MEERUT INSTITUTE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

August 2025

FUTURE SKILLS : PREPARING ENGINEERS FOR TOMORROW'S CHALLENGE

MECHANICAL ENGINEERING

Message from the Hon'ble Chairman

It is with great pride and joy that I extend my heartfelt congratulations to the Department of Mechanical Engineering on the launch of its departmental magazine on 17th September. This milestone reflects the commitment of the department towards academic excellence, creativity, and holistic development of students. A departmental magazine serves as a mirror of the vibrant academic culture and innovative spirit that thrives within an institution.

Shri Vishnu Saran
B.E. (Mechanical)

A departmental magazine serves as a mirror of the vibrant academic culture and innovative spirit that thrives within an institution. It provides a platform where students and faculty can present their ideas, research, technical contributions, and creative expressions. Such initiatives not only highlight the achievements of the department but also inspire the next generation to aim higher and think innovatively.

Mechanical Engineering has always been the backbone of industrial and technological development. In today's era of rapid advancements, the role of mechanical engineers has become even more significant in addressing challenges of sustainability, manufacturing excellence, automation, and energy efficiency. I am delighted to see that the department is nurturing young minds to meet these challenges with confidence, creativity, and competence.

I am confident that this publication will serve as a source of knowledge, motivation, and inspiration for all readers.

On this auspicious occasion, I encourage the students to continue their pursuit of excellence, stay committed to lifelong learning, and contribute meaningfully to society and the nation. Let this magazine be a symbol of your passion for innovation and your dedication to the noble profession of engineering.

I once again congratulate the Department of Mechanical Engineering and wish the magazine great success in the years to come.

Er.Vishnu Saran
Hon'ble Chairman
Meerut Group of Institutions

Message from the Hon'ble Vice Chairman

It gives me immense pleasure to extend my warmest congratulations to the Department of Mechanical Engineering on the successful launch of its departmental magazine on 17th September. This is indeed a proud moment for the institute as the magazine represents the creativity, dedication, and innovative spirit of our students and faculty.

Shri Puneet Agarwal
vice-chairman of the MIET Group of Institutions

A departmental magazine is not merely a publication; it is a platform that captures the essence of academic brilliance, technical curiosity, and youthful energy. It encourages students to express their ideas, showcase their technical skills, and share their achievements with a larger audience. I firmly believe that such initiatives help in nurturing confidence, communication skills, and a culture of collaboration among students.

Mechanical Engineering, being a foundation branch of engineering, holds immense importance in shaping industries, driving innovation, and building a sustainable future. With the rapid technological transformations happening globally, the role of mechanical engineers is expanding into diverse fields such as automation, advanced materials, renewable energy, and artificial intelligence. I am delighted that the department is guiding its students to not only adapt to these changes but also to lead them with innovation and integrity.

Your collective hard work and commitment are truly commendable. I am confident that this publication will inspire readers, encourage knowledge sharing, and reflect the true potential of the department.

On this special occasion, I urge all students to continue exploring, innovating, and excelling in their academic and professional pursuits. Let this magazine be a beacon of motivation and a reminder of the limitless opportunities that lie ahead.

I once again congratulate the Department of Mechanical Engineering for this remarkable initiative and wish the magazine great success in the years to come

Er. Puneet Agarwal
Hon'ble Vice Chairman
Meerut Group of Institutions

Message from the Hon'ble Director

It gives me immense pleasure to convey my heartfelt congratulations to the Department of Mechanical Engineering on the occasion of launching its departmental magazine on 17th September. This initiative is indeed a commendable step towards nurturing creativity, innovation, and technical excellence among our students and faculty members.

Prof. (Dr.) S.K. Singh
Campus Director

A magazine is more than just a collection of articles; it is a reflection of the collective vision, hard work, and intellectual energy of a department. It provides a platform for students and faculty to showcase their research insights, technical knowledge, creative expressions, and innovative ideas. I am confident that this magazine will not only highlight the academic achievements of the department but also inspire the readers to think beyond conventional boundaries.

Mechanical Engineering, being one of the oldest and most diverse engineering disciplines, continues to play a pivotal role in shaping the modern world. From advancements in manufacturing, design, and materials to the development of sustainable technologies, the field constantly challenges us to explore new horizons

I extend my sincere appreciation to the editorial team, faculty members, and students who have worked diligently to bring out this publication. Their dedication and collaborative efforts have made this endeavour possible. I hope that the magazine becomes an annual tradition and grows in quality and outreach with every edition.

