Keshav Memorial Technological Institute

Education | Innovation | Research

Detailed Project Report for the Grant of Deemed to be University under Distinct Category

Submitted to

University Grants Commission (UGC), New Delhi

Prepared By

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Hyderabad, Telangana, India

PREAMBLE

The genesis of the Computer Industry in India can be traced to the establishment of the Department of Electronics in 1970, and the acquisition of the first global customer (Burroughs) by Tata Consultancy Services in 1974. The subsequent two decades witnessed a sluggish performance, which was then given an impetus by the liberalisation of the IT Sector in 1986 and of the overall economy in 1991. The IT Act of 2000, the National Broadband Policy of 2004, and the Special Economic Zone (SEZ) Act of 2005 boosted the sector tremendously.

The formal Computer Education Sector in the late 1980s and 1990s struggled to cater to the burgeoning demand for hardware/software skills, and came up with an academic curriculum that was largely disconnected from the market needs. As a result, the informal sector mushroomed with a large number of computer training institutes offering a variety of courses at high costs with negligible quality oversight.

Sensing the opportunity to address this glaring demand-supply gap, the founders of the proposed University started Genesis Solutions Private Limited in Hyderabad in 1991 and pioneered the delivery of high-quality skill development programs at low costs and high volumes – basically democratising an elitist skill that was otherwise affordable to a select few only.Over the next 15 years, Genesis empowered over 100,000 individuals with market-ready skills in cutting edge domains like ERP (Oracle Financials, SAP) and Web Technologies (Java, C++).

The Y2K era and immediate period thereafter heralded a massive rush to provide manpower (suitably skilled or otherwise) with a four year graduate degree (for visa purposes) to the western world. This manpower was subsequently trained / re-trained by the industry for periods extending up to one year before getting deployed – thus rendering their formal education ineffective in many ways.

Further, a very large proportion of this manpower was at the lower end of the industry value-chain – in call centres, BPO outfits, systems and application maintenance, and coding. High-end skills such as product design, solutions architecture, project and program management were traditionally seen as the primary domain of individuals with a Western education. While outsourcing maintenance and development work to Indian talent was gaining traction in the 1990s, it was largely based onsite, and offshoring as a practice gained acceptance in the mid-2000s. With this, the demand for local high-end skills also mushroomed, and the formal Indian education sector was again found lacking in this regard.

To meet the substantial demand for graduate engineers equipped with career-defining, industry-ready skills at the high-value end of the spectrum, Genesis Solutions collaborated with the Keshav Memorial Education Society (KMES) to found the Keshav Memorial Institute of Technology (KMIT) in 2007. Established in 1940, the Keshav Memorial Education Society has a long-standing commitment to serving society through secondary and undergraduate education across diverse disciplines such as arts, sciences, law, and management.

With the aim of concentrating solely on computer science education, the Keshav Memorial Technical Education Society was established in 2014. Subsequently, it set up two additional engineering colleges: Neil Gogte Institute of Technology in 2017 and Keshav Memorial Engineering College in 2021, with an objective to provide access to quality education to a broader segment of society.

To begin with the group of engineering colleges has pioneered the following initiatives with the vision of defining high-end careers:

- **Coding School** – Wherein coding concepts are put to practise using real-life scenarios in the first two years.
- **Project School** – wherein select students, along with pursuing regular academic curriculum, work on real-life industry projects under the mentorship of experienced faculty.
- **Imagineering School** – wherein interested students are exposed to the concepts of design thinking, innovation, and entrepreneurship, and select ideas are incubated to become successful start-ups.
- **Finishing School** – wherein all students are challenged to solve real-life use cases on a daily basis from the sixth semester onwards. They are trained to handle ambiguity and given necessary soft skills with an objective to be industry-ready.

Next, the colleges are engaged in active collaborations with various industries and research institutions, such as the Defence Research and Development Laboratories (DRDL) and the Central Research Institute for Dryland Agriculture (CRIDA), to undertake research-oriented projects involving student participation. Several projects have garnered recognition and funding from diverse organisations, including the Biotechnology Industry Research Assistance Council (BIRAC) of the Government of India and the Technology Innovation Hub of IIT-Patna for initiatives such as the Breast Cancer Imaging Diagnostics project utilising AI/ML technology.

Thirdly, the colleges have established an international footprint in imparting online training in the latest technologies to over 100 students funded by the US Federal Government. In addition, the colleges are involved in conducting research and development in cutting-edge technologies in Cyber Security and GenAI in collaboration with a US corporation.

Finally, in a bid to further strengthen the bridge between industry and academia, experienced professionals from industry have been on-boarded as Professors-of-Practice. This initiative enhances the practical relevance of education by integrating real-world expertise into academic programs.

To support all the above initiatives, the colleges have invested in expensive, state-of-the-art lab facilities and cutting-edge equipment and technologies, surpassing industry standards:

- Nvidia GPU - Nvidia DGX station (4 x Tesla A-100 architecture), 128 GB GPU RAM, 512 CPU RAM processing server, 10 TB Storage space
- SuperMicro Data Server with 154 TB (14x11 RAID data disks), 132 GB physical RAM.
- Morphle Digital Pathology Scanner - 6 slide biopsy scanner.
- AWS-based cloud infrastructure for hosting various in-house LMS and testing tools.
- Drones - UAV Hexacopter with Nvidia AGX Board and Full HD Video Camera.
- Robotics - AgriBot (Ag Robots) with ploughing tool, microcontrollers, seed sowing, pesticide sprinkler, and Ultrasonic sensor device.

The impact of these initiatives is borne out by the fact that a large proportion of the graduating students since inception of the institutes have obtained lucrative roles in product companies and high-end consulting firms. With this single-minded focus on defining careers, KMIT has, in the short span of 15 years, leapfrogged to the 4^{th} rank amongst 200+ colleges in the state.

Now, with a view to taking the next quantum step in re-imagining technical education in the country and staying ahead of the curve, Keshav Memorial Technical Educational Society (KMTES) as the sponsoring body is proposing to establish the Keshav Memorial Technological Institute. The proposed university will bring together all the schools, initiatives, learnings, best practices, and facilities of the past 30 years to define the future of computer science education for the next 30 years—an education that empowers, leads, and innovates in the application of technology in all domains.

Table of Contents

1. About the Society

1.1 Society

Keshav Memorial Technical Educational Society (KMTES hereinafter) is a registered not-for-profit educational society under Section 10 of the Telangana Societies Registration Act, 2001, located in Hyderabad, India. It was established in the year 2014 with the aim of providing quality technical education to students. KMTES, through its institutions, offers courses in computer science and engineering. The institutions under the society are known for state-of-the-art facilities, experienced faculty members, and a focus on the holistic development of students. The institutes strive to impart not just theoretical knowledge but also practical skills that are relevant to the industry.

KMTES is committed to nurturing young minds and preparing students to excel in their chosen fields. It emphasises research, innovation, and entrepreneurship by encouraging students to think critically and creatively. It also focuses on holistic development by encouraging students to participate in extracurricular activities, sports, and community service initiatives. In short, the institutes established by Keshav Memorial Technical Educational Society are recognized as prominent institutions in Hyderabad for their contributions to the field of technical education.

1.2 Institutes

The following three institutes are under the aegis of KMTES:

- Neil Gogte Institute of Technology (NGIT hereinafter), established in 2017-18
- Keshav Smarak Junior College (KSJC hereinafter), established in 2018-19
- Keshav Memorial Engineering College(KMEC hereinafter), established in 2021-22

Both NGIT and KMEC are approved by All India Council for Technical Education (AICTE), New Delhi, and are affiliated to Osmania University (O.U), Hyderabad and recognized by Govt. of Telangana.

1.3 Vision And Mission

1.3.1 Vision

- To be the fountainhead in producing highly skilled, globally competent engineers.
- To produce quality graduates trained in the latest software technologies & related tools and strive to make India a world leader in software products and services.

1.3.2 Mission

- To provide a learning environment that inculcates problem solving skills, professional & ethical responsibilities, and lifelong learning through multi-modal platforms and prepares students to become successful professionals.
- To establish an industry institute interaction to prepare students for the industry.
- To provide exposure to students on latest hardware and software tools.
- To promote research-based projects/activities in the emerging areas of technological convergence.
- To encourage and enable students to not merely seek jobs from the industry but also to create new enterprises.
- To induce the spirit of nationalism which will enable the student to develop, understand India's challenges and to encourage them to develop effective solutions.
- To support the faculty to accelerate their learning curve to deliver excellent service to students.

1.4 Organisational Setup

KMTES was established by like-minded individuals from diverse backgrounds who are dedicated to enhancing the standard of technical education in the country. The Constitution of the Society is as mentioned below:

Sl. No	Name of the Office Bearers	Designation of their local standing in the Society	Profession
1.	Sri. L. Narasimha Reddy	President	Chief Justice (retd)
2.	Sri. Nitin Sahasrabudhe	Vice President	Businessman
3.	Sri. Neil Gogte	General Secretary	Academician
4.	Sri. J Narasimha Rao	Joint Secretary	Chartered Accountant
5.	Smt. Manisha Gogte	Treasurer	Social Worker
6.	Sri. Vishwanath Gogte	Executive Member	Doctor
7.	Smt.Rajitha Kumari	Executive Member	Lawyer

1.5 Infrastructure

The institutes are situated on a 10-acre plot in the HMDA limits of Hyderabad. They are housed in a building complex exceeding 200,000 square feet with excellent road access and public transport availability.

Furthermore, they have over 220 employees (teaching and non-teaching) and are aligned with the UGC norms on student-faculty ratio.

1.6 Current Programs And Activities

NGIT offers undergraduate B.E courses in Computer Science and Engineering – CSE and Computer Science and Engineering with a specialisation in Artificial Intelligence and Machine Learning – CSE(AI/ML).

KMEC offers undergraduate B.E courses in Computer Science and Engineering – CSE, Computer Science and Engineering with a specialisation in Artificial Intelligence and Machine Learning – CSE(AI/ML) and Computer Science - CS.

1.7 Accreditation Of Institute Programs

The National Board of Accreditation (NBA) accredited UG program BE (CSE) for a period of three years from June 2023-2026.

1.8 Achievements

1.8.1 Placements

After achieving a steady operational pace, more than 85% of the eligible students were recruited by over 80 companies with an average salary of ₹7.8 lakhs per annum and a maximum salary of ₹50 lakhs per annum.

1.8.2 Research projects

The institutes are actively collaborating with premier organisations such as DRDO, Hyderabad and CyberGuard360, USA to jointly conduct research in the areas of defence Technology, Bio-Medical Imaging and Cybersecurity. Projects worth rupees three and a half crores are being executed by teams of students led by experienced faculties.

2. Project Highlights

This Detailed Project Report is prepared for the grant of permission to establish a Deemed to be University under the Distinct Category by the Keshav Memorial Technical Education Society.

While the KMTES Society itself was established recently, in 2014, the promoters of the society have several decades of experience in the education sector, and have specifically been pioneers in computer education as detailed in the preamble section of the report.

The distinct category is applicable based on the vision of the proposed University which is built on the following beliefs:

- A university is a key element in any ecosystem that fosters thought leadership, and together with other elements can deliver exponential value.
- Technology is a platform that will deliver superlative solutions only when multi-domain expertise is superimposed on it.
- The era of generic solutions is evolving into a future of hyper-customization and the adaptation of advanced technology to various domains has opened new frontiers in tailoring specific solutions to specific scenarios.
- Entrepreneurship and self-reliance are strategic imperatives for the country and should be permeated across all sectors.

With the above tenets as the basis, the Society has solicited inputs from several experts across end-user/industry segments and curated highly differentiated post-graduate programs that will lead to the award of M.Tech degrees in Applied Computer Science in the domains of Manufacturing, Supply Chain, defence, Agriculture, Fintech, HealthCare and Life Sciences.

The above programs are only the starting point in the 15-year Academic Roadmap outlined in section three of the report hereunder. The journey envisages pollinating the undergraduate B.Tech curriculum with domain knowledge, introducing integrated M.Tech and Ph.D programs with deep industry engagement, introducing multi-domain knowledge in post-graduate programs, and offering high levels of customization to the students in choosing their curriculum and pedagogy, and all of this will be aligned with the guidelines of the National Education Policy 2020.

Section three also elaborates on the Vision of the proposed University which will serve as the guiding North Star for all stakeholders, and defines a set of Core Values on which will rest all actions, initiatives, policies and processes of the University. The detailed implementation plan with five-year horizon is outlined in Section 4 of the report, and lays emphasis on proactively developing deep engagements with the end-users/industry segments, nurturing thought-leading faculty as mentors, building

campus-of-the-future with state-of-the-art laboratory facilities including domain-specific equipment and establishing an incubation centre networked into the startup ecosystem.

The existing colleges of the Society will function under the umbrella of the proposed University, and over the coming years will execute the following:

- Introduce M.Tech programs blending technology and domain education
- Revise B.Tech curriculum to keep abreast of technology advancements and pollinate domain knowledge
- Introduce integrated M.Tech and PhD programs sponsored by industry
- Introduce niche capsuled certification programs
- Introduce multi-domain curriculum at PG level
- Offer complete flexibility in terms of entry and exit options, curriculum design and pedagogy.

2.1 Justification For Launching New Programmes

Several dynamics are at play at macro levels that necessitate the introduction of new programs envisioned above.

There is a growing and urgent realisation of the need for self-reliance as a nation, given the recent geo-political crises in several parts of the world, and the related denial-of-service and technology denial by other major powers. As such, there is an immediate need for building thought-leadership capability in the domestic sectors, and the new programs will align to this objective by addressing the below:

- **Interdisciplinary collaboration:** Many domains, such as healthcare, finance, and transportation, increasingly rely on interdisciplinary approaches that integrate computer science with other fields. By offering domain-oriented CSE programs, the university can facilitate collaboration between computer scientists and experts in other disciplines, fostering innovation and addressing complex societal challenges.
- **Market demand:** There is a growing demand for professionals with specialised skills in various domains of Engineering, Science and Industry along with computer science. By offering domain-specific CSE programs, the university can cater to the specific needs of industries and employers seeking talent in these areas.
- **Technological advancements:** The rapid pace of technological advancements requires continuous updates to educational programs to ensure graduates are equipped with the latest tools, techniques, and knowledge. Domain-oriented CSE programs allow universities to focus on

emerging technologies and cutting-edge research within specific fields, preparing students for the demands of the future workforce.

- **Student interest and engagement:** Students are often drawn to programs that align with their interests and career goals. By offering a diverse range of domain-oriented CSE programs that can be largely customised to suit individual interests, the university can attract students passionate about specific areas of computer science, leading to higher enrollment and student engagement.

- **Industry partnerships and research opportunities:** Domain-oriented CSE programs can facilitate closer collaboration with industry partners and research institutions working in related fields. These partnerships can lead to opportunities for internships, research projects, and technology transfer, enriching the educational experience for students and providing valuable resources for faculty and researchers.

- **Regional needs:** In some cases, there may be specific regional needs or opportunities that justify the introduction of domain-oriented CSE programs. For example, regions with a strong presence in industries such as healthcare, agriculture, or manufacturing may benefit from programs tailored to the computational needs of these sectors.

3. 15-Year Strategic Plan

3.1 Strategic Vision

To establish a University-anchored ecosystem that fosters global thought-leadership in hyper-customised technology solutions spanning multiple domains.

The last decade has witnessed an inordinate emphasis on overall customer centricity. Customers have realised the potential of technology, and are now pushing the envelope and demanding better solutions which are highly specific to their needs and environments. The assembly-line based, one-size-fits-all products that were rolled out in the previous century under the guise of efficiency and cost optimization are not finding favour with the customers.

Simultaneously, with the advent and maturity of newer technologies like GenAI, ML, IoT and Data Sciences, the industry is exploring new frontiers in the cross-domain application of technology to develop hyper-customised solutions to specific categories of customers.

