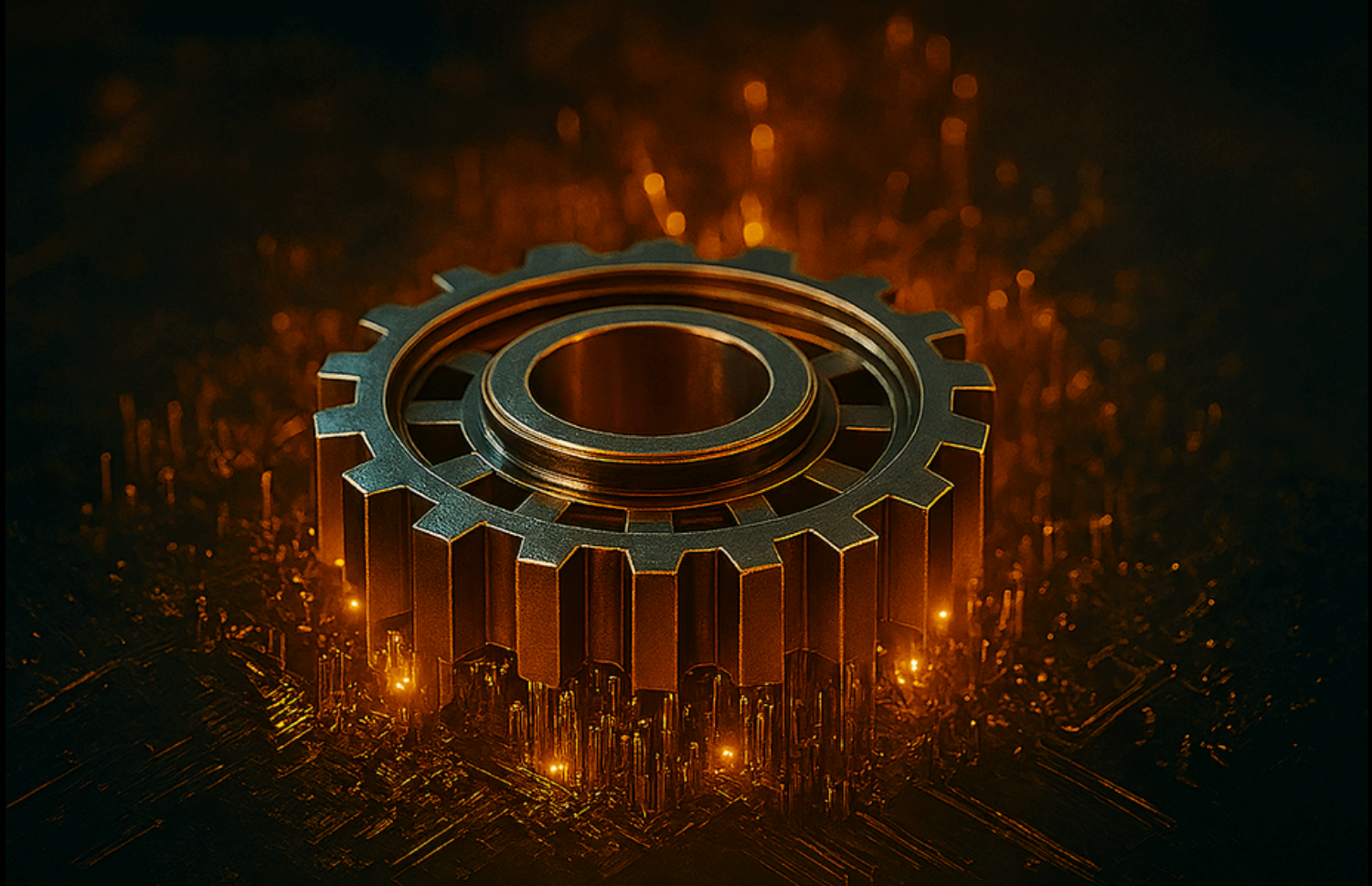
MECH TECH

THE FUTURE IS MECHANICAL ENGINEERING

JULY 2025



DEPARTMENT OF MECHANICAL ENGINEERING

AMBALIKA INSTITUTE OF MANAGEMENT AND TECHNOLOGY

Maurawan Road, Mohanlalganj, Luchnow

TABLE OF CONTENTS

Magazine Credits

CHIEF EDITOR

MADHUR PRAKASH SRIVASTAVA (ASST. PROF.)