On this proud occasion, I encourage all students to continue striving for academic excellence, innovative thinking, and professional growth. Let this magazine be a source of motivation and a reminder of the limitless opportunities that lie ahead.

I wish the Department of Mechanical Engineering great success in all its future endeavours and congratulate them once again on this remarkable achievement.

Dr. Sanjay Singh
Campus Director
Meerut Institute of Engineering and Technology, Meerut

Message from the Dean (Academics)

I am delighted to extend my heartfelt congratulations to the Department of Mechanical Engineering on the launch of its departmental magazine on 17th September. This initiative is truly commendable as it reflects the academic vibrancy, creativity, and innovative spirit of both students and faculty. I am delighted to extend my heartfelt congratulations to the Department of Mechanical Engineering on the launch of its departmental magazine on 17th September.

This initiative is truly commendable as it reflects the academic vibrancy, creativity, and innovative spirit of both students and faculty.

A departmental magazine is not just a collection of writings, but a platform that encourages the exchange of knowledge, technical insights, and creative ideas. It provides students with an opportunity to showcase their talents and build confidence, while also highlighting the achievements of the department.

Mechanical Engineering, being a core branch, has always been central to industrial progress and societal growth. I am pleased to see the department continuously motivating students to excel in research, innovation, and professional development.

I sincerely appreciate the efforts of the editorial team, faculty mentors, and contributors for bringing out this publication. I hope this magazine will inspire many more students to participate actively and set new benchmarks of excellence.

I once again congratulate the Department of Mechanical Engineering for this wonderful accomplishment and wish the magazine continued success in the years to come.

Prof. (Dr.) Sanjeev Singh

Dean Academics

Meerut Institute of Engineering and Technology, Meerut

Message from the Hon'ble Dean (Student Welfare)

I am very pleased to convey my warm congratulations to the Department of Mechanical Engineering on the launch of its departmental magazine on 17th September. This initiative is a wonderful step towards encouraging creativity, talent, and active participation among students. A magazine is a reflection of the vibrant student culture, highlighting not only academic and technical achievements but also creativity, teamwork, and leadership qualities.

It provides a platform for students to express their ideas, develop confidence, and connect with their peers and faculty members in meaningful ways.

As Dean (Student Welfare), I strongly believe that such initiatives contribute greatly to the holistic development of students by fostering values of responsibility, collaboration, and innovation. Along with academic excellence, these qualities are essential for shaping well-rounded professionals and responsible citizens.

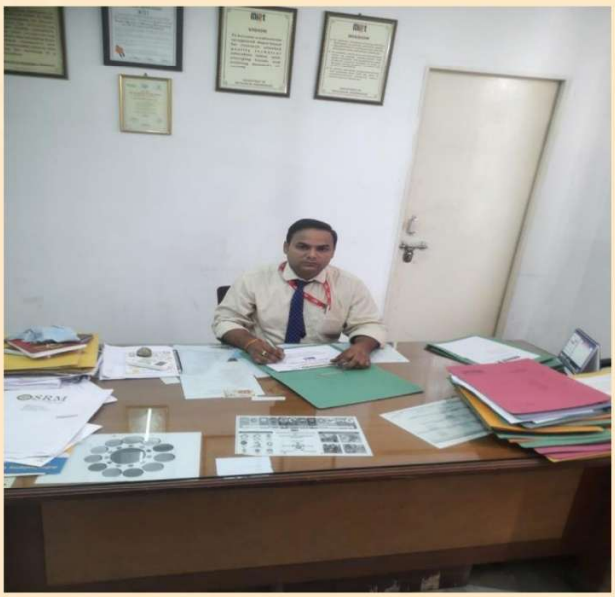
I sincerely appreciate the efforts of the faculty, editorial team, and students who have worked together to bring out this publication. Your dedication and enthusiasm are commendable. I am confident that this magazine will inspire students to explore their potential, participate actively in departmental activities, and continue striving for excellence.

I once again congratulate the Department of Mechanical Engineering for this remarkable achievement and wish the magazine and its reader's great success.

Dr. Honey Tomar
Dean (Student Welfare)
Meerut Institute of Engineering and Technology, Meerut

Message from Head of Department

Mechanical Engineering



It gives me immense pleasure to announce the launch of the **Mechanical Engineering Department Magazine**, a new initiative to showcase the achievements, creativity, and innovative spirit of our students and faculty. This magazine will serve as a vibrant platform to share academic milestones, research contributions, industry collaborations, and extracurricular accomplishments that make our department dynamic and forward-looking.