The below examples bear testament to the emerging phenomenon of hyper-customization and cross-domain applications:

- Application of Artificial Intelligence to the field of Genomics and Life Sciences to facilitate Drug Discovery that is targeted towards the Genetic composition of a class of individuals
- Application of Modern Imaging Technology, coupled with AI/ML, to enable early diagnosis of various diseases like cancer and disorders like autism
- Application of AI/ML and Imaging to predict agricultural outcomes, and together with drones and IoT technology help in boosting the yields
- Customization of defence platforms to adapt to different operating environments.

Over the last couple of decades, while computer science and engineering witnessed an exponential growth, the conventional engineering streams of Mechanical, Electrical, Civil etc. found very few takers and as a result there is an impending shortage of such skills in the global markets. With Computer Science permeating every known domain, even advanced areas like AI, DS, IoT have become foundational to all cutting-edge solutions across engineering streams.

The geo-political developments of the last few years, coupled with the disastrous effects of the pandemic, have forced a shift away from globalisation as a strategic imperative, and every country is working towards self-sufficiency, especially in the high-end of the value-chain in all domains. While India currently commands over 75% of the global digital talent, its presence up the value chain is still negligible.

It is therefore essential for the education sector to step forward and take the lead in promoting cross-functional thought leadership based on cutting-edge technology platforms. Pure technology education will get commoditized into certificate-level modules, and existing institutions will have to adapt to the emerging paradigm in order to survive.

Pioneering institutions, such as the proposed Keshav Memorial Technological Institute (KMTI hereinafter), will lead the way in adding substantial layers of multi-domain skills on top of the foundational technology skills to create a talent pool of visionary solution architects and product designers.

The enabling ecosystem will consist of highly customizable, multi-domain curriculum, deep end-user/ industry engagement, advanced research and global connections with an ultimate objective to Educate, Innovate and Imagineer.

3.2 Core Values

At the foundation of the proposed Keshav Memorial Technological Institute will be a set of core values – a set of non-negotiable principles and tenets that will define everything that the University does and stands for.

- **Customer centricity:** Identification of the final end-customer and addressing their needs will be the ultimate goal of every endeavour.
- **Student empowerment:** Empowering students to chart their own destinies through entrepreneurial traits, technical and domain expertise, innovative mindset and leadership skills will be the guiding principle of student engagement.
- **Continuous learning:** Every stakeholder in the University ecosystem will be actively encouraged and enabled to continuously up-skill / cross-skill to foster an environment of superlative performance.
- **Democratisation of knowledge:** University will maintain a knowledge bank and every stakeholder will be incentivized to contribute to this pool, which will be made accessible to the entire ecosystem.
- **Quality:** Quality consciousness will be ingrained in every individual and process in the University, and mechanisms for continuous improvement will be incorporated.
- **Honesty and Integrity:** Incorporating transparency in all interactions, engaging in ethical decision-making, building trust in relationships, inculcating objectivity and taking accountability will be the foundational core values.

- **Diversity and equity:** Diversity greatly enriches the ecosystem and will be actively solicited. University will provide equitable access to knowledge irrespective of caste, creed, gender, religion or nationality, and will take affirmative actions to support the under-privileged.
- **Dignity and self-esteem:** University will respect and safeguard the dignity and self-esteem of every stakeholder in the ecosystem.
- **Social responsibility:** University will promote a safe, healthy and sustainable environment where the stakeholders can flourish at a personal and community level as responsible citizens with obligations to improve their milieu.

3.3 Governance Structure

3.3.1 Governing Body

The apex governing body of KMTI will be the Board of Governors (Senate, hereinafter) headed by the Chancellor of the University and will have distinguished leaders in science, engineering, industry, education and public service as members of the Board, in addition to the executive roles of Vice Chancellor (VC), Pro-VC, Treasurer and Registrar. With a view to getting a 360^0 perspective on governance aspects, appropriate representation will be provided from the distinguished faculty and student (past and present) communities as non-voting members. The Chancellor of the University will be nominated by the sponsoring body (KMTES) and will be a person of outstanding calibre and impeccable integrity.

The Senate will have the responsibility for reviewing and providing guidance on strategic directions, approving annual budgets, exercising long-term fiduciary responsibility, approving the establishment of new degree programs or courses of studies, approving degrees, electing the Vice Chancellor and members of the Executive Council, and being available (individually as well as collectively) to advise the Vice Chancellor on issues that he/she may wish to raise with them.

It is also understood that the Senate members are expected to represent the interests of KMTI to outside constituencies as appropriate and help raise financial support for the University.

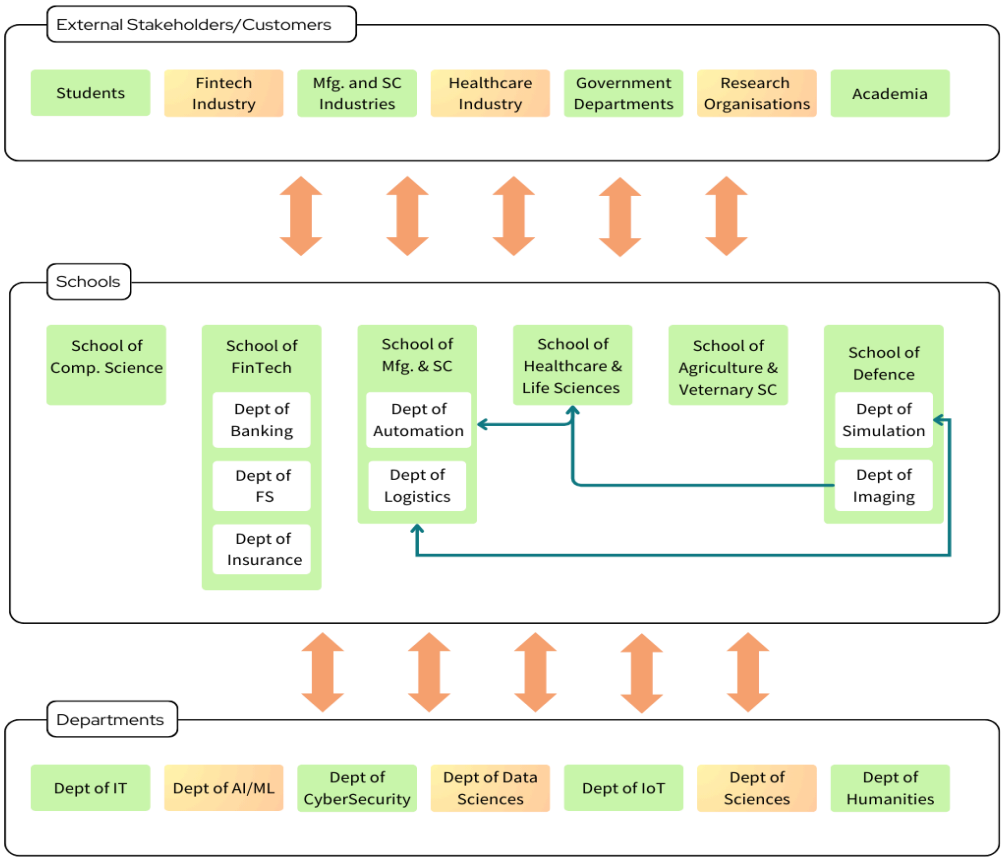
Detailed guidelines on the functioning of the Board of Governors, including selection and nomination of members, powers, meetings and voting rights will be finalised in consultation with the sponsoring body and made public.

3.3.2 Administrative Bodies

The highest administrative body of the proposed Deemed to be University shall be the Executive Council to be headed by the Vice Chancellor. The constitution and functioning of the Executive Council shall be in line with Section 10 of the UGC (Institutions Deemed to be Universities) Regulations, 2022.

The VC and Executive Council will be assisted by various committees such as the Academic Council, Finance Committee, Board of Studies and Selection Committee, and officers such as the Registrar, Finance Officer, Controller of Examinations, Deans, and Heads of Departments in the discharge of their duties. These Officers and Committees shall also work in accordance with rules outlined in Section 10 of the UGC (Institutions Deemed to be Universities) Regulations, 2022.

3.3.3 Functional Units



The key distinguishing feature of the proposed University will be the organisation of its functional units as a matrix structure of Schools and Departments.

Schools will be specialised academic units that shall house programs and departments related to specific professional or domain areas. They will serve as centres of excellence for education, research, and practical application within respective fields. Schools will also provide a focused and comprehensive learning environment for students pursuing specialised knowledge and skills.

Some of the Schools that will be setup under the proposed university are School of Computer Science, School of Manufacturing Technology, School of Defence Technology, School of Fintech, School of

Healthcare and Life Sciences Technology, School of Agriculture Technology and School of Supply Chain Technology.

Academic departments will be specialised units that shall focus on specific disciplines or fields of study. They will be crucial for organising and delivering education and research in a structured and cohesive manner. Departments will serve as the primary entities responsible for teaching courses, conducting research, and advancing knowledge within their respective areas of expertise.

Some of the departments that will be setup are the Department of IT, Department of Cybersecurity, Department of Data Sciences, Department of AI/ML, Department of Humanities and Department of Sciences.

In line with the principles of aligning with the industry and keeping customer first, the Schools will be the external-facing functional units whose primary responsibility will be to:

- Engage with industry, government and academia in related domains
- Map the current and imagine the future landscape of technology applications in related domains
- Establish the curriculum for education and areas of applied research
- Offer certifications and UG / PG / research programs
- Solicit student admissions to their programs with support of the Admissions Office
- Establish domain-related Departments within the School, and collaborate with other Departments as required
- Develop a high-calibre faculty pool to mentor students and guide research in related domains
- Develop domain-related labs and practical training facilities including simulators and test-beds

The University will award certificates and degrees under the aegis of respective Schools.

Departments are the delivery or fulfilment arms of the University, and their primary responsibility will be to:

- Develop deep expertise in their respective discipline
- Design curriculum and develop digitised learning capsules
- Teach courses and conduct research
- Develop labs and practical training facilities in respective areas
- Support all the Schools in delivering their offerings

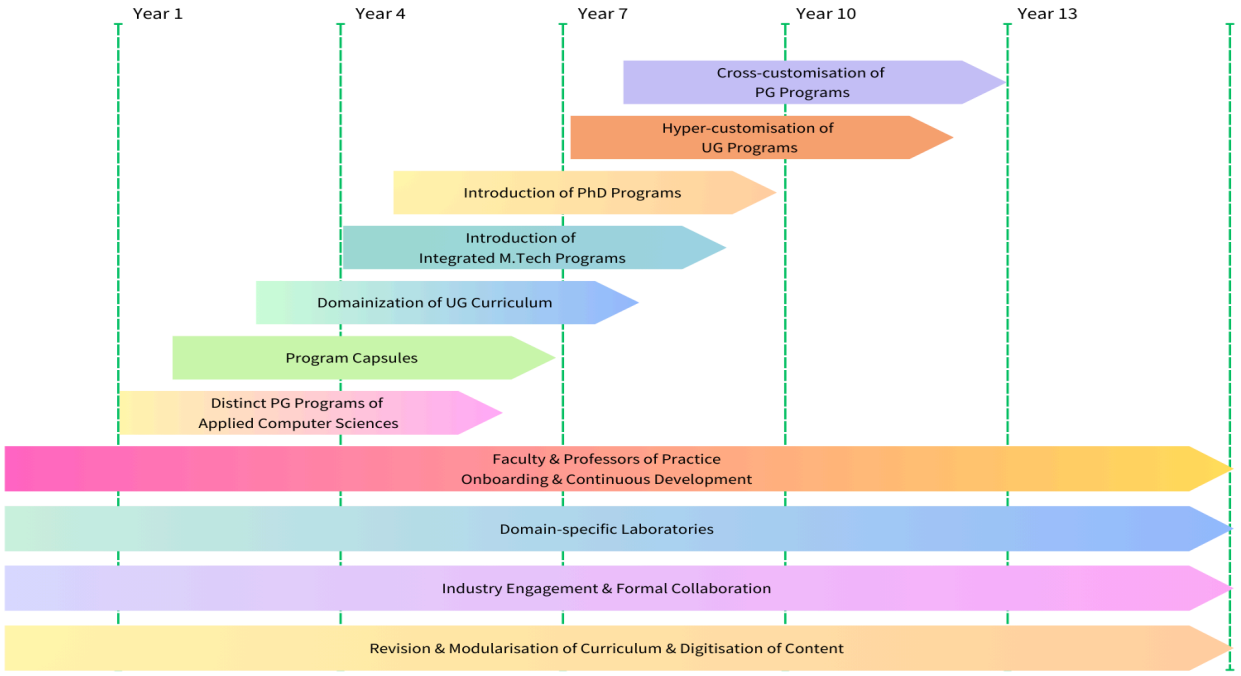
3.3.4 Strategic Roles

In addition to the regular roles as provisioned for in Section 10 of the UGC (Institutions Deemed to be Universities) Regulations, 2022, the proposed University will establish the following strategic roles to further the vision of the University:

- Director – Innovation and Entrepreneurship
- Director – Academic Outreach
- Director – Government Relations
- Director – Research Initiatives
- Director – International Students
- Director - Placements

Details on the above roles are elaborated in subsequent sections of this report.

3.4 Academic Roadmap



The Academic Plan will evolve over the next 15 years to align with the strategic imperatives outlined in the Vision Statement above, i.e, hyper-customization of cross-domain, cutting-edge technology solutions.The plan will also align with the National Education Policy 2020 emphasising on providing flexibility and a multi-disciplinary approach.

The academic landscape, both domestically and internationally, is evolving rapidly. Traditional boundaries between technological specialisations are fading, with a growing emphasis on interdisciplinary education, training, and research. With most industrial and technological innovations being a blend of engineering and cutting-edge technologies like Artificial Intelligence, IOT, Robotics, Embedded Systems, Gaming and Bio-engineering, it has become imperative for any institute, aspiring for a deemed to be university status, to take a lead in training manpower and fostering research & innovation in these areas of study.

The 15-year Strategic Academic Roadmap will lead to the following desired outcomes:

1. Establish the University as a global pioneering institute in higher education and research, blending multi-disciplinary concepts over a strong technology base.
2. Migrate from the existing prescriptive curriculum and pedagogy to a fully customizable program enabling students to pick from modularized online content based on their individual preferences, and to set their own pace and methodology of study.
3. Develop strong end-user/industry collaboration to provide domain concepts, use cases and research projects.
4. Provide programs with multipoint entry and exit options, leading to issue of Certificates, Diplomas or Degrees as envisioned in NEP-2020.
5. Promote entrepreneurship as a way of life, inculcating all its tenets as a habit.

Revision and modularization of curriculum: While the academic curriculum revision is an ongoing process to ensure the latest and the best are incorporated, special emphasis will be initiated from Year One to modularize and digitise the curriculum so that it can be delivered online and on-demand.

Industry engagement: This is a critical factor for the success of the vision statement, and envisages deep involvement of the end-user / industry segments in not only curating the contents but also in sponsoring students, providing case studies and research projects and deputing Professors of Practice.

Domain-specific Laboratories: As various domains permeate into the mainstream curriculum, there will be heavy investments into developing domain lab infrastructure, such as DNA Sequencer for genetics, high-resolution cameras and spectrophotometers for drone-based analysis of agriculture.

Faculty: While Professors of Practice will be actively solicited from the industry to deliver parts of the curriculum, their key role will be to mentor other faculty. A robust Faculty Development Program will be instituted as an ongoing practice.

Distinct PG Programs: The above initiatives will lay the foundation for the introduction of M.Tech programs in Applied Computer Sciences in Year One – starting in the domains of Manufacturing, Supply Chain, defence, Agriculture, Fintech, Healthcare and Life Sciences. Industry veterans have been identified as nodal points to collate inputs from the respective domains and draft curriculum has been prepared as elaborated in below sections.