OPERATIONS HEADS

MR.CHANDRA KUMAR DUBEY (ASST. PROF.)

MAYANK SINGH (B.TECH ME IVTH YEAR)

EDITORS

MR.SHIV SINGH (ASST. PROF.)

DESIGN AND LAYOUT

MRS.VANDANA PATHAK (ASST. PROF.)
RITIK GUPTA (B.TECH ME IIIRD YEAR)
KARAN KUMAR PNADEY (B.TECH ME IIND YEAR)

MAGAZINE NAME

MADHUR PRAKASH SRIVASTAVA (ASST. PROF.)

DEPARTMENTALMAGAZINE LOGO

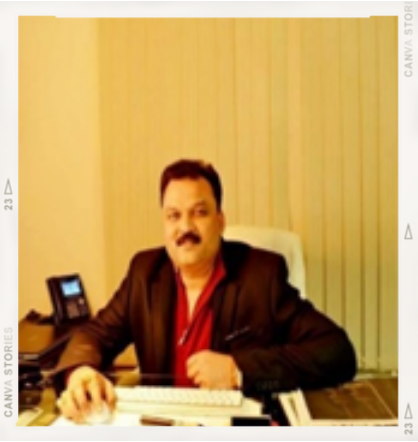
MR. PRASHANT KUMAR SRIVASTAVA (ASST. PROF.)

ABOUT AMBALIKA INSTITUTE OF MANAGEMENT AND TECHNOLOGY

Ambalika Institute of Management and Technology (AIMT) was established in 2008 as a private engineering and management college in (Mohanlalganj) Lucknow, Uttar Pradesh India and is affiliated to AKTU and BTE and Approved by AICTE. The Lucknow campus is spread over 200 acres and is located near NH-56B, surrounded by lush green field and enhanced by a beautiful lake which makes it Best Private Engineering Institute in Lucknow. The institute is 24 kilometers from Lucknow Railway Station and 20 kilometers from Amausi Airport, Lucknow. It is very well connected to the district headquarters. Ambalika center of excellence has become the most dominating center delivering high-end technical skills to our engineers to make them highly employable. AIMT, Lucknow is imparting training and joint certification programs of innovative technologies in collaboration with the Industry giants such as Microsoft, KUKA Robotics, Siemens, Ace Micromatics, MTab, Master CAM etc.

03

CHAIRMAN 'S MESSAGE



It gives me immense pleasure to introduce our Technical Magazine "MechTech" from Dept. of Mechanical Engg will be published bi- annually. Our students are very innovative and ever eager to learn new concepts. Apart from teaching, our faculty members are deeply engaged in research work. Our faculty and students regularly present their research findings in various academic conferences. It will help the documentation culture of the institute. One of our greatest strength is our highly qualified and dedicated faculty members and staff. I congratulate the editorial team, faculty, staff members and students for their contribution in the maiden issue of "MechTech". It is an attempt of the Technical Magazine to acquaint its readers with the Techological updation in the field of Mechnical Engineering.

Mr. Ambika Mishra
Chairman
Ambalika Group of Institutions

DIRECTOR'S MESSAGE

I feel honored and grateful to start the latest edition of our Technical Magazine "MechTech" from Dept. of Mechanical Engineering. This magazine will serve to reinforce and allow an increased awareness in the field of Mechanical Engineering and an improve interaction among all of us. It will not only serve the objective of creating responsiveness but will give a platform to new ideas, progress and creativity. I do hope that it will encourage faculty, students and others to contribute regularly in making our newsletter a success and may it acquire great heights in the years to come.

Dr. Ashutosh Dwivedi
Director
Ambalika Institute Of Management & Technology

ADDITIONAL DIRECTOR'S MESSAGE

I am privileged to introduce the latest edition of our esteemed Technical Magazine, "MechTech," from the Department of Mechanical Engineering. This publication stands as a testament to our collective dedication to advancing knowledge and fostering innovation within our field. It aims to not only enhance our understanding of Mechanical Engineering but also to strengthen the bonds among us as a community.