At MIET, we are proud to be a hub of **innovation, practical learning, and academic excellence**. Our department offers cutting-edge programs such as **B.Tech in Mechanical Engineering**, **B.Tech with a Minor Degree in AI & ML**, and **B.Tech (Hons.) with a Specialization in Robotics & AI**. These programs are carefully designed to provide students with a strong foundation in core engineering while preparing them for emerging technologies and industry demands.

With the support of our **dedicated and experienced faculty**, students are encouraged to explore academics, research, and professional development. Through **hands-on learning, real-world projects, and modern tools**, we ensure that they acquire industry-relevant skills. Our **Centres of Excellence, including the BOSCH Lab and FESTO-SIEMENS Lab**, play a vital role in bridging the gap between academia and industry.

This magazine reflects not only our **academic and research endeavours** but also the **creativity, teamwork, and aspirations** of the Mechanical Engineering fraternity at MIET. I invite all students and faculty to actively participate in this endeavour and contribute towards making it a meaningful and inspiring publication.

Let this magazine be a true mirror of our journey of excellence and innovation.

Dr. Vipin Kumar Sharma
Head of Mechanical Engineering Department
Meerut Institute of Engineering and Technology

Message from Assistant Dean Research

Dear Students,

As future leaders of technology, you hold the responsibility of shaping the world with innovation, creativity, and knowledge. Mechanical engineering has always been the backbone of industrial growth, and in today's era of rapid change, the importance of research and innovation in your journey cannot be overstated.

Research is not only about experiments or publications—it is about cultivating curiosity, asking the right questions, and seeking practical solutions to real-world challenges. When you participate in research, you bridge the gap between theory and practice. You gain the opportunity to apply classroom concepts to areas like robotics, manufacturing, materials science, renewable energy, and automation. These experiences sharpen your analytical skills and help you think beyond conventional approaches. Innovation, on the other hand, inspires you to design sustainable, efficient, and forward-looking technologies. The industries you will serve—automotive, aerospace, energy, healthcare, and beyond—are looking for engineers who can create new possibilities, not just follow existing practices. By embracing research and innovation, you prepare yourself to stand out in this competitive world.

I encourage you to actively engage with your faculty, utilize laboratories, join interdisciplinary projects, and collaborate with industries. These opportunities will not only enhance your technical knowledge but also nurture leadership, teamwork, and confidence—qualities that define successful engineers.

Remember, research and innovation are pathways to personal growth, professional excellence, and societal progress. Embrace them wholeheartedly, and together, we will create a brighter and more sustainable future.

With best wishes,

Dr. Husain Mehdi

Assistant Dean Research

Message from Centre Superintendent

It gives me immense pleasure to pen a few words for this edition of our esteemed Mechanical Engineering Department magazine. The magazine is not just a collection of articles and achievements—it is a reflection of the spirit, dedication, and intellectual vibrancy that thrives within our campus.

As the Centre Superintendent, my role is centred around ensuring the fair, transparent, and smooth conduct of all assessments.

Examinations are not merely a measure of academic performance, but a significant milestone in the journey of learning. They help inculcate discipline, responsibility, and a commitment to excellence—values that extend beyond the classroom.

In recent times, we have witnessed significant changes in the educational landscape. Technology, evolving pedagogies, and new evaluation methods have transformed the way we assess knowledge. Our institution has embraced these changes, ensuring that our examination system remains robust, inclusive, and student-friendly.

I extend my heartfelt appreciation to the faculty, staff, and students who continue to support the examination process with integrity and dedication. Let us continue to uphold the values of honesty and hard work as we prepare our students for the challenges and opportunities that lie ahead.

Wishing everyone continued success and personal growth.
Warm regards,

Dr. Piyush Gupta
Professor, Centre Superintendent
(Mechanical Engineering Department)
MIET Meerut

MESSAGE FROM EDITOR

The Mechanical Engineering Department at MIET, Meerut, publishes this e-magazine on a quarterly basis. Faculty members' research papers and other publications based on the most recent developments in technology are included in this edition. The magazine also offers a venue for the different technical and cultural events that the department has been hosting over the last three months.

I hope that readers will find all the information they need and inspiration in this publication.