Program Capsules: Starting Year Two, certification programs in niche areas targeting specific use cases and encompassing domain and technology skills will be offered to students and corporate candidates. These will mostly be online and on-demand, and will ultimately contribute to hyper-customization of diploma and degree programs for individuals.

Domainization of UG Curriculum: With the experience of cross-pollination of domain and technology in the PG programs, the basic 101-level domain concepts will start percolating into the existing B.Tech curriculum from Year Three, and all projects and assignments across semesters will adhere to a particular domain selected by the students.

Introduction of Integrated M.Tech Programs: Continuity of the domain concentration from UG to PG curriculum will naturally lead to offering of Integrated M.Tech program from Year Four onwards.

Introduction of PhD Programs: The University will leapfrog into the industry-led research arena around Year Five by offering doctorate programs sponsored by Industry Chairs.

Hyper-customization of UG Programs: The University will gear itself by Year Seven to provide complete flexibility to students to define their curriculum and pedagogy, and the prerequisites to reach this stage will be addressed by the earlier steps – digitization of curriculum capsules, faculty trained as guides and mentors, deep industry engagement and adequate lab infrastructure.

Cross-domainization of PG Programs: The next quantum jump in the evolution journey will be to introduce multi-domain use cases for technology solutions, such as incorporating human psychology into fintech solutions, or addressing defence requirements in air, land, sea, space and cyber-world integrated into a single solution. Such scenarios will be addressed from Year Eight.

4. Five-Year Rolling Implementation Plan

4.1 Academic Plan

In line with the vision of blending domain areas into technology space, efforts have already been initiated to engage with the end-user industry segments to understand their priorities and solicit their inputs in defining the programs.

Based on these interactions, we have identified the following PG programs and propose to introduce five of the seven PG Programs from the academic year 2025-26 (Year One):

1. M.Tech in Applied Computer Science (Manufacturing)
2. M.Tech in Applied Computer Science (Defence Technologies)
3. M.Tech in Applied Computer Science (Supply Chain)
4. M.Tech in Applied Computer Science (AgriTech)
5. M.Tech in Applied Computer Science (Fintech)
6. M.Tech in Applied Computer Science (Healthcare)
7. M.Tech in Applied Computer Science (Life Sciences)

Detailed curriculum for the above is provided in Annexure I.

Modularization and digitization of content is already work-in-progress, and it is envisaged that from academic year 2026-27 (Year Two), program capsules will be offered as certification programs in areas such as GenAI, Warfare Gaming, and Vulnerability Assessment.

With deepening industry connections and experience of introducing domains into the PG curriculum, the UG curriculum will start getting aligned with different domains from the academic year 2027-28 (Year Three). Basic 101-level topics giving an overview of the domain and its processes will be covered as guest lectures or seminars by seasoned practitioners from the domain, and students will be encouraged to take up assignments and projects in a particular domain across the four-year course.

The next logical step in the academic roadmap will be to seamlessly merge the UG exit point into the PG entry point with the domain as the connecting theme, and offer integrated five-year M.Tech programs from the academic year 2028-29 (Year Four).

The institutes under the proposed University will be investing heavily in upgrading laboratories, acquiring state-of-the-art equipment related to different domains, and establishing research centres of excellence as an ongoing initiative. Innovation and research will be actively promoted at all levels in both UG and PG

programs. This will lead to the introduction of Ph.D programs from the academic year 2028-29 (Year Five) focusing on faculty-led research initiatives by providing seed grants, securing external funding, and fostering collaborations with industry and government agencies.

4.2 Admission Plan

Admission to all the programs will be open to candidates from anywhere in India and abroad. The admission will be based on a predefined process which will be informed in advance to the aspiring candidates.

Selection of candidates will be based on multiple criteria, including but not limited to:

1. Common entrance tests conducted by state and national departments
2. Entrance test conducted by the University
3. Extra-curricular performance in areas such as sports, arts and social work
4. Entrepreneurial and leadership skills

It is planned to gradually increase the UG Program intake by three sections per year (180 additional students) over and above the existing intake of 840 per year. The PG programs will have 30 students per batch in each of the seven streams to start with, which will expand as the demand picks up. Admission to Ph.D. programs will be limited to the expertise available with the Institute and as per UGC guidelines. Certification programs will be available on-demand and will be marketed separately.

Industry engagement will be central to the admissions process, with industry-sponsored candidates contributing significantly to the academic ecosystem's depth and diversity. This task will fall under the purview of the School Deans, who will be appointed to the management team to oversee and strengthen industry relationships.

A dedicated Marketing team will launch targeted campaigns to attract high-calibre students from across the country and internationally. They will organise recruitment events, campus tours, and outreach activities to engage with prospective students, parents, and educational counsellors.Based on the above projections, the expected enrolled strength in each year is expected to be as below:

Sl. No	Academic Year	I Year	II YEAR	III YEAR	IV YEAR	Total UG Intake	I YEAR	II YEAR	Total PG Intake	Total Intake
		Undergraduate Intake					Postgraduate Intake			
1.	2025-26	840	0	0	0	840	150	0	150	990
2.	2026-27	1020	840	0	0	1860	150	150	300	2160

Sl. No	Academic Year	I Year	II YEAR	III YEAR	IV YEAR	Total UG Intake	I YEAR	II YEAR	Total PG Intake	Total Intake
		Undergraduate Intake					Postgraduate Intake			
3.	2027-28	1200	1020	840	0	3060	300	150	450	3510
4.	2028-29	1380	1200	1020	840	4440	300	300	600	5040
5.	2029-30	1560	1380	1200	1020	5160	300	300	600	5760
6.	2030-31	1560	1560	1380	1200	5700	300	300	600	6300
7.	2031-32	1560	1560	1560	1380	6060	300	300	600	6660

4.3 Faculty Development Plan

The university's vision demands an exceptional faculty pool, groomed to reach global thought-leadership standards. Recruitment will meet or exceed UGC guidelines for student-to-faculty ratios, qualifications, and experience.Based on the admission plan outlined in the earlier section, the faculty requirement is projected as below:

Undergraduate Faculty Requirement					
Undergraduate Faculty - Student Ratio 1:20					
Academic Year	Strength	Professor	Associate Professor	Assistant Professor	Total Faculty
2025-26	840	4	10	28	42
2026-27	1860	10	20	63	93
2027-28	3060	17	34	102	153
2028-29	4440	25	50	147	222
2029-30	5160	28	56	174	258
2030-31	5700	31	62	192	285
2031-32	6060	33	66	204	303

Postgraduate Faculty Requirement					
Postgraduate Faculty - Student Ratio 1:15					
Academic Year	**Strength**	**Professor**	**Associate Professor**	**Assistant Professor**	**Total PG Faculty**
2025-26	150	1	3	6	10
2026-27	300	2	6	12	20
2027-28	450	3	9	18	30
2028-29	600	4	12	24	40
2029-30	600	4	12	24	40
2030-31	600	4	12	24	40
2031-32	600	4	12	24	40

Academic Year	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33
UG Faculty	42	93	153	222	258	285	303
PG Faculty	10	20	30	40	40	40	40
Total Faculty	52	113	183	262	298	325	343

The industry engagement process will again play a key role in the faculty development process on two fronts – as a supplier of Professors of Practice, and as mentors to the technical faculty in adapting to the practical world.

Multiple avenues will be made available to the Faculty to engage in continuous self-development, including mandating minimum specified hours per week towards self-development, access to learning assets, sponsorship to trade and industry events (both domestic and international), externships and mentoring by seasoned professionals.

Faculty will be actively encouraged to engage in applied research in interdisciplinary and industry-relevant domains and publish papers in international journals of repute. They will be encouraged to contribute towards open-source initiatives such as GSoC and Intel Innovation.

A formal Faculty Exchange Program will be institutionalised with other leading national and international universities, and adequate budgetary provisions will be made towards this.

A dedicated professional HR team will be appointed to exclusively look at all angles of Faculty Development outlined above, in addition to competitive C&B policies, performance evaluation processes and retention strategies.

4.4 Innovations in Learning Frameworks

The Institutes under the proposed University have already pioneered significant innovative and transformative changes in educational practices, methodologies and approaches aimed at improving overall outcomes and effectiveness. These innovations encompass pedagogical approaches, technology integration, personalised learning and experiential learning.

The biggest challenges faced by learning institutions is the heterogeneous mix of learning abilities in students and their shortening attention spans. To address this, the Institutes customised Moodle – the open-source LMS offered by Google – into a unique tool called Tessellator which allows faculty to assess the learning absorption after introducing every concept. This real-time feedback mechanism allows the faculty to adapt the learning content delivery to individual abilities.

The other major challenge faced by learning institutions is getting top-quality faculty, and this challenge is being mitigated by enhancing the Tessellator tool and enabling it to host digitised content that is delivered by the best of the institutes' faculty, and adding the functionality of automatic assessment of code quality and free-text answers in addition to MCQs by utilising multiple LLMs to ensure accurate and unbiased assessment. This advanced version of the LMS called Tesseract is under beta testing.

This custom- designed MOOC model aims to enhance scalability in delivering online courses while also prioritising customised learning experiences. Consequently, such an approach allows students to learn at their own pace and convenience, fostering greater flexibility and adaptability in their educational journey.

Another distinctive feature of Tesseract is the usage of GenAI in the assessment process, whereby questions are automatically framed per Bloom's Taxonomy difficulty levels of 2, 3 and 4. Questions with varying levels of difficulty are administered based on a student's performance, thereby balancing the heterogeneous levels in the student pool.

The Coding School, Project School, Imagineering School and Finishing School explained earlier in the Preamble section, supported by the advanced in-house LMS tools Tesseract and Tesselator, have together enabled the adoption of Adaptive Learning, Blended Learning and Flipped Classroom practices into the traditional pedagogical approaches.

Further, to ensure all-round holistic development of students, the in-house tool Trinetra captures the extra-curricular interests and achievements of students which are then developed by forming special-interest groups or clubs in the institutes. Faculty mentorship is available with one faculty mentoring 30 students individually on holistic development.

All of the above are contributing towards the goal of hyper-customization of learning experience based on individual abilities, and the introduction of Content-beyond-Syllabus to advanced students in line with the AICTE guidelines

4.5 Infrastructure Development Plan

4.5.1 Campus Development

The existing campus is spread across a 10-acre land with over 200,000 sq.ft built-up area accommodating the academic, administrative and recreational requirements of current enrolment of 3000 students. The campus is compliant with all legal and regulatory requirements, and has ample space for future expansion.

In line with the planned increase in student intake, approvals are in place to construct another 200,000 sq. ft built-up area which will be deployed in phases over the next few years. The campus expansion will incorporate several features to make it future-ready. These are:

- **Flexible Learning Spaces** - Transforming classrooms into immersive spaces, integrating mixed reality with Tesseract, enabling interactive learning experiences
- **Collaborative Spaces** - Establishing dynamic collaboration hubs, equipped with advanced prototyping tools and virtual collaboration platforms
- **Smart Desks** - Installation of smart desks connected to mixed reality environments, providing access to virtual learning environments and personalised learning tools
- **Campus Design** - Implementation of automation technology following LEED standards for energy, lighting, and temperature control
- **Digital Campus Services** - Introduction of user-friendly digital services for campus needs, such as online course registration, library access, placement services and student support

A satellite residential campus is under construction along the seaside in Konkan región of Maharashtra State. The aim is for the campus to provide focus on holistic development and mental wellness of the students, in addition to giving an immersive experience of the marine and aqua-based economy.

A second satellite campus with residential facilities is planned in the district of Mahbubnagar, Telangana State which will provide the students with an immersive experience of the rural and agrarian economy, and expose them to the challenges faced by these sectors. This will boost social innovation and entrepreneurship thought-processes.

4.5.2 Laboratory Facilities

i. Core Technology Lab

The institution has set up a core technology lab with following hardware, along with few subject specific labs like IoT Lab, CyberSecurity Lab, AI-ML lab in-line with regulatory requirements over the last five years.

Both the technology lab and subject labs are periodically added/upgraded with new hardware on a needed basis, as per student growth.

Sl. No	Technology	Lab
1.	Nvidia A100 GPU Server	Nvidia DGX station (4 x Tesla A-100 architecture), 128 GB GPU RAM, 512 GB CPU RAM processing server, 10 TB Storage space
2.	SuperMicro Data server	Data Server with 154 TB (14x11 RAID data disks), 132 GB physical RAM
3.	Digital Pathology Scanner	Morphle Digital Pathology Scanner with 6 Biopsy Slides Scanner
4.	Drones	UAV Hexacopter with Nvidia AGX board and Full HD Video Camera
5.	Robots	AgriBot (Ag Robots) with Ploughing tool, micro controllers, seed sowing, pesticide sprinkler and UltraSonic sensor device have been procured and various modules are being designed using mechanical design and 3D-Printing techniques

ii. Domain specific labs

Domain specific labs will be set up over the first three years (0-3rd year) in line with identified domain project/problem areas as laid out by Subject Matter Experts

The domain labs will have necessary domain specific instruments/equipment. Each domain lab will have process-workflows/models or test-beds, prototypes in the form of software frameworks which are to be used as base building blocks for each domain problems and idea/prototype evaluation tools.

For e.g, The following domain specific Lab (Soft-Lab) infrastructure will be made available for both UG and Post-Graduate programs.

Sl. No	Specialisation	Lab
1.	Fintech	Banking simulator
2.	Supply chain	Supply Chain simulation tool for Education
3.	Manufacturing	Manufacturing Business Process Simulation Software, Additive Manufacturing instrument (3D Printer)

Sl. No	Specialisation	Lab
4.	Defence Tech	Gaming platform: War Game infra and Drones
5.	AgriTech	IOT Devices, Drones
6.	Health care	Diagnostics AI models, imaging platform
7.	Life sciences	Wet Lab with DNA sequencer

4.6 Ecosystem Development Plan

The vision statement envisages a University-anchored ecosystem to deliver the desired goals, and establishing deep connections with end-user industry segments, leading academic institutions and government agencies are critical elements of the ecosystem.

The Deans of various domain Schools will be responsible for the following:

- Identifying and establishing relationships with leading players in respective industry domains and R&D organisations
- Soliciting domain expertise, case studies, funded-research projects, sponsored candidates and Professors of Practice
- Arrange student and faculty field visits and industrial tours to experience real-life issues
- Enabling externships for institute faculty
- Get access to high-end industry equipment and proprietary data banks for further training and research

Management will appoint an Academic Outreach Director, whose responsibility will be to establish relationships with reputed national and international Higher Education Institutes. The main objectives of these relationships will be to:

- Share learning and knowledge assets
- Enable faculty and student exchange
- Facilitate joint research
- Gain mutual access to state-of-the-art laboratory facilities
- Develop co-branded programs

Additionally, there will be a Government Relations role with primary responsibilities including:

- Soliciting funded-research projects and grants for innovation and entrepreneurship

- Getting clearances for national security related projects
- Influencing government policies through academic insights

4.7 Entrepreneurship Development Plan

Entrepreneurship is a game-changing discipline which has several innate traits and characteristics that need to be identified, nurtured and augmented to deliver exponential benefits to self, society, industry and country. It is a skill that can be applied to activities in one's daily life or to one's role in industry or academia, as well as a career-defining approach of promoting start-up ventures. Entrepreneurship encompasses traits such as passion & motivation, self-discipline, risk-taking and adaptability, and characteristics such as leadership, creativity, innovation and vision – all of which are inherent to varying degrees in individuals.

Entrepreneurship development enhances these traits and characteristics and will form an integral part of the curriculum, both at UG and PG levels, from the early stages itself. In line with customer centricity, a key element of this development process will be the inculcation of a design thinking process that encourages one to see through the eyes of the customer. This necessarily entails identifying the customer and defining their problem statement. At the fundamental level, entrepreneurship is all about doing different things or things differently to deliver outcomes that are innovative.