Through this platform, we aspire to inspire creativity, share pioneering ideas, and showcase progress. I am confident that this magazine will continue to serve as a beacon for excellence, encouraging regular contributions from our faculty, students, and colleagues. Let us work together to ensure its continued success and propel it to even greater heights in the years ahead.

Dr. Shweta Mishra
Additional Director
Ambalika Institute Of Management & Technology

HOD'S MESSAGE

It gives me immense pleasure to present this latest edition of **MechTech**, the technical magazine of the **Department of Mechanical Engineering at Ambalika Institute of Management & Technology**. This publication reflects our department's commitment to fostering innovation, technical excellence, and a spirit of collaboration among our students and faculty.

Mechanical engineering is a discipline that continues to evolve with advancements in technology, sustainability, and industry needs. Through **MechTech**, we aim to showcase not only the latest trends and emerging domains in our field but also the creativity, problem-solving ability, and forward-thinking approach of our students. Each article, whether on robotics, green engineering, or future skills, is a testament to the dedication and passion within our department.

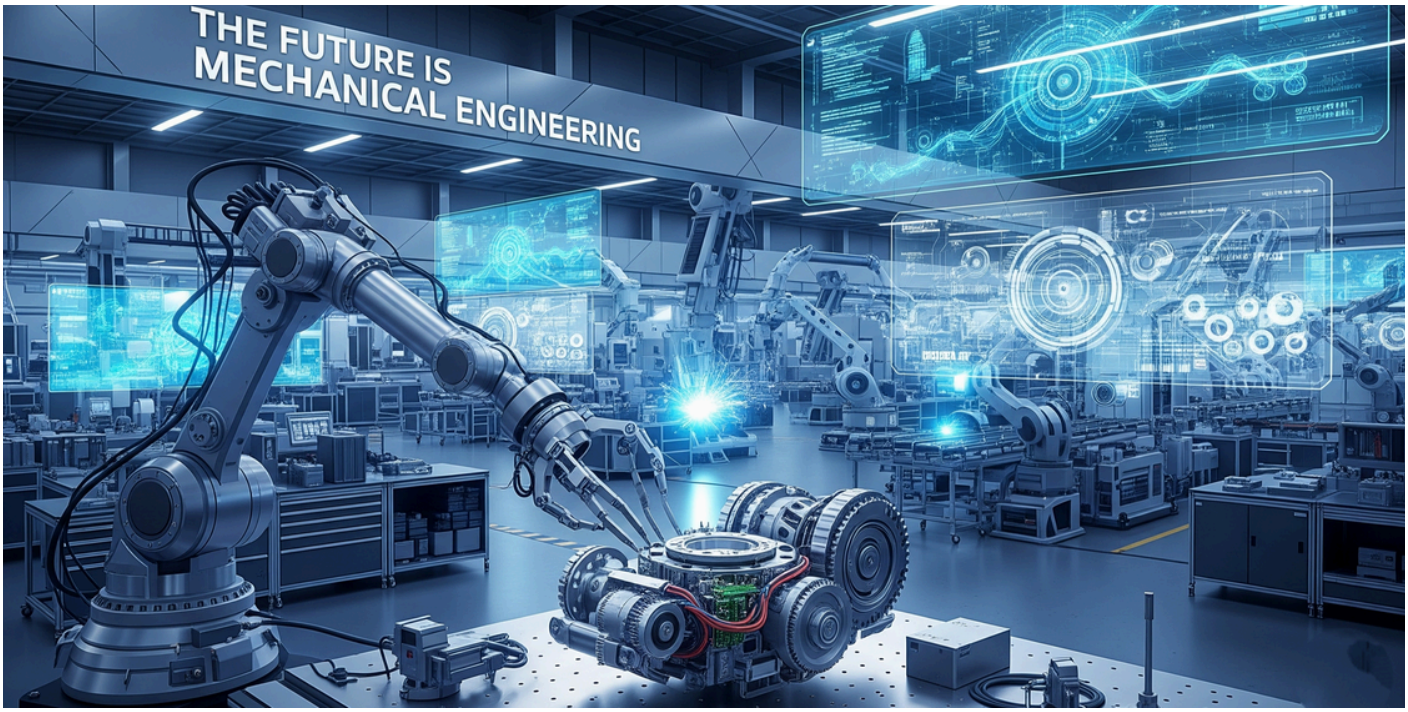
I sincerely appreciate the efforts of our editorial team, faculty members, and students for making this issue possible. I am confident that **MechTech** will continue to inspire, inform, and connect readers with the exciting possibilities that mechanical engineering holds for the future.