MR. PIYUSH GAUR
ASSISTANT PROFESSOR
ME DEPARTMENT, MIET

Mechanical Engineering Department

Vision of the Department

To become a nationwide recognized department for research-oriented quality technical education in line with emerging trends and evolving demands of society.

Mission of the Department

The mission of mechanical engineering department includes:

- To embrace excellent teaching learning techniques to provide practical quality education that is commensurate with the emerging trends and industry demands.
- To promote research in interdisciplinary areas by forging collaborations with global industries and establishing state-of- the-art research facilities in order to develop among students innovative and creative capabilities.
- To mentor and guide young technocrats and inculcate them with the spirit of entrepreneurship along with ethics, values and eco-sensitivity.

Program Educational Objectives (PEOs)

After four years from completion of graduation, the student will:

- Pursue career as practicing mechanical engineer in core mechanical or allied industries worldwide.
- Meet the expectations of modern industries for catering the proliferating demand and rising quality standards.
- Become a responsible engineer capable of conducting sustainable, environment- friendly, innovative research and development in advanced domains.
- Serve the society better by practicing professional leadership roles with a commitment to lifelong learning.
- Become a person with a strong will and attitude to excel through the challenges in all walks of life.

Program Outcomes (POs)

Engineering Graduates will be able to:

- ✓ **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems using first principles of mathematics, natural sciences, and engineering sciences.
- ✓ **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- ✓ **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- ✓ **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- ✓ **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- ✓ **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- ✓ **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- ✓ **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- ✓ **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- ✓ **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- ✓ **Lifelong 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.

HOW TO STUDY EFFECTIVELY

STUDY SMARTER, NOT HARDER

Your study method depends on the subject you're learning and the medium of instruction. Let's study smarter, not harder.

REMEMBER YOUR GOALS

On the journey of studying, there will be a time when you get bored or feel lazy. Always remember your goals and what you want to achieve.

MAKE A STUDY SCHEDULE

The first thing you can try is to make a study schedule. Decide a perfect time and study at the same time every day. It will practice your brain as well.

Meerut Institute of Engineering & Technology

Department of Mechanical Engineering

Placement 2024-25

Aayush Sharma
Motherson Sumi Electric Wires

Akshit Kaushik
Victory Electric International

Ansh Verma
Technico Industries Pvt. Ltd

Ayush Kumar
Motherson Sumi Electric Wire
Bharat Electronics Ltd. (BEL)

Atul Mohan
ThermoFab Pvt Ltd

Himanshu
Multimax Engineering

Karan Dhiman
JRPT Automation Pvt. Ltd.

Krishna Pundir
ThermoFab Pvt. Ltd.

Kunik Dayal
Motherson Sumi Electric Wire

Lakshya Pratap Singh
JBM Group

Manvender Singh
Nector Life Sciences/JBM

Prashant Malik
Motherson Sumi
Electric Wires

Prince Kumar
Technico Industries
Pvt. Ltd

Vaibhav Chauhan
ThermoFab Pvt. Ltd.

Vansh Deshwal
ThermoFab Pvt. Ltd.

Vaibhav Tyagi
Nectar Lifescience

Vishal Heera
Multimax Engineering Works Pvt. Ltd.
Bharat Electronics Limited (BEL)

Vidhanshu Dixit
Motherson Sumi
Electric Wires

Vikrant Kumar
Technico industries Pvt. Ltd.

Innovation & Incubation

90+ Startup

Six Startup over 1Cr.

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Our student placed in many companies including PSUs such as BEL with a decent package