The Institutes have already appointed a Director of Innovation and Entrepreneurship. This individual's primary responsibility is to foster collaboration with reputed incubation organisations such as TiE and T-HUB, as well as with accomplished entrepreneurs. Together, they will mentor students in various aspects of entrepreneurship, including problem identification, ideation, solution finding, prototyping, marketing and financing. By leveraging these partnerships and expertise, the Director aims to cultivate a vibrant ecosystem that nurtures and supports student entrepreneurs in realising their innovative ideas and ventures.

The Institutes have also taken steps to secure a 20,000 sq. ft facility to establish an incubation centre which will bring together the ecosystem of budding innovators and entrepreneurs, seasoned veterans, investors and industry patrons. The incubation centre will have state-of-the-art hardware and software facilities, and will provide various modular "sandboxes" or "test-beds" such as payment gateways or workflow automation that can be brought together to validate the prototype development.

4.8 Research Plan

In order to deliver on the Vision of Thought Leadership, Research and Innovation as a discipline will be all-pervasive in every aspect of the University's functioning.

To start with, a research mind-set will be inculcated in students, and towards this, concepts of design thinking, critical thinking, analytical thinking and out-of-the-box thinking will be introduced in the initial years.

The instructional strategy of flipped classrooms that has already been adopted will encourage students to engage in self-study, self-discovery and research while utilising classroom time to apply the concepts in real-life problem solving under the mentorship of faculty. This again opens up the minds of students to alternative and practical thinking.

Industry partners and research institutions will be solicited to give research projects (funded or otherwise), and faculty will be actively encouraged to lead the projects with participation of students.

Keeping in mind the Government of India initiatives of Atmanirbhar Bharat, innovative research leading to patents, product ideas, and technologies to make India self-sustaining shall be given special focus. Socially-relevant areas like educational social responsibility (ESR) and sustainable development will be prioritised. Incubation facilities, laboratory equipment and expert mentorship to promising researchers and product developers shall be provided.

The outcomes of research initiatives will be duly patented where applicable, and the technology will be shared with industry to create an ecosystem of self-reliance thereby leading to accomplishment of national mission.

4.9 Outcome Orientation

The orientation of every initiative of the proposed University towards excellence in outcomes is demonstrated by the below highlights:

- Deep engagement of the end-user industry in every stage of the process by the respective domain Schools – seeking inputs on program design, soliciting Professors of Practice, inviting sponsored students, arranging externships, sponsoring applied research etc.
- Commitment to engaging with eminent global institutes of higher education and research by establishing the office of Director of Academic Outreach and facilitating student exchanges.
- Commitment to promoting Innovation and Entrepreneurship by setting up a 20,000 sq ft facility and collaborating with leading incubation organisations such as TiE and T-HUB.

- Concurrently running special programs to make students career-ready
    - Coding School
    - Project School
    - Imagineering School
    - Finishing school
- Customised Workforce Development for tailoring students' skill sets to precisely align with the industry's requirements thereby making them deployable from Day One
- Conducting workshops on paper publishing to SCOPUS standards
- Soliciting funded research through premier labs like DRDL

The measures of success of the University will be congruent to the Vision of the University, and will manifest in the below dimensions:

4.9.1 Thought leadership:

- Number of patents filed
- Number of publications in reputed journals
- Number of entrepreneurial ventures incubated
- Number of students enrolling for research programs

4.9.2 Hyper-customization and domainization:

- Number of students placed in end-user industries and technology product companies
- Number of students placed in high-end of value chain

The combined endeavour of every unit of the University will be to ensure that every student has a meaningful and defined career path – either in high-end jobs in premier industries or in research positions of cutting-edge R&D institutions or in technological entrepreneurial ventures.

The endeavour will also be to build the stature of the University as the go-to institution for staffing needs of premier industries and institutions.

4.10 Marketing Plan

With the easing of norms under the National Education Policy 2020, there has been a surge in applicants seeking to get the University status under different categories, and marketing will be a key strategic tool to differentiate our University and promote our value proposition.

To start with, all the value propositions and differentiating elements of the proposed University have been encapsulated into a single tagline that defines what students can aspire for:

"Follow Your Passion. Create Your Space. Leave Your Mark."

The University's brand will be developed around the above tagline and will be actively promoted in all communications, both internal and external. Additionally, all internal stakeholders will be motivated to align with the brand and deliver to the promise therein.

Marketing plans will be drawn up for each of the revenue streams identified below, viz,

- Enrolments in UG programs
- Enrolments in PG and PhD programs
- Enrolments in Certification Capsule programs
- Industry sponsorships
- Government grants

Each of the marketing plans will cover the following high-level steps:

- Identification of target market segments
- Identification of needs and constraints
- Defining the decision-making process
- Designing messaging and outreach activities to each stage of the decision-making process for each market segment

The messaging and outreach activities will employ a mix of approaches, some of which are given below:

- **Content marketing** – posting blogs and articles about the University, sharing videos and stories through website and social media
- **Digital Advertising** – target ads by market segment on popular channels like Instagram, engaging content including videos, photographs and unique messaging

- **Direct Connects** – through WhatsApp, Email, Direct Mailers, Handouts etc. with personalised messaging around preferences, application process status, deadlines, etc.
- **Events** – including on-campus, off-campus, college fairs, high school visits, etc. with presentations and interactions with current students and alumni

The success of the Marketing Plan will be measured in terms of the pool size at each stage of the funnel (prospect à inquiry à appliquant à admit à enrol) and the conversion ratio at each progression. The University will engage professional help in addressing this strategic function.

4.11 Finance Plan

Based on the infrastructure development plan in earlier sections, an ambitious capital investment plan of close to ₹70 crores has been drawn up for the next few years. This will be funded initially by the sponsoring society to the extent of ₹25 crores and subsequently by operational surplus generated annually.

An approximation of financial projections is given below:

KMTI CASH FLOW (PROJECTION) - ₹ Lakhs							
Year	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
AY	**2024-25**	**2025-26**	**2026-27**	**2027-28**	**2028-29**	**2029-30**	**2030-31**
Revenue	-	2,130	4,851	8,235	12,363	14,732	16,846
Total Opex	-	1,711	3,497	5,925	9,125	11,110	12,180
Surplus	-	419	1,354	2,310	3,238	3,622	4,666
Capex	1,314	1,300	1,400	1,490	1,580	121	136
Borrowings /Surplus	-1,314	-881	-46	820	1,658	3,501	4,530
Cumm Borrowing	-1,314	-2,195	-2,241	-1,421	237	3,738	8,268

5.Conclusion

To summarise, the Detailed Project Report adequately depicts the following salient points:

- Vast experience of the promoters in the field of technical education
- Proven track record of pioneering transformational innovations in software pedagogy
- Vision to further transform higher education riding on the twin planks of hyper-customization and domainization
- Proactive engagement with industry experts across multiple domains
- Early investments in Campus-of-the-Future and Faculty-of-the-Future
- Provision for holistic development and immersive experience
- Focus on innovation and entrepreneurship
- Development of soft infrastructure to transform the learning framework
- Adoption of state-of-art management practices to the education sector

All the above will come together under the aegis of the proposed Keshav Memorial Technological Institute (KMTI) to deliver a distinct package to students, and will empower them to define their own future.

Annexure-I

M.Tech. Program and Academic Curricula

M.Tech in Applied Computer Science (Manufacturing)

Introduction

In the era of Industry 4.0, where technological advancements are transforming traditional manufacturing, the Master of Technology (M.Tech.) in Computer Science and Engineering, specialising in Manufacturing 4.0, emerged as a pioneering program. This program aims to cultivate a cadre of adept professionals who can seamlessly integrate cutting-edge computer science expertise with the intricacies of modern manufacturing.

Manufacturing 4.0, synonymous with the Fourth Industrial Revolution, signifies the fusion of digital technologies, data-driven insights, and intelligent automation to usher in a new era of smart, efficient, and interconnected manufacturing systems. In line with this transformative shift, KMTI has designed a postgraduate course focused on Manufacturing 4.0, aiming to equip students with the skills to apply their knowledge of computer science, artificial intelligence (AI), and machine learning (ML) in the field.

The mission of this M.Tech. course is clear: to empower students to be industry-ready to apply their core knowledge of computer science, with a specialisation in AI & ML, to design and develop state-of-the-art systems or enhance capabilities of existing major ICT systems on manufacturing platforms through upgrades. This course is certain to ignite interest in students and motivate them to pursue careers in research and development for supply chain technology management and related industries.

Program Objectives

a. To impart a deep understanding of modern manufacturing processes, technologies, and challenges, enabling graduates to bridge the gap between traditional manufacturing and Industry 4.0.

b. To familiarise students with cutting-edge technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), machine learning, robotics, and automation, and their application in the manufacturing domain.

c. To encourage interdisciplinary collaboration by integrating computer science and engineering principles with manufacturing practices, fostering innovative solutions to real-world challenges.

d. To equip students with research skills and a research-oriented mindset, preparing them for contributions to academia, industry, and the advancement of Manufacturing 4.0 technologies.

e. To enhance communication and collaboration skills, preparing graduates for leadership roles that require effective interaction with interdisciplinary teams, stakeholders, and industry professionals.

f. To enable graduates to stay abreast of emerging trends in Manufacturing 4.0, fostering adaptability and a continuous learning mindset.

Eligibility Criteria

Students who have graduated in disciplines of Computers,Electronics,Instrumentation, Electrical and Control Engineering would be eligible for the PG course.

Course Structure

The proposed M.Tech program, centering on Manufacturing 4.0, spans a two-year duration (four semesters). The initial three semesters emphasise core and domain subjects, while the concluding semester focuses on individual Dissertation Projects aimed at addressing the practical needs of end users in both public and private sectors. To facilitate this, KMTI aims to proactively engage with stakeholders, facilitating visits to their facilities.

The curriculum comprises core and elective subjects, tailored to students' specialisation during their undergraduate studies and informed by research on technology requirements in India's manufacturing sector. Industry insights will be pivotal in shaping the curriculum.

In addition to regular sessions, students will actively engage in:

a. **Seminars (one per semester):** Students will delve into assigned domain topics, presenting their findings to faculty and peers under mentor guidance. Their contributions will factor into their overall performance evaluation.

b. **Guest Lectures:** Distinguished speakers from academia, manufacturing, certification agencies, and end-user sectors will deliver talks to enrich the learning experience. Following each lecture, students will provide written feedback, contributing to their performance assessment.

c. **Visits to Industry/Stakeholders:** Excursions to user premises, PSUs, and private industries will offer firsthand insights. Subsequent reports on these visits will be assessed and factored into performance evaluations. Additionally, external speakers will contribute to seminar sessions.

Course Curriculum for M.Tech in Applied Computer Science (Manufacturing)

T: Tutorial; L: Lecture; P: Practical

Semester-1						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
Compulsory Courses						
1.	MTMF-01-01	Industry 4.0	3	-	-	3
2.	MTMF-01-02	Product Design and Development	3	-	-	3
3.	MTMF-01-03	Computer Integrated Manufacturing & Automation	3	-	-	3
4.	MTMF-01-04	MEMS and Nanotechnology	3	-	-	3
5.	MTMF-01-05	Data Science (DS) and Machine Learning (ML)	3	-	-	3
6.	MTMF-01-06	Innovation & Entrepreneurship	3	-	-	3
7.	MTMF-01-L01	Machine Learning Lab	-	-	2	1
8.	MTMF-01-L02	Seminar/Industrial Training	-	-	2	1

Semester-2						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
1.	MTMF-02-01	Mechatronics	3	-	-	3

Semester-2						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
2.	MTMF-02-02	Industrial Internet of Things (IIoT) and Digital Twin	3	-	-	3
3.	MTMF-02-03	Additive Manufacturing (AM)	3	-	-	3
4.	MTMF-02-04	Marketing & Finance for Entrepreneurs	3	-	-	3
5.	MTMF-02-EL1	Elective 1	3	-	-	3
6.	MTMF-02-EL2	Elective 2	3	-	-	3
7.	MTMF-02-L01	Industrial Internet of Things (IIoT) Lab	-	-	2	1
8.	MTMF-02-L02	Seminar/Industrial Training	-	-	2	1

Elective courses						
Sl No.	**Course Code**	**Elective-1 Course Title**	**Credits**			
1.	MTMF-EL1-01	Hydraulics and Pneumatics	3	-	-	3
2.	MTMF-EL1-02	Machine Vision				
3.	MTMF-EL1-03	Modelling of Manufacturing Systems				
4.	MTMF-EL1-04	Product Data Management				

Sl No.	Course Code	Elective-2 Course Title	Credits			
1.	MTMF-EL2-01	Concurrent Engineering	3	-	-	3
2.	MTMF-EL2-02	Precision Engineering				
3.	MTMF-EL2-03	Production and Operations Management				
4.	MTMF-EL2-04	Service Operations Management				

Semester-3

Sl No.	Course Code	Course Title	Periods/Week			Credits
			L	T	P	20
1.	MTMF-03-01	AR/VR/MR/Haptics	3	-	-	3
2.	MTMF-03-02	Research Methodology and Intellectual Property Rights	3	-	-	3
3.	MTMF-03-03	Sensors and Actuators for Intelligent Manufacturing	3	-	-	3
4.	MTMF-03-04	AI & ML applications in Manufacturing and Analytics	3	-	-	3
5.	MTMF-02-EL3	Elective 3	3	-	-	3
6.	MTMF-02-EL4	Elective 4	3	-	-	3

Semester-3						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
7.	MTMF-02-L01	AR/VR/MR/Haptics Lab	-	-	2	1
8.	MTMF-02-L02	Seminar/Industrial Training	-	-	2	1

Elective courses						
Sl No.	**Course Code**	**Elective-3 Course Title**	**Credits**			
1.	MTMF-EL3-01	Design of Experiments	3	-	-	3
2.	MTMF-EL3-02	Project Management for Technology Ventures				
3.	MTMF-EL3-03	Advanced Topics in Cybersecurity				
4.	MTMF-EL3-04	Robotic Process Automation				
Sl No.	**Course Code**	**Elective-4 Course Title**	**Credits**			
1.	MTMF-EL4-01	Ergonomics in Design and Manufacturing	3	-	-	3
2.	MTMF-EL4-02	Optimization Techniques				
3.	MTMF-EL4-03	Financial Management for Entrepreneurs				
4.	MTMF-EL4-04	Applied GIS & Spatial Data Analytics				

Semester-4		
Sl No.	**Course Title**	**Credits**
1.	Capstone Project - Technology Startup Business Plan Development	20

Conclusion

The M.Tech in Applied Computer Science (Manufacturing) has been designed taking into consideration of the following:

a. The Technology Challenges Being Faced By Manufacturing Industry and User.

b. The Subjects identified would strengthen the core specialisation of students at graduate level and shape them by exposing them to domain knowledge

c. The state-of-the-art technologies being embedded in manufacturing systems by the leading industry in the international arena.

d. Besides contact classes, adequate time has been allotted for seminars,visits and guest lectures to enable the students to understand the ground reality and align their learning with them.

e. The dissertation project will be carried out by the students in collaboration with either users or the industry, addressing a real-time need of the nation.

f. Students would be provided detailed exposure to manufacturing industry technology needs and ICT sub-systems. This would enable them to apply their core specialisation to enhance the efficacy of these.

M.Tech in Applied Computer Science (Defence Technologies)

Introduction

The vision to establish India as a dominant regional superpower emphasises the importance of self-reliance in high technologies across all sectors, particularly in Defence. Currently, the nation relies heavily on foreign sources for major weapon systems, which poses risks such as denial of critical technologies when needed most. To address this, there's a pressing need for India to develop indigenous capabilities in designing, manufacturing, and sustaining state-of-the-art Defence Systems.

In line with this objective, DRDO has been actively engaging in basic and applied research, collaborating with academia and funding research projects. Over the past few years, DRDO has established Centers of Excellence within premier institutes and universities to accelerate technological self-reliance in defence and security.