Mrs. Vandana Pathak
HEAD
Department of Mechanical Engineering
Ambalika Institute Of Management & Technology

CHIEF EDITOR ’S MESSAGE

We are proud to present our latest issue of the Mechanical Engineering Technical Magazine. This issue is packed with cutting-edge research and development in the field.We hope that this magazine will help you stay up-to-date with the latest trends and advancements in mechanical engineering. We would like to thank our dedicated team of writers and editors who worked hard to make this magazine possible. We are also thankful for the generous support of our sponsors, who made this publication possible. We hope that you enjoy this issue of the Mechanical Engineering Technical Magazine and find it to be a valuable resource in your professional journey.

Mr.Madhur Prakash Srivastava
Assistant Professor
Department of Mechanical Engineering
Ambalika Institute Of Management & Technology



The Future is Mechanical Engineering: A Vision for 2035

If you think mechanical engineering is “old school,” think again. By 2035, this field will be at the heart of some of the most exciting changes in the way we live, work, and explore the world. The gears, bolts, and blueprints of the past are merging with AI, robotics, and sustainable technologies to create a future that feels like science fiction – except it’s real, and it’s coming fast

From Machines That Work to Machines That Think

In the factories of the future, machines won’t just follow orders – they’ll learn from every move they make. AI-powered robots will adjust their operations on the fly, predicting problems before they happen and working alongside humans like trusted teammates. Imagine a workshop where the “apprentice” is a robot that never forgets, never gets tired, and keeps improving with every project.

Sustainability Will Be in Every Blueprint

By 2035, every mechanical design will be created with the planet in mind. Engines will run on clean hydrogen, factories will recycle almost all their waste, and entire cities will be powered by energy-efficient systems. Mechanical engineers won’t just build machines – they’ll help restore balance between industry and nature.

Making the Impossible, Possible

Additive manufacturing, better known as 3D printing, will let us create custom parts in hours instead of weeks, with almost zero waste. At the same time, futuristic materials like self-healing metals and ultra-light composites will make vehicles stronger, faster, and more efficient. We’ll see rockets built faster, cars that repair themselves, and medical implants designed perfectly for each patient.

Engineering Beyond Earth and Beneath the Seas

Mechanical engineers will be among the first to design for worlds beyond our own. Think Mars habitats that recycle every drop of water, or submarines that can dive deeper than ever to explore the secrets of the oceans. Whether it’s outer space or the ocean floor, the challenge will be the same: creating machines that can survive in places humans can’t – yet.

Engineering Beyond Earth and Beneath the Seas

The mechanical engineer of 2035 will design machines that are not just efficient but also human-friendly.

From exoskeletons that help workers lift heavy loads without strain, to prosthetics that feel like part of the body, technology will enhance life in ways we're only beginning to imagine. The focus will shift from "how well it works" to "how well it works for people."

The Skills of Tomorrow's Engineer

Tomorrow's mechanical engineers won't stop learning when they graduate. They'll be constantly updating their skills in AI, sustainability, virtual reality, and new manufacturing techniques. Classrooms will have VR labs, and students will work on real-world projects with international teams before they even get their degrees.