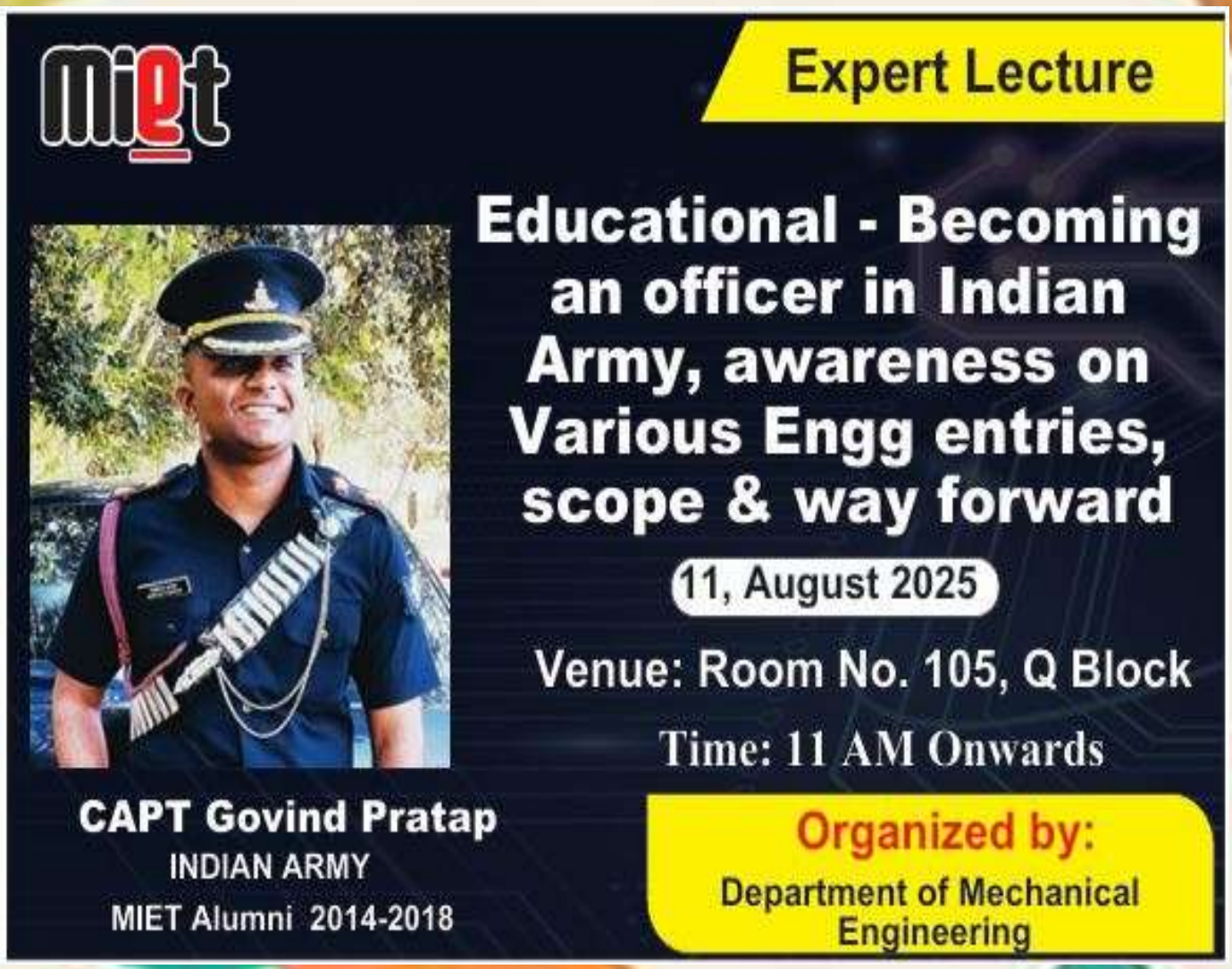
Most of the student passed from the college are selected in two or more companies with good package.

Research and Publication of Mechanical Engineering Department

Total Paper published in the Department in the session (2024-25) – 24

Total Patent Published by the Department in the session (2024-25) - 17

Expert Lecture by Capt Govind Pratap Miet Alumni (2014-2018)



A very fabulous session by Captain Govind Pratap for the student for their future and how they can improve themselves and excel in their respective lives

ORIENTATION

PROGRAM

Orientation Program done on 19th August 2025 for 2nd year student in the Mechanical Department

Orientation Program done on 21st August 2025 for 3rd year student in the Mechanical Department

JOB INTERVIEW TIPS

Tips for your Remote Interviews

Mock Interview conducted in Mechanical Engineering Department for Final Year

The visit was organized by Mechanical Engineering Department of MIET campus in collaboration with Namaste India Food Product Limited to raise students' awareness of the different market norms.

Students from Mechanical Engineering Department of MIET campus won a shield and cash prize in Robo war competition at IPEC Ghaziabad.