KMTI has designed a postgraduate course, focusing on Defence technologies, to equip students with the knowledge of computer science, AI, and ML, enabling them to contribute to the development of cutting-edge defence systems. The mission is to prepare students to apply their core CS knowledge, specialising in AI & ML, to design, develop, and upgrade state-of-the-art ICT systems on Defence platforms. This course is poised to inspire students to pursue careers in research and development for defence and security sectors, spanning defence, PSUs, and private industries.

Through a blend of class lectures, seminars, visits, and guest talks, students will gain exposure to various defence systems and contemporary technologies. They will also have the opportunity to conduct their main thesis work in DRDO labs, Defence PSUs, and Private Defence Industries. This academic-industry collaboration aims to contribute significantly to realising the Government of India's vision of Atmanirbhar Bharat.

Program Objectives

a. To provide postgraduates with the necessary theoretical and experimental knowledge, skills, and aptitude in defence technologies and systems, enabling them to secure employment in various DRDO laboratories, DPSUs, private industries, ordnance factories, and similar sectors of the national and international economy

b. To foster increased interaction between students and experienced personnel working in defence labs and industries, thereby ensuring awareness of ground-level requirements, acquiring real-time knowledge and experience in technology development, and its integration into defence systems.

c. To instil enthusiasm among students for devising implementable solutions that effectively tackle present and future challenges in defence technologies through focused research and development.

Eligibility Criteria

Students who have graduated in disciplines of Computers,Electronics,Instrumentation, Electrical and Control Engineering would be eligible for the PG course.

Course Structure

1. The proposed M.Tech course with a focus on Defence Technologies would span two years (four semesters). The first three semesters would be dedicated to imparting knowledge of core and domain subjects. The final semester would be allocated for the Dissertation Project, where individual students would address the felt needs of DRDO, end users, or the defence industry (both public and private). To facilitate this, KMTI would proactively engage with these stakeholders to establish and maintain long-term relationships.

2. The syllabus has been carefully crafted, taking into account students' specialisations during their undergraduate studies, as well as insights from various articles and papers highlighting technology needs in India's Defence sector. Additionally, DRDO's critical technology requirements for designing and developing state-of-the-art systems for the Indian Defence Forces have been prioritised in designing the curriculum.

3. In addition to contact sessions, students will actively participate in seminars, visits to local and outstation establishments, and guest lectures, with their efforts contributing to their CGPA assessment:

    a. **Seminars (one per semester):** Students, organised into groups, will conduct research on assigned, domain-related topics and present their findings to faculty and peers. Each group will be guided by a mentor to ensure meaningful engagement.

    b. **Guest Lectures:** Specialists from DRDO labs, academia, defence industry, certification agencies, and end-users will deliver guest lectures to enhance the overall learning experience. Students will provide written feedback on the lecture content and takeaway

    c. **Visits to the Industry/Stakeholders:** Trips to user premises, DRDO labs, DPSUs, and private industry engaged in defence-related work will provide students with practical insights. Post-visit reports will highlight key learnings, and external speakers will be invited to participate in seminar

Course Curriculum for M.Tech in Applied Computer Science (Defence Technologies)

T: Tutorial; L: Lecture; P: Practical

Semester-1						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
Compulsory Courses						
1.	MTDT-01-01	Advanced Engineering Mathematics	3	-	-	3
2.	MTDT-01-02	Advanced Data Structures and Algorithms	3	-	-	3
3.	MTDT-01-03	Generative AI	3	-	-	3
4.	MTDT-01-04	Gaming Technology	3			3
5.	MTDT-01-05	Introduction to Defence Platforms & Systems	3	-	-	3
6.	MTDT-01-06	Entrepreneurial Mindset and Innovation	3			3
7.	MTDT-01-L01	Advanced Data Structures Lab	-	-	2	1
8.	MTDT-01-L02	Seminar/Industrial Training	-	-	2	1

Semester-2						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
1.	MTDT-02-01	Fundamentals of Defence Systems operating in EM Spectrum	3	-	-	3
2.	MTDT-02-02	War Gaming & Strategies	3	-	-	3
3.	MTDT-02-03	Development, Certification, Production & Lifecycle of Defence Platforms	3	-	-	3
4.	MTDT-02-04	ICT systems in Defence Platforms	3	-	-	3
5.	MTDT-02-EL1	Elective 1	3	-	-	3
6.	MTDT-02-EL2	Elective 2	3	-	-	3
7.	MTDT-02-L01	Generative AI Lab	-	-	2	1
8.	MTDT-02-L02	Seminar/Industrial Training	-	-	2	1

Elective Courses						
Sl No.	**Course Code**	**Elective-1 Course Title**	**Credits**			
1.	MTDT-EL1-01	Optimization for Machine Learning	3	-	-	3
2.	MTDT-EL1-02	Aircrafts / UAVs Design				
3.	MTDT-EL1-03	Algorithms in the Real World				
4.	MTDT-EL1-04	Cloud Computing Technology				
Sl No.	**Course Code**	**Elective-2 Course Title**	**Credits**			
1.	MTDT-EL2-01	Introduction to Robotics	3	-	-	3
2.	MTDT-EL2-02	Machine Learning with Large Data sets				
3.	MTDT-EL2-03	Internet of Things (IOT)				
4.	MTDT-EL2-04	Rockets & Missiles Fundamentals				

Semester-3						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
1.	MTDT-03-01	Advanced Parallel Computing & GPU Programming	3	-	-	3
2.	MTDT-03-02	Computer Vision	3	-	-	3

Semester-3						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
3.	MTDT-03-03	Advanced Applications of AI & ML in defence	3	-	-	3
4.	MTDT-03-04	Financial Management for Entrepreneurs	3			3
5.	MTDT-02-EL3	Elective 3	3	-	-	3
6.	MTDT-02-EL4	Elective 4	3	-	-	3
7.	MTDT-02-L01	Seminar/Industrial Training	-	-	2	2

Elective Courses						
Sl No.	**Course Code**	**Elective-3 Course Title**	**Credits**			
1.	MTDT-EL3-01	Electronic Warfare (EW)	3	-	-	3
2.	MTDT-EL3-02	Quantum Computing				
3.	MTDT-EL3-03	Reinforcement Learning				
4.	MTDT-EL3-04	Advanced Topics in Cryptology				
Sl No.	**Course Code**	**Elective-4 Course Title**	**Credits**			
1.	MTDT-EL4-01	MIS & Information Security	3	-	-	3
2.	MTDT-EL4-02	Remote Sensing				

3.	MTDT-EL4-03	Introduction to Blockchain				
4.	MTDT-EL4-04	Randomised Algorithms				

Semester-4		
Sl No.	**Course Title**	**Credits**
1.	Capstone Project - Technology Startup Business Plan Development	20

Conclusion

The M.Tech in Applied Computer Science (defence Technologies) has been designed taking into consideration of the following:

a. The technology challenges being faced by DRDO,defence industry and User(Defence forces).

b. The Subjects identified would strengthen the core specialisation of students at graduate level and shape them by exposing them to domain knowledge.

c. Defence systems and technologies

d. The state-of-the-art technologies being embedded in defence systems by the leading defence industry in the international arena.

e. Besides contact classes, adequate time has been allotted for seminars,visits and guest lectures to enable the students to understand the ground reality and align their learning with them.

f. The dissertation project will be carried out by the students in collaboration with either DRDO Labs/users or the defence industry, addressing a real-time need of the nation.

g. Students would be provided detailed exposure to defence systems and ICT sub-systems. This would enable them to apply their core specialisation to enhance the efficacy of these.

M.Tech in Applied Computer Science (Supply Chain Management)

Introduction

In today's rapidly evolving global market, optimising supply chain processes through innovative technologies and entrepreneurial approaches is crucial for organisations to remain competitive and sustainable. This specialised M.Tech program in CSE with a focus on Supply Chain Innovation and Entrepreneurship aims to bridge the gap between traditional supply chain management and cutting-edge technologies, nurturing professionals capable of driving innovation and value creation in the supply chain domain.

The program addresses the pressing need for professionals who can leverage technology, innovation, and an entrepreneurial mindset to drive positive changes in supply chain management, thereby enhancing competitiveness and sustainability in today's dynamic business environment. With rapid technological advancements such as artificial intelligence, machine learning, big data analytics, IoT, blockchain, and robotics transforming the field of supply chain management, there is a growing demand for individuals with expertise in both computer science and supply chain management to effectively leverage these technologies.

Organisations across industries are actively seeking innovative ways to optimise their supply chain processes, reduce costs, improve efficiency, and enhance customer satisfaction. This program equips students with the technical skills and domain knowledge needed to develop and implement technology-driven solutions, meeting the evolving needs of the supply chain industry.

KMTI has designed this postgraduate course to empower students to apply their core knowledge of computer science, specialising in AI & ML, to design and develop state-of-the-art systems or enhance existing ICT systems on manufacturing platforms through upgrades. The program aims to inspire students to pursue careers in research and development for supply chain technology management and related industries.

Through a combination of class lectures, seminars, visits, guest talks, and thesis work, students will gain valuable exposure to state-of-the-art manufacturing systems and contemporary technologies. Additionally, students will have the opportunity to carry out their thesis work in PSUs and private industries, fostering an academic-industry trained workforce to contribute to the realisation of the Government of India's vision of Atmanirbhar Bharat.

Program Objectives

a. To provide students with a deep understanding of advanced concepts, theories, and methodologies in computer science and engineering, with a specific focus on applications in supply chain management.

b. To equip students with the knowledge and skills necessary to identify, evaluate, and implement innovative technologies and strategies to optimise supply chain processes, enhance efficiency, reduce costs, and improve overall performance.

c. To cultivate an entrepreneurial mindset among students, empowering them to identify opportunities, develop innovative solutions, and create value in the supply chain ecosystem. Emphasis will be placed on fostering creativity, critical thinking, and problem-solving skills.

d. To foster a global perspective by exploring emerging trends, challenges, and opportunities in the global supply chain landscape. Students will gain insights into international markets, cross-cultural dynamics, and global supply chain networks.

Eligibility Criteria

Students who have graduated in disciplines of Computers,Electronics,Instrumentation, Electrical and Control Engineering would be eligible for the PG course.

Course Structure

The proposed M Tech course with a focus on Supply Chain Management would span two years (four semesters). The first three semesters would prioritise core and domain subjects, while the final semester would be dedicated to individual Dissertation Projects aimed at addressing the needs of end-users or industries, both public and private.

To facilitate this, KMTI intends to actively engage with stakeholders to establish and maintain long-term relationships, enabling student visits to their facilities.

The syllabus has been crafted with consideration of students' undergraduate specialisations and insights gleaned from various publicly available articles and papers on technology needs within the Supply Chain Innovation and Entrepreneurship sector in India. Industry input has been pivotal in shaping the curriculum.

In addition to regular classes, students will participate in one seminar per semester, visit local and out-of-town establishments, and attend guest lectures. Student engagement in these activities will contribute to their overall assessment, factoring into their CGPA computation.

a. **Seminars (one per semester):**Students will conduct research on assigned domain-related topics in their own time, presenting their findings to faculty and peers. Each group will be assigned a guide/mentor to ensure the exercise is productive.

b. **Guest Lectures:** Experts from academia, manufacturing industries, certification agencies, and end-users will be invited to deliver lectures, enriching students' learning experiences. Following each lecture, students will submit written feedback to faculty, reflecting on the lecture's content and their takeaways.

c. **Visits to the Industry/Stakeholders:** Students will visit local and out-of-town premises of stakeholders, including public sector undertakings (PSUs) and private industries engaged in manufacturing, to gain practical insights. Following each visit, students will submit reports outlining their learnings. External speakers may also be invited to participate in seminars.

Course Curriculum for M.Tech in Applied Computer Sciences(Supply Chain Management)

T: Tutorial; L: Lecture; P: Practical

Semester-1						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
Compulsory Courses						
1.	MTSC-01-01	Advanced Algorithms and Data Structures	3	-	-	3
2.	MTSC-01-02	Database Management Systems	3	-	-	3
3.	MTSC-01-03	Supply Chain Fundamentals	3	-	-	3
4.	MTSC-01-04	Entrepreneurial Mindset and Innovation	3			3
5.	MTSC-01-05	Programming for Supply Chain Applications	3	-	-	3

Semester-1						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
6.	MTSC-01-06	Operations Research and Optimization Techniques	3			3
7.	MTSC-01-L01	Seminar/Industrial Training	-	-	2	2

Semester-2						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
1.	MTSC-02-01	Data Visualization and Business Intelligence	3	-	-	3
2.	MTSC-02-02	Blockchain for Supply Chain Innovation	3	-	-	3
3.	MTSC-02-03	IoT and Smart Logistics	3	-	-	3
4.	MTSC-02-04	Market Analysis and Product Development	3	-	-	3
5.	MTSC-02-EL1	Elective 1	3	-	-	3
6.	MTSC-02-EL2	Elective 2	3	-	-	3
7.	MTSC-02-L01	Seminar/Industrial Training	-	-	2	2

Elective Courses						
Sl No.	**Course Code**	**Elective-1 Course Title**	**Credits**			
1.	MTSC-EL1-01	Warehousing and Stocking Algorithms	3	-	-	3
2.	MTSC-EL1-02	AR/VR in Logistics				
3.	MTSC-EL1-03	Innovations in Waste Management				
4.	MTSC-EL1-04	Cybersecurity in Supply Chain Management				
Sl No.	**Course Code**	**Elective-2 Course Title**	**Credits**			
1.	MTSC-EL2-01	Financial Management for Entrepreneurs	3	-	-	3
2.	MTSC-EL2-02	Global Supply Chain Management				
3.	MTSC-EL2-03	Customer Relationship Management in Supply Chains				
4.	MTSC-EL2-04	Service Operations Management				

Semester-3						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
1.	MTSC-03-01	Advanced Supply Chain Strategies	3	-	-	3
2.	MTSC-03-02	E-Commerce and Digital Supply Chains	3	-	-	3
3.	MTSC-03-03	Sustainable Supply Chain Management	3	-	-	3
4.	MTSC-03-04	Machine Learning and Predictive Analytics	3	-	-	3
5.	MTSC-02-EL3	Elective 3	3	-	-	3
6.	MTSC-02-EL4	Elective 4	3	-	-	3

Semester-3						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
7.	MTSC-02-L01	Seminar/Industrial Training	-	-	2	2

Elective Courses						
Sl No.	**Course Code**	**Elective-3 Course Title**	**Credits**			
1	MTSC-EL3-01	Lean Six Sigma for Supply Chain Improvement	3	-	-	3
2.	MTSC-EL3-02	Applied GIS & Spatial Data Analytics				
3.	MTSC-EL3-03	Big Data Applications in Supply Chain				
4.	MTSC-EL3-04	Supply Chain Simulation and Modelling				
Sl No.	**Course Code**	**Elective-4 Course Title**	**Credits**			
1.	MTSC-EL4-01	Project Management for Technology Ventures	3	-	-	3
2.	MTSC-EL4-02	Legal Aspects of Business and Technology				
3.	MTSC-EL4-03	Case studies of successful startups/unicorns in Supply Chains & Logistics				
4.	MTSC-EL4-04	Robotic Process Automation				

Semester-4		
Sl No.	**Course Title**	**Credits**
1.	Capstone Project - Technology Startup Business Plan Development	20

Conclusion

The M.Tech in Applied Computer Science (Supply Chain Management) has been designed taking into consideration of the following:

a. The technology challenges being faced by industry and Users.

b. The subjects identified would strengthen the core specialisation of students at graduate level and shape them by exposing them to domain knowledge.

c. The state-of-the-art technologies being embedded in the supply chain by the leading industry in the international arena.

d. Besides contact classes, adequate time has been allotted for seminars,visits and guest lectures to enable the students to understand the ground reality and align their learning with them.

e. The dissertation project will be carried out by the students in collaboration with either users or the industry, addressing a real-time need of the nation.