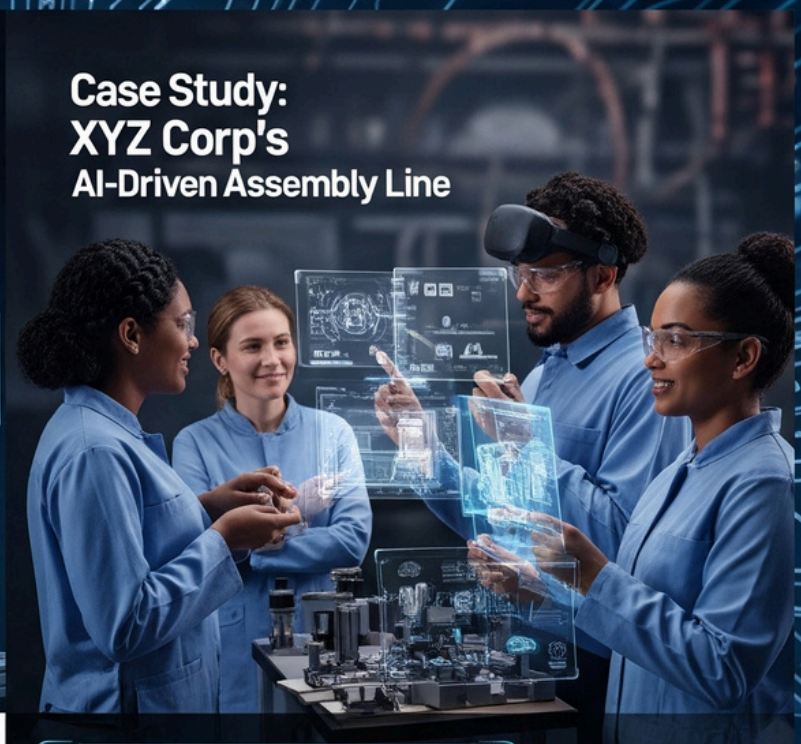
A Future Built by Engineers, for Everyone

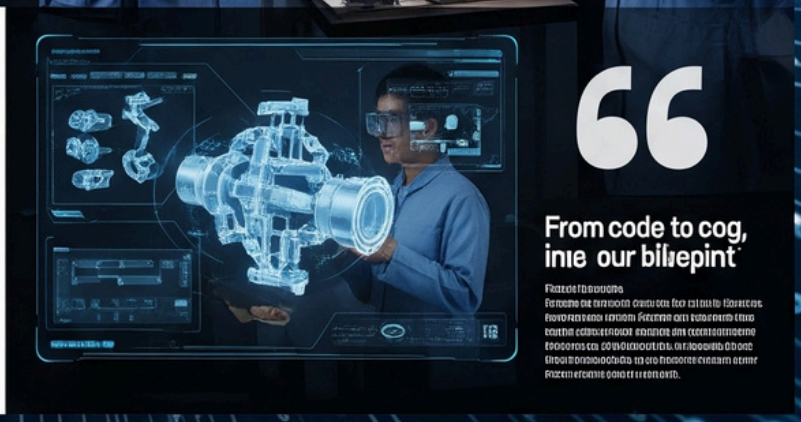
By 2035, mechanical engineering won't be just about making things move – it will be about moving humanity forward. The innovations we create will touch every part of life: the way we travel, the way we heal, the way we explore, and the way we protect our planet.

The future is not waiting for us to catch up – it's being built, piece by piece, by today's mechanical engineers with tomorrow in mind. And if you're part of this journey, you're not just making machines... you're making history.

EMERGING DOMAINS: ROBOTICS, AI & SMART MANUFACTURING

“Where human creativity meets machine intelligence, the future is built.”





The New Industrial Symphony

Step into a modern factory and it feels like walking into a living, breathing organism. Robotic arms move with the grace of dancers. Sensors flash like neurons firing. Somewhere deep inside the network, Artificial Intelligence is making thousands of micro-decisions – faster than any human could.

This is the Fourth Industrial Revolution in motion – powered by Robotics, AI, and Smart Manufacturing. Not a distant dream, but a transformation unfolding right now.

Robotics – The Co-Workers of Tomorrow

Once rigid and repetitive, robots have learned to adapt. Modern robots can see, feel, and respond in real time.

"Tomorrow's robots won't just follow instructions – they'll understand them."

Cobots (collaborative robots) are working alongside humans, lifting heavy loads, assembling delicate components, or even assisting in surgeries. By 2035, robots will be as common in factories as laptops are in offices – self-repairing, multi-tasking, and learning on the go.

AI – The Brain of the Smart Factory

If robots are the muscle, AI is the mind that keeps everything in harmony. AI-powered systems can predict machine breakdowns before they happen, adjust production schedules in real time, and even design new products virtually before the first prototype is made.

"AI-powered predictive maintenance can reduce downtime by up to 50% and cut maintenance costs by 30%".

.In the coming years, AI will move from managing processes to optimizing entire ecosystems – from raw materials to final delivery.