Faculty Achievement

Mechanical Engineering Department

Dr. Husain Mehdi is recognized among the **World's Top 2% Scientists** by Stanford/Elsevier based on the SCOPUS citation database, reflecting his global research impact and excellence. He has published more than 90 research papers in reputed international journals and conferences, including 16 SCI and SCOPUS-indexed publications in 2025 alone. His work has been cited over 2106 times worldwide, achieving a notable h-index of 29, which highlights the significance and influence of his contributions. Dr. Mehdi holds 13 granted patents in the areas of advanced materials, welding technologies, and composite material processing. He has successfully supervised 10 M.Tech research scholars and guided over 25 B.Tech projects, nurturing the next generation of researchers. His expertise has earned him invitations as a keynote speaker at prestigious international conferences, such as the International Conference on Scientific Ideas of Young Scientists, Poland (2021), and the 2nd International Congress of Chemical Engineering, Morocco (2021). He has also played a vital role in organizing major international conferences, including ICARIE-2017, ICAMMIA-2023, and ICARAE-2022. In addition to his research contributions, Dr. Mehdi serves as an Editor for the *Journal of Adhesion Science and Technology* (Taylor & Francis, SCI, IF 2.4) and as Guest Editor for several leading journals, including *International Journal on Interactive Design and Manufacturing* (Springer, IF 2.1) and *Advanced Manufacturing: Polymer & Composites Science* (Taylor & Francis, SCOPUS, ESCI).

Best faculty awards given in Mechanical Engineering Department

Best faculty award given to Mr. Mohd Saify and Mr. Ravi Kumar from first year

Best faculty award given to Dr. Pankaj Kumar Gupta and Mr Piyush Gaur from Mechanical Engineering Department

Why research and Innovation is important for B.Tech Mechanical students

Research and innovation form the cornerstone of progress in engineering, particularly for B.Tech Mechanical students. In today's fast-changing technological era, the role of a mechanical engineer is no longer confined to applying formulas and theories; instead, it involves solving real-world problems with creativity, critical thinking, and advanced technical skills.

Engaging in research allows students to deepen their understanding of core subjects such as Machine Design, Thermodynamics, Manufacturing, Fluid Mechanics, and Materials Science. It bridges the gap between theoretical learning and practical application by encouraging students to design, test, and refine solutions to contemporary engineering challenges. Through research, students not only strengthen their technical expertise but also develop essential skills in problem-solving, data analysis, and scientific communication.

Innovation, on the other hand, inspires students to think beyond traditional methods. It pushes them to create efficient, cost-effective, and sustainable solutions for industries such as automotive, aerospace, power generation, and automation. By working on innovative projects, students gain exposure to modern tools, simulation software, and industry-relevant technologies, making them more adaptable and employable in a competitive job market.

Moreover, research and innovation foster collaboration, leadership, and teamwork. Students often work in groups, interact with faculty mentors, or engage with industry experts, which broadens their perspectives and enhances professional confidence. These experiences also open doors to higher studies, patents, start-ups, and entrepreneurship opportunities.

Ultimately, research and innovation cultivate a mindset of lifelong learning. As mechanical engineering continuously evolves with advancements like artificial intelligence, additive manufacturing, and green technologies, students who embrace these practices remain future-ready and capable of driving technological growth.

Dr. Husain Mehdi
(Associate Professor)
Mechanical Engineering Department

Vision: Transforming Education in India

The role of India's 2020 National Education Policy

Introduction:

The National Education Policy (NEP) 2020 was formulated by a committee headed by Dr. K. Kasturirangan, a renowned Indian space scientist and former chairman of ISRO. It received approval from the Union Cabinet on **July 29, 2020**. This marks India's third national education policy, following those introduced in **1968 and 1986**. Although the 1986 policy was revised in **1992**, the changes were relatively minor. Education plays a crucial role in shaping individuals and advancing societies. In the context of global leadership—whether in economic development, social justice, scientific progress, national unity, or cultural heritage—providing inclusive, high-quality education is essential. As India is projected to become the most populous country in the coming decades, ensuring comprehensive and quality education for its citizens is vital for their all-round development.

With the rapid advancement of technologies like big data, **machine learning (ML),** and **artificial intelligence (AI)**, many low-skilled jobs are becoming increasingly inaccessible to the Indian population. This shift necessitates a transition towards a more skilled and capable workforce. To meet this demand, India must emphasize the development of multidisciplinary competencies that span science, social science, engineering, and the humanities. As the global employment landscape and economic ecosystem continue to evolve, it becomes crucial for students not only to acquire knowledge but also to develop the ability to learn and how to learn? Education must, therefore, move beyond rote content delivery and prioritize critical thinking, creativity, problem-solving, adaptability, and innovation. These skills will be essential in navigating dynamic and fast-changing sectors.

