated by integrating modern technology, repurposed to include efficient use of space, and

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rejuvenated with flexible interior environments at a later point in time. The infrastructure development will be "long life, loose fit" solutions that anticipate the future in a flexible and adaptable way.

iv. **Research Infrastructure**-The 12 CoEs would be built over a period of the next five years. These CoEs would have state of the art equipment to enable world class research and innovation. The CoEs would be developed in such a manner that the interior environment will be highly functional yet inherently flexible. The CoE will house classrooms and project spaces that will be constructed of demountable partitions, which allow them to be quickly reconfigured according to a specific project team's needs. The spaces will be highly dynamic and responsive to constantly evolving research and demands. Plug-and-play utilities will allow for ease in reconfiguration of spaces. Transparency, views, and lighting are key drivers for the design of the interior spaces, but a percentage of solid modular panels adds a level of privacy and a place for required technology and displays

v. **Technology in Infrastructure:** Innovation and technology would cut across each of the strategic pillars; be it academic, research, talent recruitment strategy or global networking and collaborations. The institution will leverage technology to enable the effective implementation of its long-term strategy.

a) **Inter disciplinary communication:** Enhancing communication between various stakeholders in the institution to build an inter-disciplinary ecosystem. Students and faculty of various disciplines will be brought together on a single platform via *Vision*. The platform will allow all faculty and students to know the current research areas, prospective areas of interest of all individuals to promote collaboration. All students, irrespective of the degree they are pursuing, will be brought together on an online platform to promote interaction between a diverse set of students.

b) **Pedagogy:** Tech powered classrooms allowing for innovative pedagogical approaches like (i) flipped classrooms, (ii) MOOCs, (iii) Collaborative learning, etc., would be built. This will push our education delivery towards global standards. Capabilities will also be built for the institution to develop their own digital content and eventually launch MOOCs themselves.

c) **Administrative ease:** Operational efficiency will be enhanced

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through the deployment of a host of tech enabled management systems.

vi. **Academic and housing** -The number of students who will be taking the on campus program will increase from 1,000 in 2020 to 10,000 in 2025. Renovations will be undertaken in academic infrastructure. A state-of-the-art library/ knowledge management systems would focus on developing collaborative thinking spaces which would facilitate outside the box thinking and provide impetus to innovation.

vii. **Campus Experience for Students:** RAMA UNIVERSITY, FET, CSE Department mission is to be a distinctive, pioneering and connected institution that shapes the future through educating and empowering people to meet the real challenges of tomorrow. RAMA UNIVERSITY, FET, CSE Department would deliver an excellent campus experience in an outstanding physical environment which benefits the University community and contributes to the economic, social and cultural life of the region. A number of core values shape our vision on campus experience - Student-centred; Self- reliant; striving for excellence and Innovative. The key strategies to be adopted for providing an excellent campus experience are:

— Provide an outstanding student living experience

— Enhance social and recreational facilities and develop an outstanding campus life experience

— Support the University's contribution to the economic, social and cultural life of the region

— Progress the development of the University

Section-4

The Path Ahead:

Strategic Plan 2020-2025 sets out specific targets in every sphere of activity of the department academic programmer, research, collaboration with industry, human resource development, entrepreneurship, development of infrastructure and facilities, student life, placement, community outreach, international and alumni relations.

These targets have been set after extensive consultation to ensure that they are both ambitious and achievable.

The targets will likely be exceeded if the contributions of stakeholders—faculty, staff, students, alumni, international partners and collaborators from industry—are aligned and reinforce each other. The vision outlined in the Plan will then be realized, and department of CSE of Rama University can be justifiably proud that the trust reposed in it by the nation will stand redeemed.

Snapshot of RAMA UNIVERSITY, FET, CSE Department in 2025

Student Strength	**Total Student Enrollments**	10,000
	Total PhDs	500
	Total PG Students	2,000
	Students enrolled in online/ EDP	20,000
	International Students	500
Faculty	**Total Faculty**	25
	No. of Faculty with PhD	15
	No. of Industry Faculty	10
	No. of International Faculty	4
	No. of Queen bee faculty	20
Research	**Total Centres of Excellence**	10
	Total Publications/ Citations	500/ 3000
	Patents filed	150
	Revenue from Research	INR 10crore
	Number of startups	20
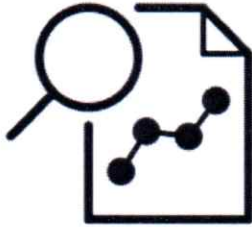
incubated

	No. of collaborative publications	200
Collaborations	**Collaborations with Top 200 universities**	20
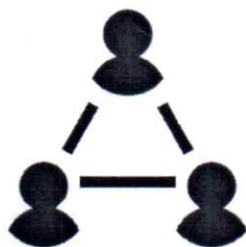
| % of outbound students through exchange programs | 500 |
| Cumulative funds raised from alumni | INR 50 lakhs |