Smart Manufacturing – Factories That Think

Smart manufacturing merges robotics, AI, and IoT into a single connected network. Machines talk to each other, share updates, and coordinate their work.

With digital twins, engineers can run endless "what if" scenarios without stopping production. The result? Factories that can pivot overnight – building cars one day and medical devices the next.

"The smartest factory is the one that can reinvent itself in 24 hours.".

Why It Matters

This transformation isn't just about speed or efficiency – it's about adaptability and sustainability. Smart factories can quickly respond to global disruptions, use fewer resources, and produce less waste.

The Human Role

In this brave new world, people are not being replaced – they're being empowered. Engineers of the future will blend coding skills with creativity, **problem-solving, and ethical decision-making.**

"Future engineers will spend more time on innovation and design, and less on repetitive manual tasks".

Looking Ahead

By 2035, the best factories won't just be automated – they'll be collaborative ecosystems where humans and machines work side by side. The promise of robotics, AI, and smart manufacturing is not about removing the human touch, but amplifying it.

"We're not building machines to replace us. We're building partners to help us imagine – and create – more than ever before."

MECHANICAL ENGINEERING AND THE GREEN FUTURE

Designing machines for progress, without costing the planet

The world is at a turning point. Climate change, resource scarcity, and environmental degradation are no longer distant threats – they're challenges knocking at our door. Amid this urgency, mechanical engineering is stepping up, not just to build the future, but to build it green.

From Carbon Footprints to Green Blueprints

Mechanical engineering has always been about solving problems through design, innovation, and efficiency. Now, the problems are bigger: reducing carbon emissions, conserving resources, and creating technology that works in harmony with nature.

Gone are the days when efficiency meant "faster and cheaper" alone. Today, it also means cleaner and greener – from engines that run o**n** hydrogen, to manufacturing processes that recycle 95% of their waste.

Renewable Energy: Powering the Future

Mechanical engineers are leading the charge in developing renewable energy technologies. Wind turbines with ultra-light composite blades, solar tracking systems that follow the sun like flowers, and tidal power machines that harness the ocean's rhythm – all have engineering at their core.

Sustainable Manufacturing

Green manufacturing isn't a buzzword – it's a necessity. Engineers are rethinking factory layouts, introducing energy-efficient equipment, and designing closed-loop systems where waste becomes a resource. Additive manufacturing (3D printing) is cutting material waste dramatically while enabling custom, on-demand production.

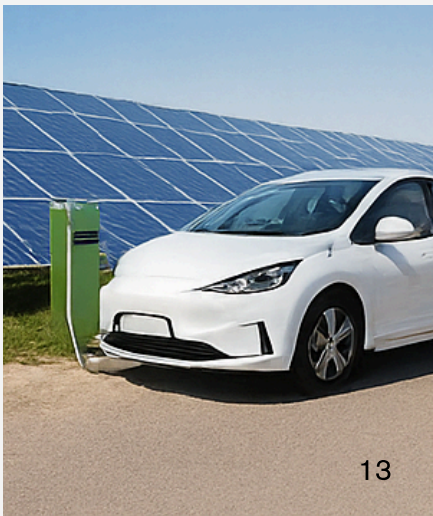
Eco-Friendly Mobility

From electric vehicles to high-speed trains powered by renewables, mechanical engineers are rewriting the rules of transportation. Lightweight materials, aerodynamic designs, and regenerative braking systems are reducing energy use while keeping performance high.

Switching to electric public transport in a single city can cut annual CO_2 emissions by thousands of tonnes

Engineering with Nature in Mind

A green future demands that every project begins with sustainability as a priority, not an afterthought. This means life-cycle thinking – considering the environmental impact of a product from raw materials to end-of-life disposal. It's about designing machines that are efficient, durable, repairable, and recyclable.



The Human Role in a Green Era

Mechanical engineers will need more than technical skills. The future calls for eco-conscious creativity – finding ways to meet human needs without harming the planet. Collaboration with environmental scientists, policy makers, and communities will be essential to design solutions that are both practical and planet-friendly.

"In the hands of today's engineers, the tools of tomorrow can heal the world as much as they build it."