The policy is structured in a comprehensive manner:

- **Part 1–2** cover school and university-level education,
- **Part 3** highlights key areas of focus,
- **Part 4** outlines the steps for implementation.

A major proposal within this policy is the transformation of the traditional 10+2 education system into a new pedagogical and curricular structure of **5+3+3+4**, targeting learners from ages 3 to 18. This framework includes the Foundational (F), Preparatory (P), Middle (M), and Secondary (S) stages of schooling, **as illustrated in Figure 1.**

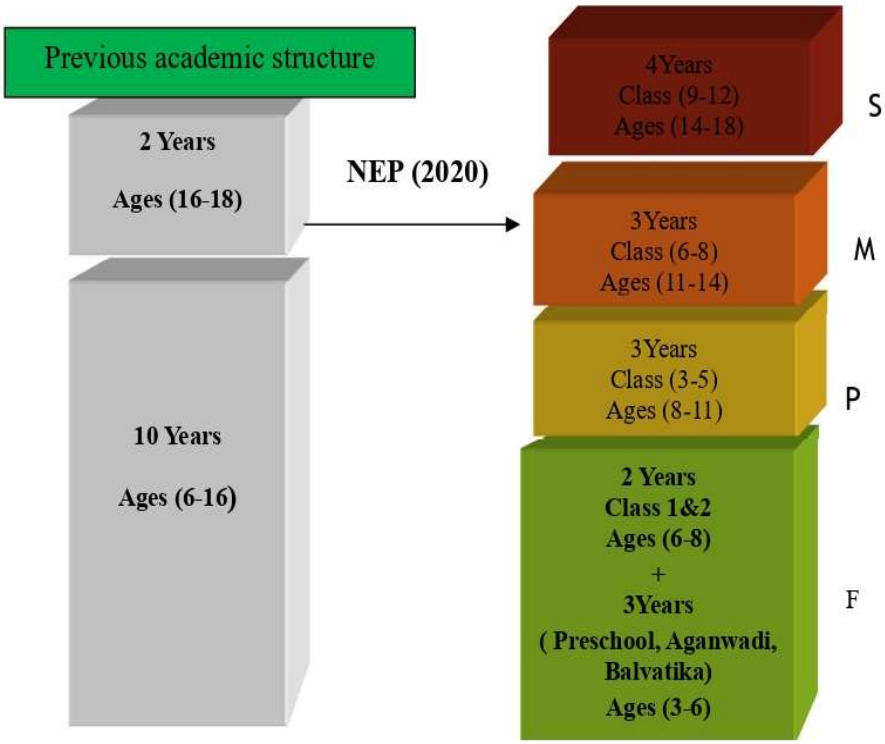


Figure1. Transformation of old education to new education system through National Education Policy 2020.

Part 2 of the policy concentrates on reforms in higher education, setting the direction for a more holistic and flexible academic environment. A **multi-dimensional approach to education**, integrating **multidisciplinary, vocational, and skill-based learning**, is being emphasized under the new framework. This includes the provision of **multiple entry and exit options at various academic stages**, supported by an **Academic Bank of Credits (ABC)** those records and retains students' academic credits. The **qualification types and credit structures** are systematically laid out in **Table 1,** incorporating the **Multiple Entry Multiple Exit (MEME)** framework. The proposed **four-year undergraduate programme** will be flexible and diverse in its structure. It may consist of the following components:

- A **major course** comprising **40–56 credits** (which can be disciplinary or interdisciplinary),

- A **minor course** of **20–28 credits** (also disciplinary or interdisciplinary),
- **Vocational education** ranging from **12–18 credits**

Table1. Credit framework distribution of the National Education Policy 2020.

Level	Qualification Title	Credit Requirement (Min -Max)	Semester	Year
5	UG-Certificate	36-40	I & II	1
6	UG- Diploma	72-80	III & IV	2
7	3Years Bachelor' Degree	108-120	V & VI	3
8	Bachelor' Degree (Honours /Research)	144-160	VII & VII	4
9	Master's Degree of 2 years	72-80	I , II, III, IV	-
9	Master's Degree of 1 year	36-40	I & II	-
10	Doctoral Degree	Minimum prescribed credits for course work and a thesis with published work		-

- **Field-based experiences** such **as projects, internships, apprenticeships, community engagement, or service**, contributing **24–32 credits**.