M.Tech in Applied Computer Science (AgriTech)

Introduction

The political vision aims to achieve sustainable development in the agriculture industry by leveraging cutting-edge technologies and entrepreneurial initiatives. This interdisciplinary program integrates principles of computer science, data analytics, artificial intelligence, and entrepreneurship with agricultural science to tackle the evolving challenges and opportunities in the agritech sector. Graduates of this program will blend technical expertise with entrepreneurial skills, enabling them to spearhead innovation, sustainability, and economic growth in agriculture through the development of advanced technologies and entrepreneurial ventures.

Over the past six decades, many central and state government institutes have actively pursued basic and applied research, collaborating with academia and funding research projects through various mechanisms, including the Grant-in-Aid scheme.

KMTI has thus designed a postgraduate course (Master of Technology) focused on Agriculture technologies, aimed at enabling students to apply their knowledge of computer science, AI, and ML in the agricultural field. The mission is to empower students to be industry-ready, leveraging their core CS knowledge with a specialisation in AI & ML to design and develop state-of-the-art systems or enhance existing major ICT systems on Agriculture Platforms through upgrades. The M.Tech. course is expected to ignite students' interest and motivate them to pursue careers in research and development.

Throughout the program, students will gain valuable exposure and knowledge of various state-of-the-art and contemporary technologies through lectures, seminars, visits, guest talks, and their main thesis work. They will carry out their main thesis work in Agriculture labs, PSUs, and Private Industries, providing them with practical experience. This academic-industry-trained workforce is poised to significantly contribute to realising the Government of India's vision of Atmanirbhar Bharat.

Program Objectives

a. To provide students with a deep understanding of agricultural science, including agronomy, crop science, soil science, and agricultural economics thereby enabling them to develop technology solutions that address real-world agricultural challenges.

b. To foster an entrepreneurial mindset among students by providing them with the knowledge, skills, and resources needed to identify opportunities, develop business models, and launch successful agritech startups and ventures.

c. To encourage students to engage in research and innovation in agritech by providing opportunities for hands-on projects, internships, and collaboration with industry partners and agricultural research institutions.

d. To equip students with advanced technical skills in computer science, including data analytics, machine learning, Internet of Things (IoT), and blockchain technology, tailored to the specific needs and challenges of the agriculture sector.

e. To emphasise the importance of sustainability, environmental stewardship, and social responsibility in agritech innovation, ensuring that technological solutions contribute to the long-term viability and resilience of agricultural systems.

Eligibility Criteria

Students who have graduated in disciplines of Computers,Electronics,Instrumentation, Electrical and Control Engineering would be eligible for the PG course.

Course Structure

The proposed M Tech course with a focus on Agriculture Technologies would span two years (four semesters). The initial three semesters would be dedicated to imparting knowledge of core and domain subjects, while the final semester would be reserved for the Dissertation Project by individual students, aimed at addressing the needs of industry or end-users. To facilitate this, and for visits to industry facilities, KMTI would proactively engage with stakeholders to establish and sustain long-term relationships.

The syllabus has been developed considering students' specialisations during their undergraduate studies, and after reviewing various articles and papers available in the public domain, highlighting technology needs in the Agriculture and Entrepreneurship sector in India. Industry inputs have been prioritised in designing the curriculum.

In addition to contact sessions, students will actively participate in one seminar per semester, visit local and out-of-town establishments, and attend guest lectures. The students' efforts will be assessed and will carry weight in the computation of their CGPA.

a. **Seminars (one each in the first three semesters):** Students, working as groups, will conduct research on assigned domain-related topics in their own time and present their findings to faculty and peers. Each group will be assigned a guide/mentor to ensure the exercise is meaningful.

b. **Guest Lectures:** Specialists from academia, manufacturing industries, certification agencies, and end-users will be invited to deliver guest lectures to students, aiming to enhance the overall learning experience. Following each lecture, students will submit written feedback to the faculty, reflecting on the lecture's content and their takeaways.

c. **Visits to the Industry/Stakeholders::** Local and out-of-town visits to user premises, PSUs, and private industries engaged in manufacturing-related work will be organised to acquaint students

with ground realities. Following each visit, students will submit a report highlighting their learnings. External speakers may also be invited to participate in the seminars.

Course Curriculum for M.Tech in Applied Computer Science (AgriTech)

T: Tutorial; L: Lecture; P: Practical

Semester-1						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
Compulsory Courses						
1.	MTAG-01-01	Advanced Engineering Mathematics	3	-	-	3
2.	MTAG-01-02	Advanced Data Structures and Algorithms	3	-	-	3
3.	MTAG-01-03	Generative AI	3	-	-	3
4.	MTAG-01-04	Basic Agriculture Management Practices	3			3
5.	MTAG-01-05	Remote Sensing and GIS for Agriculture	3	-	-	3
6.	MTAG-01-06	Entrepreneurial Mindset and Innovation	3	-	-	3
7.	MTAG-01-L01	Advanced Data Structures Lab	-	-	2	1
8.	MTAG-01-L02	Seminar/Industrial Training	-	-	2	1

Semester-2						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
1.	MTAG-02-01	Agricultural Robotics and	3	-	-	3

Semester-2						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
		Automation				
2.	MTAG-02-02	Internet of Things (IoT) Applications in Agriculture	3	-	-	3
3.	MTAG-02-03	Big Data Analytics in Agriculture	3	-	-	3
4.	MTAG-02-04	Introduction To Precision Farming	3	-	-	3
5.	MTAG-02-EL1	Elective 1	3	-	-	3
6.	MTAG-02-EL2	Elective 2	3	-	-	3
7.	MTAG-02-L01	Internet of Things (IoT) Lab	-	-	2	1
8.	MTAG-02-L02	Seminar/Industrial Training	-	-	2	1

Elective Courses						
Sl No.	**Course Code**	**Elective-1 Course Title**	**Credits**			
1	MTAG-EL1-01	Optimization for Machine Learning	3	-	-	3
2	MTAG-EL1-02	Blockchain Technology in Agriculture				
3	MTAG-EL1-03	Machine Learning with Large Data sets				
4	MTAG-EL1-04	Cloud Computing for Agritech				

Sl No.	Course Code	Elective-2 Course Title	Credits			
1.	MTAG-EL2-01	Crop Modeling and Simulation	3	-	-	3
2.	MTAG-EL2-02	Agricultural Economics and Policy				
3.	MTAG-EL2-03	Precision Livestock Farming				
4.	MTAG-EL2-04	Agri-Food Supply Chain Management				

Semester-3

Sl No.	Course Code	Course Title	Periods/Week			Credits
			L	T	P	20
1.	MTAG-03-01	Wireless Sensor Networks for Precision Agriculture	3	-	-	3
2.	MTAG-03-02	Computer Vision for Agriculture	3	-	-	3
3.	MTAG-03-03	Advanced Parallel Computing GPU Programming	3	-	-	3
4.	MTAG-03-04	Financial Management for Entrepreneurs	3	-	-	3
5.	MTAG-02-EL3	Elective 3	3	-	-	3
6.	MTAG-02-EL4	Elective 4	3	-	-	3
7.	MTAG-02-L01	GPU Programming Lab	-	-	2	1
8.	MTAG-02-L02	Seminar/Industrial Training	-	-	2	1

Elective Courses						
Sl No.	**Course Code**	**Elective-3 Course Title**	**Credits**			
1.	MTAG-EL3-01	Sustainable Agriculture Practices	3	-	-	3
2.	MTAG-EL3-02	Agricultural Biotechnology				
3.	MTAG-EL3-03	Human-Computer Interaction in Agritech				
4.	MTAG-EL3-04	Agriculture Bioinformatics				
Sl No.	**Course Code**	**Elective-4 Course Title**	**Credits**			
1.	MTAG-EL4-01	Geographic Information Systems (GIS) for Natural Resource Management	3	-	-	3
2.	MTAG-EL4-02	Cyber-Physical Systems for Smart Agriculture				
3.	MTAG-EL4-03	Advanced Applications of AI & ML in Agriculture				
4.	MTAG-EL4-04	Management Information Systems & InformationSecurity				

Semester-4		
Sl No.	**Course Title**	**Credits**
1.	Capstone Project - Technology Startup Business Plan Development	20

Conclusion

The M.Tech in Applied Computer Science (AgriTech) has been designed taking into consideration of the following:

a. The technology challenges being faced by the Agriculture sector and User.

b. The subjects identified would strengthen the core specialisation of students' graduate level and shape by exposing them to domain knowledge.

c. The state-of-the-art technologies being embedded in the supply chain by the leading industry in the international arena.

d. Besides contact classes, adequate time has been allotted for seminars,visits and guest lectures to enable the students to understand the ground reality and align their learning with them.

e. The dissertation project will be carried out by the students in collaboration with either users or the industry, addressing a real-time need of the nation.

M.Tech in Applied Computer Science (FinTech)

Introduction

In today's rapidly evolving global market, optimising financial services processes through innovative technologies and entrepreneurial approaches is crucial for organisations, particularly in banking, payments, lending, insurance, wealth management, and regulatory compliance.

This specialised program aims to bridge the gap between traditional financial services and cutting-edge technologies, nurturing a new generation of professionals capable of driving innovation and adding value in the financial services domain. The M.Tech program in Computer Science and Engineering, with a specialisation in Innovation in FinTech and Entrepreneurship, addresses the pressing need for professionals who can harness technology, innovation, and an entrepreneurial mindset to effect positive changes in financial services, thereby enhancing organisations' competitiveness and sustainability in today's dynamic business landscape.

The FinTech industry continues to innovate and disrupt traditional financial services, facilitating digital transformation, financial inclusion, and enhanced customer experiences across the global financial ecosystem. With technological advancements and evolving regulatory frameworks, FinTech companies are increasingly influential in shaping the future of finance and driving global economic growth.

These advancements include artificial intelligence, machine learning, big data analytics, Internet of Things (IoT), blockchain, and robotics. Professionals proficient in both computer science and FinTech are crucial to leveraging these technologies effectively.

Financial services organisations seek innovative solutions to optimise service processes, improve efficiency, reduce costs, and enhance customer satisfaction. There is a growing demand for professionals capable of leveraging technology-driven solutions and entrepreneurial approaches to drive innovation and transformation in the financial services domain.

KMTI has designed a postgraduate course (Master of Technology) focused on Innovation in Fintech And Entrepreneurship to enable students to apply their knowledge of computer science, AI, and ML in the field. The M.Tech. Course aims to inspire students and motivate them to pursue careers in research and development. Throughout the program, students will gain valuable exposure to various financial services systems and contemporary technologies through lectures, seminars, visits, guest talks, and their main thesis work. They will also undertake their main thesis work in Public Sector Undertakings (PSUs) and private industries, providing them with practical experience. This academic-industry-trained workforce will significantly contribute to realising the Government of India's vision of Atmanirbhar Bharat.

Program Objectives

a. To provide students with a deep understanding of advanced concepts, theories, and methodologies in computer science and engineering, with a specific focus on applications in the Financial Services Industry.

b. To equip students with the knowledge and skills necessary to identify, evaluate, and implement innovative technologies and strategies to optimise Financial Services Processes, enhance efficiency, reduce costs, and improve overall performance.

c. To cultivate an entrepreneurial mindset among students, empowering them to identify opportunities, develop innovative solutions, and create value in the Financial Services ecosystem. Emphasis will be placed on fostering creativity, critical thinking, and problem-solving skills.

d. To foster a global perspective by exploring emerging trends, challenges, and opportunities in the global FinTech landscape. Students will gain insights into international markets, cross-cultural dynamics, and global FinTech networks.

Eligibility Criteria

Students who have graduated in disciplines of Computers,Electronics,Instrumentation, Electrical and Control Engineering would be eligible for the PG course.

Course Structure

The proposed M Tech course, focusing on Innovation in FinTech, would span two years (four semesters). The initial three semesters would be dedicated to imparting knowledge of core and domain subjects, while the last semester would be reserved for the Dissertation Project by individual students, focusing on addressing the needs of end-users or industries (public/private). To facilitate this, and for visits to their facilities, KMTI would proactively reach out to these stakeholders to establish and sustain long-term relationships.

The syllabus has been prepared considering students' specialisations during their graduation and after reviewing various articles and papers available in the public domain, highlighting technology needs in the Innovation in Fintech And Entrepreneurship sector in India. Industry inputs have been given prominence while designing the curriculum.

In addition to contact sessions, students would actively participate in one seminar per semester, visit establishments (local and outstation), and attend guest talks. The efforts of the students would be assessed and would contribute to the computation of their CGPA.

a. **Seminars (one each in the first three semesters):** Students, working as groups, would conduct research on assigned domain-related topics in their own time and present their findings to faculty and peers. Each group would be assigned a guide/mentor to ensure the exercise is meaningful.

b. **Guest Lectures:** Specialists from academia, manufacturing industries, certification agencies, and users would be invited to deliver guest lectures to students, aiming to enhance the overall learning experience.

After the lecture, each student would submit written feedback to the faculty on the content of the talk and the takeaways identified by them.

c. **Visits to the Industry/Stakeholders::** Local and outstation visits to user premises, PSUs, and private industries engaged in manufacturing-related work would be organised to acquaint students with ground realities. After each visit, students would submit a report highlighting the learning from the visit. External speakers would also be invited to participate in the seminars.

Course Curriculum for M.Tech in Applied Computer Science (FinTech)

T: Tutorial; L: Lecture; P: Practical

Semester-1						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
Compulsory Courses						
1.	MT-FT-01-01	Advanced Algorithms and Data Structures	3	-	-	3
2.	MT-FT-01-02	Database Management Systems	3	-	-	3
3.	MT-FT-01-03	Finance Concepts and Math	3	-	-	3
4.	MT-FT-01-04	Entrepreneurial Mindset and Innovation	3	-	-	3
5.	MT-FT-01-05	Financial Analysis through Data Science	3	-	-	3
6.	MT-FT-01-06	Digital Transformation at Financial Institutions	3	-	-	3

Semester-1						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
7.	MT-FT-01-L01	Advanced Data Structures Lab	-	-	2	1
8.	MT-FT-01-L02	Seminar/Industrial Training	-	-	2	1

Semester-2						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
1.	MT-FT-02-01	R Programming for Data Analysis	3	-	-	3
2.	MT-FT-02-02	Fintech in Developing Markets: Digital India	3	-	-	3
3.	MT-FT-02-03	Private Equity and Venture Finance	3	-	-	3
4.	MT-FT-02-04	Machine Learning in Finance	3	-	-	3
5.	MT-FT-02-EL1	Elective 1	3	-	-	3
6.	MT-FT-02-EL2	Elective 2	3	-	-	3
7.	MT-FT-02-L01	Seminar/Industrial Training	-	-	2	2

Elective Courses						
Sl No.	**Course Code**	**Elective-1 Course Title**	**Credits**			
1.	MT-FT-EL1-01	Advanced Cryptography for Fintech	3	-	-	3
2.	MT-FT-EL1-02	Digital Consumer Banking				
3.	MT-FT-EL1-03	Digital Wealth Management				
4.	MT-FT-EL1-04	Regulatory Compliance and Ethical Policies for FinTech				
Sl No.	**Course Code**	**Elective-2 Course Title**	**Credits**			
1.	MT-FT-EL2-01	Financial Management for Entrepreneurs	3	-	-	3
2.	MT-FT-EL2-02	Financial Risk Management				
3.	MT-FT-EL2-03	Data Analysis and Visualization for FinTech				
4.	MT-FT-EL2-04	Cyber Security in FinTech				

Semester-3						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
1.	MT-FT-03-01	Blockchain and Cryptocurrencies	3	-	-	3
2.	MT-FT-03-02	Advanced Analytics and Big Data in Finance	3	-	-	3
3.	MT-FT-03-03	Behavioural Finance in Fintech	3	-	-	3
4.	MT-FT-03-04	Innovation and Strategy in FinTech	3	-	-	3
5.	MT-FT-02-EL3	Elective 3	3	-	-	3
6.	MT-FT-02-EL4	Elective 4	3	-	-	3
7.	MT-FT-02-L01	Seminar/Industrial Training	-	-	2	2

Elective Courses						
Sl No.	**Course Code**	**Elective-3 Course Title**	**Credits**			
1.	MT-FT-EL3-01	Automating Compliance: The Future of RegTech and InsurTech	3	-	-	3
2.	MT-FT-EL3-02	Robo-Advisors & Wealth Management				
3.	MT-FT-EL3-03	Fintech Product Design and Development				

Elective Courses						
Sl No.	**Course Code**	**Elective-3 Course Title**	**Credits**			
4.	MT-FT-EL3-04	Applied Intelligence in Fintech				
Sl No.	**Course Code**	**Elective-4 Course Title**	**Credits**			
1.	MT-FT-EL4-01	Project Management for Technology Ventures	3	-	-	3
2.	MT-FT-EL4-02	Legal Aspects of Business and Technology				
3.	MT-FT-EL4-03	Lending and Alternative Financing				
4.	MT-FT-EL4-04	Robotic Process Automation				

Semester-4		
Sl No.	**Course Title**	**Credits**
1.	Capstone Project - Technology Startup Business Plan Development	20

Conclusion

The M.Tech in Applied Computer Science (FinTech) has been designed taking into consideration of the following:

a. The Technology Challenges Being Faced By Industry and User.

b. The subjects identified would strengthen the core specialisation of students' graduate level and shape by exposing them to domain knowledge..

c. The state-of-the-art technologies being embedded in Financial Services By the leading industry in the international arena.

d. Besides contact classes, adequate time has been allotted for seminars,visits and guest lectures to enable the students to understand the ground reality and align their learning with them.

e. The dissertation project will be carried out by the students in collaboration with either users or the industry, addressing a real-time need of the nation.