FUTURE SKILLS EVERY MECHANICAL ENGINEER MUST HAVE

As we move toward an era defined by rapid technological change, globalization, and sustainability challenges, the role of a mechanical engineer is evolving faster than ever.

No longer confined to the traditional realms of design and manufacturing, tomorrow's mechanical engineers will be expected to blend technical expertise with interdisciplinary knowledge, creativity, and adaptability. Here's a look at the key future skills every mechanical engineer must develop to remain competitive and impactful.

1 Digital Literacy and Industry 4.0 Competence

The fourth industrial revolution has brought advanced technologies like the Internet of Things (IoT), Artificial Intelligence (AI), Digital Twins, and Big Data into manufacturing and engineering. Mechanical engineers must be proficient in using CAD/CAM software, simulation tools, and data analytics platforms. Understanding automation, robotics, and smart manufacturing will be essential to design efficient, connected systems.

2 Programming and Computational Thinking

Coding is no longer optional. From automating design processes to integrating sensors into systems, engineers must be comfortable with programming languages like Python, MATLAB, or C++. Computational thinking will allow them to solve problems logically, model systems accurately, and work effectively alongside AI-powered tools.

3 Sustainability and Green Engineering

Coding is no longer optional. From automating design processes to integrating sensors into systems, engineers must be comfortable with programming languages like Python, MATLAB, or C++. Computational thinking will allow them to solve problems logically, model systems accurately, and work effectively alongside AI-powered tools.

4 Interdisciplinary Collaboration Skills

Engineering solutions increasingly require cross-domain expertise. A mechanical engineer might collaborate with electrical engineers, software developers, materials scientists, and even business strategists. Strong communication, teamwork, and adaptability will ensure that these collaborations lead to innovative outcomes.

5 Digital Literacy and Industry 4.0 Competence

While technology offers powerful tools, engineers will still need to think beyond algorithms. Creative problem-solving, root-cause analysis, and the ability to weigh trade-offs between cost, performance, and ethics will define successful professionals in the future.

6 Emotional Intelligence and Leadership

In a world where automation handles repetitive tasks, human skills will matter more. Emotional intelligence will help engineers lead teams, manage conflicts, and inspire innovation. Leadership in engineering is about guiding diverse, multidisciplinary groups toward shared goals.

7 Lifelong Learning Mindset

Technology will not stop evolving. Engineers must embrace continuous upskilling through online courses, professional certifications, and research. Staying updated on emerging technologies like additive manufacturing, smart materials, and advanced energy systems will keep them relevant and future-ready.

ABOUT DEPARTMENT OF MECHANICAL ENGINEERING

Mechanical engineering is a subset of general engineering. Engineers use science and mathematical principles to solve technical problems. Since they often create new products to solve these problems, they are in high demand. Engineers are essentially inventors. By dreaming up ideas and turning them into a reality they push technology to its limits.

Mechanical engineers are specialized engineers who work with mechanical devices. These may include elevators, refrigeration and air-conditioning equipment, robots, and electric generators. Mechanical engineers design tools used in other engineering disciplines. As you can imagine, mechanical engineering is one of the broadest engineering specialties.

Mechanical Engineering is an engineering discipline that involves the application of principles of physics for analysis, design, manufacturing, and maintenance of mechanical systems. It requires a solid understanding of key concepts including mechanics, kinematics, thermodynamics and energy. Mechanical engineers use these principles and others in the design and analysis of automobiles, aircraft, heating and cooling systems, manufacturing plants, industrial equipment and machinery, medical devices and more.

To develop department of mechanical engineering as a centre of excellence in the various advance fields.

To develop the habit of continuous learning, team work and fulfill the societal needs.

DEPARTMENT VISION & MISSION

VISION

To nurture the students in achieving excellence in mechanical engineering to develop proficiency in the field of research activities along with overall personality development and contribute to the nation and humanity.