M.Tech in Applied Computer Science (Healthcare)

Introduction

India's political vision aims to achieve sustainable development in the healthcare industry by leveraging cutting-edge technologies and entrepreneurial initiatives. Over the last six decades, many central and state government institutes have actively pursued basic and applied research in collaboration with academia, funding research projects through various mechanisms to engage with academia under its Grant-in-Aid scheme.

KMTI has designed a postgraduate course (Master of Technology) focused on Healthcare Informatics to enable students to apply their knowledge of computer science, artificial intelligence, and machine learning in the field. The mission is to empower students to be industry-ready to apply their core knowledge of computer science with specialisation in artificial intelligence and machine learning to design and develop state-of-the-art systems or enhance capabilities of existing major ICT technologies and systems in healthcare platforms through upgrades. The M.Tech. Course is certain to spark interest in students and motivate them to pursue careers in research and development, as well as entrepreneurship in the healthcare industry and related sectors.

Throughout the program, students will gain valuable exposure and knowledge of various state-of-the-art manufacturing systems and contemporary technologies through class lectures, seminars, visits, guest talks, and main thesis work. During the program, students will gain valuable exposure by conducting their main thesis work in Public Sector Undertakings (PSUs) and private industries. The academic-industry-trained workforce will significantly contribute to realising the Government of India's vision of Atmanirbhar Bharat.

Program Objectives

a. To impart a deep understanding of various digital technologies for improving healthcare delivery, patient outcomes, and overall population health. The curriculum integrates principles from healthcare, technology, data analytics, and innovation to address contemporary challenges in the field of digital health.

b. To familiarise students with cutting-edge technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), machine learning, robotics, and automation, and their application in the healthcare domain.

c. To encourage interdisciplinary collaboration by integrating computer science and engineering principles with healthcare industry processes, practices, fostering innovative solutions to real-world challenges.

d. To equip students with research skills and a research-oriented mindset, preparing them for contributions to academia, industry, and the advancement of Digital Health and Healthcare Informatics.

e. To enhance communication and collaboration skills, preparing graduates for leadership roles that require effective interaction with interdisciplinary teams, stakeholders, and industry professionals.

f. To enable graduates to stay abreast of emerging trends in HealthTech, fostering adaptability and a continuous learning mindset.

g. To create zeal among students to find implementable solutions that effectively address the present and future challenges in digital health through focused R & D.Facilitating students to identify Entrepreneurship opportunities in each domain.

Eligibility Criteria

Students who have graduated in disciplines of Computers, Electronics, Instrumentation, Electrical and Control Engineering would be eligible for the PG course.

Course Structure

The proposed M Tech course with focus on Healthcare Informatics would be of two-year duration (four semesters). First three semesters would be utilised for imparting knowledge of core and domain subjects. The last semester would be dedicated to the Dissertation Project by individual students, which would be focused on addressing identified needs of the end user/ industry (public / private). To enable this, and for visits to their facilities, KMTI would proactively reach out to said stakeholders to establish and sustain long-term relationships.

Besides contact sessions, the students would have to actively participate in:

a. **Seminars (one each in first three semesters)** – Students (as a group) would carry out research, in their own time, on assigned domain related topics, and present their findings to faculty and other students of the course. A guide/mentor would be assigned to each group to make the exercise meaningful.

b. **Guest Lectures** – Specialists from academia, manufacturing industry, certification agencies and users would be invited to deliver guest lectures to students with an aim to enhance the overall learning experience during the course. Post the lecture, each student would submit written feedback to the faculty on the contents of the talk and the takeaways identified by them.

c. **Visits to Industry/Stakeholders** – Local and outstation visits to user premises, PSUs, private industry engaged in manufacturing related work, would be organised to acquaint them with

ground realities. Post the visit the students would submit a report highlighting the learnings from the visit. External speakers would also be invited to deliver the lectures.

The efforts of the students in all the three activities will be assessed and will have weightage in computation of CGPA.

Course Curriculum for M.Tech in Applied Computer Science (Healthcare)

T: Tutorial; L: Lecture; P: Practical

Semester-1						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
Compulsory Courses						
1.	MTHCI-01-01	Advanced Engineering Mathematics	3	-	-	3
2.	MTHCI-01-02	Advanced Data Structures and Algorithms	3	-	-	3
3.	MTHCI-01-03	Generative AI	3	-	-	3
4.	MTHCI-01-04	Introduction to Digital Health	3	-	-	3
5.	MTHCI-01-05	Healthcare Systems and Policy	3	-	-	3
6.	MTHCI-01-06	Entrepreneurial Mindset and Innovation	3	-	-	3
7.	MTHCI-01-L01	Advanced Data Structures Lab	-	-	2	1
8.	MTHCI-01-L02	Seminar/Industrial Training	-	-	2	1

Semester-2						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
1.	MTHCI-02-01	Health Informatics and Data Analytics	3	-	-	3
2.	MTHCI-02-02	Mobile Health Technologies	3	-	-	3
3.	MTHCI-02-03	Wearable Health Devices and Sensors	3	-	-	3
4.	MTHCI-02-04	Telemedicine and Remote Patient Monitoring	3	-	-	3
5.	MTHCI-02-EL1	Elective 1	3	-	-	3
6.	MTHCI-02-EL2	Elective 2	3	-	-	3
7.	MTHCI-02-L01	Generative AI Lab	-	-	2	1
8.	MTHCI-02-L02	Seminar/Industrial Training	-	-	2	2

Elective Courses						
Sl No.	**Course Code**	**Elective-1 Course Title**	**Credits**			
1.	MTHCI-EL1-01	Optimization for Machine Learning	3	-	-	3
2.	MTHCI-EL1-02	Medical Imaging Informatics				
3.	MTHCI-EL1-03	Machine Learning with Large Data sets				

4.	MTHCI-EL1-04	Cloud Computing for Healthcare				
Sl No.	**Course Code**	**Elective-2 Course Title**	**Credits**			
1.	MTHCI-EL2-01	Digital Health Entrepreneurship and Innovation	3	-	-	3
2.	MTHCI-EL2-02	Healthcare Data Privacy and Security				
3.	MTHCI-EL2-03	Blockchain Applications in Healthcare				
4.	MTHCI-EL2-04	Health Data Science				

Semester-3						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
1.	MTHCI-03-01	Artificial Intelligence in Healthcare	3	-	-	3
2.	MTHCI-03-02	Clinical Decision Support Systems	3	-	-	3
3.	MTHCI-03-03	Advanced Parallel Computing GPU Programming	3	-	-	3
4.	MTHCI-03-04	Financial Management for Entrepreneurs	3	-	-	3

Semester-3						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
5.	MTHCI-02-EL3	Elective 3	3	-	-	3
6.	MTHCI-02-EL4	Elective 4	3	-	-	3
7.	MTHCI-02-L01	GPU Programming Lab	-	-	2	1
8.	MTHCI-02-L02	Seminar/Industrial Training	-	-	2	1

Elective Courses						
Sl No.	**Course Code**	**Elective-3 Course Title**	**Credits**			
1.	MTHCI-EL3-01	Human-Computer Interaction	3	-	-	3
2.	MTHCI-EL3-02	User Experience Design in Healthcare				
3.	MTHCI-EL3-03	Regulatory Affairs in Digital Health				
4.	MTHCI-EL3-04	Programming for Health data (Python, R)				
Sl No.	**Course Code**	**Elective-4 Course Title**	**Credits**			
1.	MTHCI-EL4-01	Internet of Things (IoT) Applications in Healthcare	3	-	-	3

2.	MTHCI-EL4-02	Big Data Analytics in Healthcare				
3.	MTHCI-EL4-03	Blockchain Technology in Healthcare				
4.	MTHCI-EL4-04	Management Information Systems & Information Security				

Semester-4		
Sl No.	**Course Title**	**Credits**
1.	Capstone Project - Technology Startup Business Plan Development	20

Conclusion

The M.Tech in Applied Computer Science (Healthcare) has been designed taking into consideration of the following:

a. The technology challenges being faced by the healthcare industry and User.

b. The subjects identified would strengthen the core specialisation of students at graduate level and shape them by exposing them to domain knowledge.

c. The state-of-the-art technologies being embedded in healthcare systems by the leading industry in the international arena.

d. Besides contact classes, adequate time has been allotted for seminars, visits and guest lectures to enable the students to understand the ground realities and align their learning with them.

e. The dissertation project will be carried out by the students in collaboration with either users or the industry, addressing a real-time need of the nation.

f. Students would be provided detailed exposure to healthcare systems, processes, practices and digital health technologies.

M.Tech in Applied Computer Science (Life Sciences)

Introduction

The government envisions achieving sustainable development in the life science industry through the application of cutting-edge technologies and entrepreneurial initiatives. To realise this vision, many central and state government institutes have actively pursued both basic and applied research in collaboration with academia over the past six decades, funding research projects through various mechanisms, including the Grant-in-Aid schemes.

In line with this vision, KMTI has developed a postgraduate course (Master of Technology) focused on Life Science Informatics. This program aims to equip students with the ability to apply their knowledge of computer science, artificial intelligence, and machine learning in the field. The M.Tech. Course is poised to instil interest in students and inspire them to pursue careers in research and development, as well as entrepreneurship in the healthcare industry and related sectors.

Throughout the program, students will receive valuable exposure and knowledge of state-of-the-art manufacturing systems and contemporary technologies through class lectures, seminars, visits, guest talks, and thesis work. Additionally, students will gain practical experience by conducting their thesis work in Public Sector Undertakings (PSUs) and private industries. This academic-industry collaboration will significantly contribute to realising the Government of India's vision of Atmanirbhar Bharat.

Program Objectives

a. To impart a deep understanding of various digital technologies for improving healthcare delivery, patient outcomes, and overall population health. The curriculum integrates principles from healthcare, technology, data analytics, and innovation to address contemporary challenges in the Life Science Field.

b. To familiarise students with cutting-edge technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), machine learning, robotics, and automation, and their application in the Life Sciences domain.

c. To encourage interdisciplinary collaboration by integrating computer science and engineering principles with healthcare industry processes, practices, fostering innovative solutions to real-world challenges.

d. To equip students with research skills and a research-oriented mindset, preparing them for contributions to academia, industry, and the advancement of Life Science Informatics.

e. To enhance communication and collaboration skills, preparing graduates for leadership roles that require effective interaction with interdisciplinary teams, stakeholders, and industry professionals.

f. To enable graduates to stay abreast of emerging trends in Life Science Tech, fostering adaptability and a continuous learning mindset.

g. To enhance students' interaction with the end users, experienced manpower engaged in Life Sciences industries, Pharma Industries, Drug Design Orgs, CRO (Contract Research Orgs) so that they are aware of felt needs on ground, acquire real time knowledge / experience in the technology development and its

h. Integration in real time usage, patient care.

i. To create zeal among students to find implementable solutions that effectively address the present and future challenges in digital health through focused R&D.

Eligibility Criteria

Students who have graduated in disciplines of Computers, Electronics, Instrumentation, Electrical and Control Engineering would be eligible for the PG course.

Course Structure

The proposed M Tech course with focus on Life Science Informatics would be of two-year duration (four semesters). The first three semesters would be utilised for imparting knowledge of core and domain subjects. The last semester would be dedicated to the Dissertation Project by individual students, which would be focused on addressing identified needs of the end user/ industry (public / private). To enable this, and for visits to their facilities, KMTI would proactively reach out to these stakeholders to establish and sustain long-term relationships.

The syllabus has been designed considering the specialisation of students during their graduation and after perusal of various articles and papers available in public domain eliciting technology needs in India. Industry inputs have been kept at fore in designing the curriculum.

Besides contact sessions, the students would have to actively participate:

a. **Seminars (one each in first three semesters)** – Students (as a group) would carry out research, in their own time, on assigned domain related topics, and present their findings to faculty and other students of the course. A guide/mentor would be assigned to each group to make the exercise meaningful.

b. **Guest Lectures** – Specialists from academia, manufacturing industry, certification agencies and users would be invited to deliver guest lectures to students with an aim to enhance the overall learning experience during the course. Post the lecture, each student would submit written feedback to the faculty on the contents of the talk and the takeaways identified by them.

c. **Visits to the industry/Stakeholders** – Local and outstation visits to user premises, PSUs, private industry engaged in manufacturing related work, would be organised to acquaint them with ground realities. Post the visit the students would submit a report highlighting the learnings from the visit. External speakers would also be invited to deliver the lectures.

Note:The efforts of the students in all the three activities will be assessed and will have weightage in computation of CGPA.

Course Structure for M.Tech in Applied Computer Science (Life Sciences)

T: Tutorial; L: Lecture; P: Practical

Semester-1						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
Compulsory Courses						
1.	MTLSC-01-01	Introduction to Life Science Informatics	3	-	-	3
2.	MTLSC -01-02	Molecular Biology and Genetics Fundamentals	3	-	-	3
3.	MTLSC -01-03	Bioinformatics Algorithms and Data Structures	3	-	-	3
4.	MTLSC -01-04	Programming for Life Sciences (Python, R)	3	-	-	3
5.	MTLSC -01-05	Statistical Methods in Bioinformatics	3	-	-	3
6.	MTLSC -01-06	Biological Databases and	3	-	-	3

		Data Mining				
7.	MTLSC-01-L01	Python/R programming Lab	-	-	2	1
8.	MTLSC-01-L02	Seminar/Industrial Training	-	-	2	1

Semester-2

Sl No.	Course Code	Course Title	Periods/Week			Credits
			L	T	P	20
1.	MTLSC-02-01	Sequence Analysis and Genome Informatics	3	-	-	3
2.	MTLSC-02-02	Structural Bioinformatics and Protein Modeling	3	-	-	3
3.	MTLSC-02-03	Systems Biology and Network Analysis	3	-	-	3
4.	MTLSC-02-04	Next-Generation Sequencing Technologies	3	-	-	3
5.	MTLSC-02-EL1	Elective 1	3	-	-	3
6.	MTLSC-02-EL2	Elective 2	3	-	-	3
7.	MTLSC-02-L01	Genomics and Proteomics Lab	-	-	2	1
8.	MTLSC-02-L02	Seminar/Industrial Training	-	-	2	1

Elective courses						
Sl No.	**Course Code**	**Elective-1 Course Title**	**Credits**			
1	MTLSC-EL1-01	High-Performance Computing in Life Sciences	3	-	-	3
2	MTLSC-EL1-02	Data Visualization in Life Sciences				
3	MTLSC-EL1-03	Cloud Computing for Life Sciences				
4	MTLSC-EL1-04	Optimization Methods in Machine Learning				
Sl No.	**Course Code**	**Elective-2 Course Title**	**Credits**			
1.	MTLSC-EL2-01	Machine Learning for Bioinformatics	3	-	-	3
2.	MTLSC-EL2-02	Machine Learning with Large Data sets				
3.	MTLSC-EL2-03	Financial Management for Entrepreneurs				
4.	MTLSC-EL2-04	Entrepreneurship and Innovation				

Semester-3						
Sl No.	**Course Code**	**Course Title**	**Periods/Week**			**Credits**
			L	**T**	**P**	**20**
1.	MTLSC-03-01	Microarray Data Analysis	3	-	-	3
2.	MTLSC-03-02	Pharmacogenomics and Personalized Medicine	3	-	-	3
3.	MTLSC-03-03	Metagenomics and Microbiome Analysis	3	-	-	3

4.	MTLSC-03-04	Transcriptomics and Gene Expression Analysis	3	-	-	3
5.	MTLSC-02-EL3	Elective 3	3	-	-	3
6.	MTLSC-02-EL4	Elective 4	3	-	-	3
7.	MTLSC-02-L01	Molecular modelling & Chem Informatics	-	-	2	1
8.	MTLSC-02-L02	Seminar/Industrial Training	-	-	2	1

Elective Courses

Sl No.	Course Code	Elective-3 Course Title	Credits			
1.	MTLSC-EL3-01	Artificial Intelligence in Drug Discovery	3	-	-	3
2.	MTLSC-EL3-02	Comparative Genomics and Evolutionary Biology				
3.	MTLSC-EL3-03	Cheminformatics and Drug Design				
4.	MTLSC-EL3-04	Data Privacy and Security in Life Science Applications				
Sl No.	**Course Code**	**Elective-4 Course Title**	**Credits**			
1.	MTLSC-EL4-01	Regulatory Affairs in Biotechnology	3	-	-	3
2.	MTLSC-EL4-02	Ethical and Legal Issues in Bioinformatics				

Elective Courses						
3.	MTLSC-EL4-03	Deep Learning for Neuroscience				
4.	MTLSC-EL4-04	Computational Systems Biology				

Semester-4		
Sl No.	**Course Title**	**Credits**
1.	Capstone Project - Technology Startup Business Plan Development	20

Conclusion

The M.Tech in Applied Computer Science (Life Sciences) has been designed taking into consideration of the following:

a. The technology challenges being faced by Life Sciences, Pharma industry and User.

b. The subjects identified would strengthen the core specialisation of students at graduate level and shape them by exposing them to domain knowledge.

c. The state-of-the-art technologies being embedded in Life Science systems by the leading industry in the international arena.

d. Besides contact classes, adequate time has been allotted for seminars, visits and guest lectures to enable the students to understand the ground realities and align their learning with them.

e. The dissertation project will be carried out by the students in collaboration with either users or the industry, addressing a real-time need of the nation.

f. Students would be provided detailed exposure to healthcare systems, processes, practices and digital health technologies. This would enable them to apply their core specialisation to enhance the efficacy of these.

Annexure-II

B.Tech. Program and Academic Curricula

B.Tech in Computer Science & Engineering

Course Structure

CSE-I Year I Semester

Sl No.	Course Title	L	T	P	Credits
1.	Matrices and Calculus	3	0	0	3
2.	Engineering Chemistry	3	1	0	4
3.	Programming for Problem Solving	3	0	0	3
4.	Basic Electrical Engineering	2	0	0	2
5.	Electronic Devices and Circuits	2	0	0	2
6.	Computer Aided Engineering Graphics	1	0	4	3
7.	Engineering Chemistry Laboratory	0	0	2	1
8.	Programming for Problem Solving Laboratory	0	0	2	1
9.	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
	Total Credits	**14**	**1**	**10**	**20**

CSE-I Year II Semester

Sl No.	Course Title	L	T	P	Credits
1.	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	Applied Physics	3	1	0	4
3.	Python Programming	2	0	0	2

4.	English for Skill Enhancement	2	0	0	2
5.	Applied Physics Laboratory	0	0	3	1.5
6.	Python Programming Laboratory	0	0	2	1
7.	English Language and Communication Skills Laboratory	0	0	2	1
8.	Engineering Workshop and IT Workshop	1	0	3	2.5
9	Linear Algebra and Calculus – Lab	0	0	2	1
10.	Elements of Computer Science and Engineering	0	0	2	1
	Total Credits	**11**	**2**	**14**	**20**

CSE-II Year I Semester

Sl No.	Course Title	L	T	P	Credits
1.	Digital Electronics	3	0	0	3
2.	Database Management Systems	3	0	0	3
3.	Computer Oriented Statistical Methods	3	1	0	4
4.	Discrete Mathematics	3	0	0	3
5.	Object Oriented Programming through Java	3	0	0	3
6.	Database Management Systems Lab	0	0	2	1
7.	Object Oriented Programming through Java Lab	0	0	2	1
8.	Skill Development Course 1	0	0	4	2

Sl No.	Course Title	L	T	P	Credits
9.	Gender Sensitization Lab	0	0	2	0
	Total Credits	**15**	**1**	**10**	**20**

CSE-II Year II Semester

Sl No.	Course Title	L	T	P	Credits
1.	Automata Theory and Compiler Design	3	0	0	3
2.	Data Structures	3	0	0	3
3.	Operating Systems	3	0	0	3
4.	Machine Learning	3	0	0	3
5.	Computer Organization and Architecture	3	0	0	3
6.	Data Structures Lab	0	0	2	1
7.	Operating Systems Lab	0	0	2	1
8.	Machine Learning Lab	0	0	2	1
9.	Real-time Research Project/Societal Related Project	0	0	4	2
10.	Constitution of India	3	0	0	0
	Total Credits	**18**	**0**	**10**	**20**

CSE-III Year I Semester

Sl No.	Course Title	L	T	P	Credits
1.	Software Engineering	3	0	0	3
2.	Design and Analysis of Algorithms	3	0	0	3
3.	Web Technologies	3	0	0	3
4.	Professional Elective-I	3	0	0	3
5.	Professional Elective-II	3	0	0	3
6.	Software Engineering Lab	0	0	2	1
7.	Web Technologies Lab	0	0	2	1
8.	Advanced English Communication Skills Lab	0	0	2	1
9.	Skill Development Course -2	0	0	4	2
10.	Intellectual Property Rights	3	0	0	0
	Total Credits	**18**	**0**	**10**	**20**

Professional Elective-I

Sl.No	Course Title
1.	Parallel Programming
2.	Data Analytics
3.	Advanced Computer Architecture

Professional Elective-II

Sl.No	Course Title
1.	Artificial Intelligence
2.	Design Patterns
3.	Distributed Databases

CSE-III Year II Semester

Sl No.	Course Title	L	T	P	Credits
1.	Computer Networks	3	0	0	3
2.	Cloud Computing	3	0	0	3
3.	Competitive Programming	3	0	0	3
4.	Professional Elective-III	3	0	0	3
5.	Open Elective-III	3	0	0	3
6.	Computer Networks Lab	0	0	2	1
7.	Cloud Computing Lab	0	0	2	1
8.	Competitive Programming Lab	0	0	2	1
9.	Professional Elective-III Lab	0	0	2	1
10.	Skill Development Course -3	0	0	2	1
	Total Credits	**15**	**0**	**10**	**20**

Professional Elective-III

Sl.No	Course Title
1.	Cyber Security
2.	Software Testing Methodologies
3.	Mobile Application Development

Professional Elective-III Lab

Sl.No	Course Title
1.	Cyber Security Lab
2.	Software Testing Methodologies Lab
3.	Mobile Application Development Lab

Open Elective - I

Sl.No	Course Title
1.	Internet of Things
2.	Embedded Systems

CSE-IV Year I Semester

Sl No.	Course Title	L	T	P	Credits
1.	Business Economics and Financial Analysis	3	0	0	3
2.	Cryptography and Network Security	3	0	0	3
3.	Professional Elective-IV	3	0	0	3
4.	Professional Elective-V	3	0	0	3

Sl No.	Course Title	L	T	P	Credits
5.	Open Elective-II	3	0	0	3
6.	Cryptography and Network Security Lab	0	0	2	1
7.	Industrial Oriented Mini Project/ Internship	0	0	2	2
8.	Project Stage-I	0	0	6	2
9.	Environmental Science	3	0	0	0
	Total Credits	**18**	**0**	**10**	**20**

Professional Elective-IV

Sl.No	Course Title
1.	Data Mining
2.	Scripting Languages
3.	Soft Computing

Professional Elective-V

Sl.No	Course Title
1.	Large Language Models
2.	Service Oriented Architecture
3.	Information Retrieval Systems

Open Elective – II

Sl.No	Course Title
1.	Data Visualization Techniques
2.	R Programming

CSE-IV Year II Semester

Sl.No	Course Title	L	T	P	Credits
1.	Management Science	3	0	0	3
2.	Professional Elective- VI	3	0	0	3
3.	Open Elective –III	3	0	0	3
4.	Project Stage-II including Seminar	0	0	22	11
	Total Credits	**9**	**0**	**22**	**20**

Professional Elective –VI

Sl.No	Course Title
1.	Software Process and Project Management
2.	Biometrics
3.	Computer Graphics

Open Elective – III

Sl.No	Course Title
1.	Linux Programming
2.	Concurrent Programming

B. Tech in Computer Science and Engineering (AI & ML)

Course Structure

CSE (AI & ML)-I Year I Semester

Sl No.	Course Title	L	T	P	Credits
1.	Matrices and Calculus	3	0	0	3
2.	Applied Physics	3	1	0	4
3.	Programming for Problem Solving	3	0	0	3
4.	English for Skill Enhancement	2	0	0	2
5.	Basic Electrical Engineering	2	0	0	2
6.	Applied Physics Laboratory	0	0	3	1.5
7.	Programming for Problem Solving Laboratory	0	0	2	1
8.	English Language and Communication Skills Laboratory	0	0	2	1
9.	Engineering Workshop and IT Workshop	1	0	3	2.5
	Induction Program	-	-	-	-
	Total Credits	**14**	**1**	**10**	**20**

CSE (AI & ML)-I Year II Semester

Sl No.	Course Title	L	T	P	Credits
1.	Ordinary Differential Equations and Vector Calculus	3	1	0	4

2.	Engineering Chemistry	3	1	0	4
3.	Python Programming	2	0	0	2
4.	Computer Aided Engineering Graphics	1	0	4	3
5.	Electronic Devices and Circuits	2	0	0	2
6.	Engineering Chemistry Laboratory	0	0	2	1
7.	Python Programming Laboratory	0	0	2	1
8.	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
9.	Linear Algebra and Calculus Lab	0	0	2	1
10.	Elements of Computer Science and Engineering	0	0	2	1
	Total Credits	**11**	**2**	**14**	**20**

CSE (AI & ML)-II Year I Semester

Sl No.	Course Title	L	T	P	Credits
1.	Mathematical and Statistical Foundations	3	1	0	4
2.	Introduction to Artificial Intelligence	3	0	0	3
3.	Computer Organization and Architecture	3	0	0	3
4.	Object Oriented Programming through Java	3	0	0	3
5.	Operating Systems	3	0	0	3

6.	Introduction to Artificial Intelligence Lab	0	0	2	1
7.	Operating Systems Lab	0	0	2	1
8.	Java Programming Lab	0	0	2	1
9.	Skill Development Course - 1	0	0	2	1
10.	Constitution of India	3	0	0	0
	Total Credits	**18**	**0**	**10**	**20**

CSE (AI & ML)-II Year II Semester

Sl No.	Course Title	L	T	P	Credits
1.	Discrete Mathematics	3	0	0	3
2.	Automata Theory and Compiler Design	3	0	0	3
3.	Database Management Systems	3	0	0	3
4.	Data Structures	3	0	0	3
5.	Deep Learning	3	0	0	3
6.	Database Management Systems Lab	0	0	2	1
7.	Introduction to Data Structures Lab	0	0	2	1
8.	Deep Learning Lab	0	0	2	1
9.	Real-time Research Project/Field-BasedResearchProject	0	0	4	2

10.	Gender Sensitization Lab	0	0	2	0
	Total Credits	**15**	**0**	**12**	**20**

CSE (AI & ML)-III Year I Semester

Sl No.	Course Title	L	T	P	Credits
1.	Design and Analysis of Algorithms	3	1	0	4
2.	Natural Language Processing	3	0	0	3
3.	Computer Networks	3	0	0	3
4.	Software Engineering	3	0	0	3
5.	Professional Elective-I	3	0	0	3
6.	Software Engineering Lab	0	0	2	1
7.	Natural Language Processing Lab	0	0	2	1
8.	Computer Networks Lab	0	0	2	1
9.	Professional Elective – I Lab	0	0	2	1
10.	Intellectual Property Rights	3	0	0	0
	Total Credits	**18**	**01**	**08**	**20**

CSE (AI & ML)- III Year II Semester

Sl No.	Course Title	L	T	P	Credits
1.	Business Economics and Financial Analysis	3	0	0	3
2.	Data Analytics	3	0	0	3
3.	Reinforcement Learning	3	0	0	3
4.	Professional Elective – II	3	0	0	3
5.	Open Elective-I	3	0	0	3
6.	Reinforcement Learning Lab	0	0	2	1
7.	Principles of Data Analytics Lab	0	0	2	1
8.	Industrial Oriented Mini Project/ Internship/Skill Development Course (DevOps)	0	0	4	2
9.	Skill Development Course - 2	0	0	2	1
10.	Environmental Science	3	0	0	0
	Total Credits	**18**	**0**	**8**	**20**

CSE (AI & ML)-IV Year I Semester

Sl No.	Course Title	L	T	P	Credits
1.	Generative AI	3	0	0	3
2.	Professional Elective -III	3	0	0	3
3.	Professional Elective -IV	3	0	0	3

4.	Open Elective - II	3	0	0	3
5.	Generative AI Lab	0	0	2	1
6.	Professional Practice, Law & Ethics	0	0	4	2
7.	Advanced English Communication Skills Lab	0	0	2	1
8.	Project Stage - I	0	0	6	3
9.	Skill Development Course	0	0	2	1
	Total Credits	**14**	**0**	**12**	**20**

CSE (AI & ML)-IV Year II Semester

Sl No.	Course Title	L	T	P	Credits
1.	Professional Elective - V	3	0	0	3
2.	Professional Elective – VI	3	0	0	3
3.	Open Elective – III	3	0	0	3
4.	Project Stage – II including Seminar	0	0	22	11
	Total Credits	**9**	**0**	**22**	**20**

CSE (AI & ML)-Professional Elective-I

Sl.No	Course Title
1.	Web Programming
2.	Computer Vision and Robotics

CSE (AI & ML)-Professional Elective – II

Sl.No	Course Title
1.	Parallel Programming
2.	Data Warehousing and Business Intelligence

CSE (AI & ML)-Professional Elective - III

Sl.No	Course Title
1.	Big Data with Hadoop and Spark
2.	Cloud Computing

CSE (AI & ML)-Professional Elective -IV

Sl.No	Course Title
1.	AI Technologies and Applications
2.	Tiny ML

CSE (AI & ML)-Professional Elective – V

Sl.No	Course Title
1.	Artificial Intelligence in Healthcare
2.	Soft Computing

CSE (AI & ML)-Professional Elective – VI

Sl.No	Course Title
1.	Principles of Programming Languages
2.	Biometrics

KMTES

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