MISSION

· To motivate students to indulge in analytical and creative thinking by putting them in challenging environment by means of appropriate pedagogy.
· To develop department of mechanical engineering as a centre of excellence in the various advance fields.
· To develop the habit of continuous learning, team work and fulfill the societal needs.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

1. To prepare students for successful career in Core Mechanical and Interdisciplinary Industries through strong foundation in mathematical, scientific and engineering fundamentals. (Pre-preparation)
2. To develop ability among the students for acquiring technical knowledge in specialized areas of Mechanical Engineering such as Materials, Design, Manufacturing and Thermal Engineering with a focus on research and innovation and gaining the technical skills in classical software packages. (Core competence and professionalism)
3. To equip students with broad based knowledge to support the service industries, economic development and to address social and engineering challenges of the nation. (Breadth)
4. To promote the students for continuous learning, research and development with strong professional, moral and ethical values and zeal for life-long learning. (Learning environment)

PROGRAMME OBJECTIVES (POS)

PO 1: Engineering knowledge: Ability to perform academic activities and achieve the expected requirements by conforming to a pre-defined process as set by the institute and university.

PO 2: Problem analysis: Ability to effectively apply knowledge of computing and mathematics to computer science problems.

PO 3: Design/development of solutions: Ability and skills to effectively use state-of-the-art techniques and computing tools for analysis, design and implementation of computing systems which resolve real life problems.

PO 4: Conduct investigations of complex problems: Ability to utilize multi-disciplinary knowledge across domains to effectively apply computer technology in a global and social environment.

PO 5: Modern tool usage: Ability to efficiently make use of additional training provided throughout the course, satisfying industry requirements and thereby becoming globally employable.

PO 6: The engineer and society: Ability to successfully pursue professional development through lifelong learning.

PO 7: Environment and sustainability: Ability to communicate effectively with both technical and non-technical audiences.

PO 8: Ethics: Ability to become a versatile professional and function effectively as an individual and as a member.

PO 9: Individual and team work: Ability to understand professional, ethical, legal, security, and social issues and responsibilities.

PO 10: Communication: Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team. Manage projects in multidisciplinary environments.

PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

ABOUT MAGAZINE

MECHTECH, THE BI-ANNUAL TECHNICAL MAGAZINE OF THE DEPARTMENT OF MECHANICAL ENGINEERING AT AMBALIKA INSTITUTE OF MANAGEMENT & TECHNOLOGY, IS A VIBRANT PLATFORM FOR SHOWCASING INNOVATION, TECHNICAL KNOWLEDGE, AND CREATIVE IDEAS. DESIGNED FOR STUDENTS, FACULTY, AND INDUSTRY PROFESSIONALS, THE MAGAZINE HIGHLIGHTS THE LATEST TRENDS, RESEARCH, AND EMERGING DOMAINS IN MECHANICAL ENGINEERING.

EACH ISSUE FEATURES A RICH MIX OF VISIONARY ARTICLES, SUCH AS *THE FUTURE IS MECHANICAL ENGINEERING: A VISION FOR 2035, EMERGING DOMAINS: ROBOTICS, AI & SMART MANUFACTURING, MECHANICAL ENGINEERING AND THE GREEN FUTURE, AND FUTURE SKILLS EVERY MECHANICAL ENGINEER MUST HAVE. THE CONTENT IS HUMANIZED, RELATABLE, AND FORWARD-LOOKING — BLENDING TECHNICAL DEPTH WITH ACCESSIBLE STORYTELLING.

MECHTECH ALSO SERVES AS A BRIDGE BETWEEN ACADEMIA AND INDUSTRY, COVERING TOPICS LIKE SUSTAINABILITY, INDUSTRY 4.0, RENEWABLE ENERGY, SMART MANUFACTURING, AND GREEN MOBILITY. FACULTY MESSAGES, STUDENT CONTRIBUTIONS, AND DEPARTMENTAL ACHIEVEMENTS FURTHER ENHANCE THE MAGAZINE'S COMMUNITY SPIRIT.

WITH ITS MODERN LAYOUT, CLEAN VISUALS, AND WELL-CURATED ARTICLES, MECHTECH IS NOT JUST A PUBLICATION — IT'S A TESTAMENT TO AIMT'S COMMITMENT TO NURTURING INNOVATIVE THINKERS AND RESPONSIBLE ENGINEERS FOR THE FUTURE.**

Other Issues

AMBALIKA INSTITUTE OF MANAGEMENT & TECHNOLOGY
CAMPUS: MAURAWAN ROAD, MOHANLALGANJ, LUCKNOW- 227305
PHONE- 0522 – 3996200
www.aimt.edu.in