In alignment with the National Education Policy **(NEP) 2020,** students will be awarded appropriate **qualifications**—such as a certificate, diploma, or degree (with honours /research)—depending on the accumulated credits at the time of exit. These credits will remain valid for up to **seven years**, or as specified by the **University Grants Commission (UGC)** under the **Higher Education Regulations, 2021**.

Key objectives of **NEP 2020** in the domain of higher education include:

- Comprehensive **curriculum and pedagogical reforms,**
- Promotion of **multidisciplinary and multilingual education,**
- Emphasis on **institutional autonomy and good governance**, among other critical areas.

The key objectives of **NEP (2020)** are shown in various domains by the given **Figure 2**. These reforms aim to foster in students a **deep respect for constitutional values and fundamental duties,** nurture a **strong sense of national identity,** and promote **ethical consciousness and civic responsibility.** The overarching vision is to instill **pride in Indian heritage and values**—not only at the intellectual level, but also through attitudes, actions, and engagement—both within India and across the global Indian diasporas.

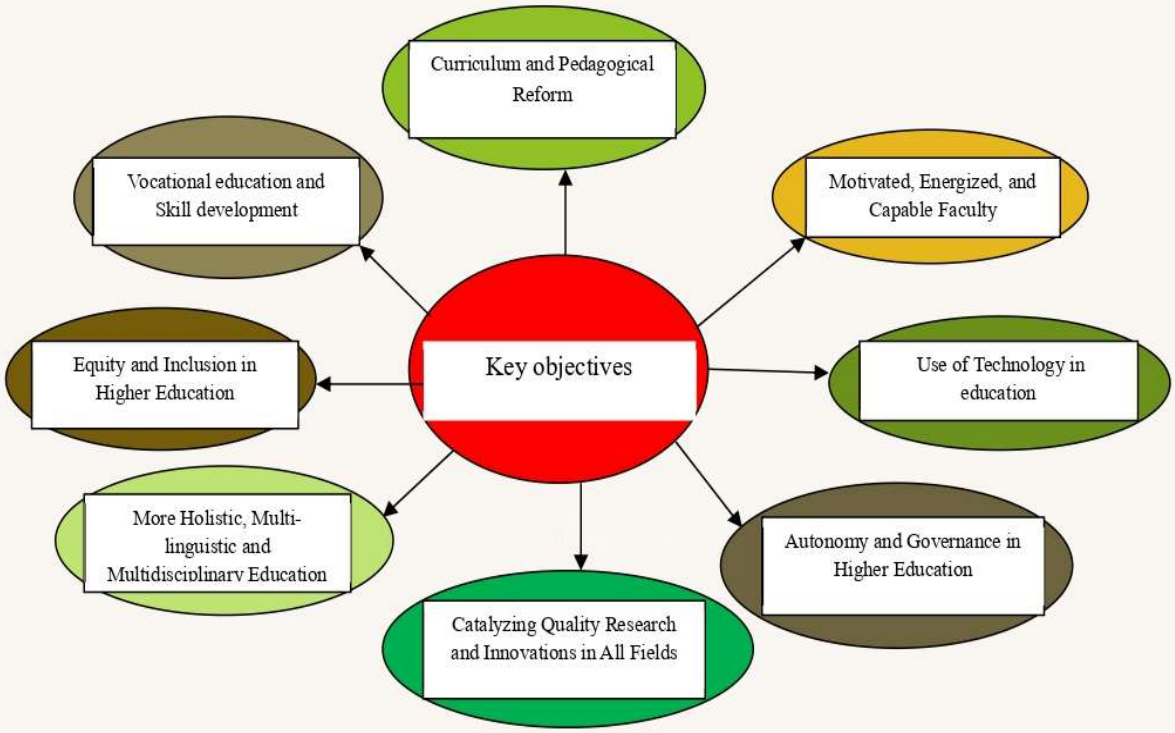


Figure2. Objective of National Education Policy 2020 for higher education

Conclusion:

This initiative marks a forward-thinking approach to reforming India's education system, aligning it with global standards. It emphasizes flexibility, multidisciplinary learning, multilingual proficiency, and a strong focus on skill development, foundational literacy, and advanced research. Its successful implementation has been made possible through the collective efforts of government bodies, educational institutions, educators, and students.

Name: Dr. Pankaj Kumar Gupta
Designation: Assistant Professor (MED)
Email id: pankaj.gupta@miet.ac.in

ERP Systems: Empowering Autonomous Educational Institutions

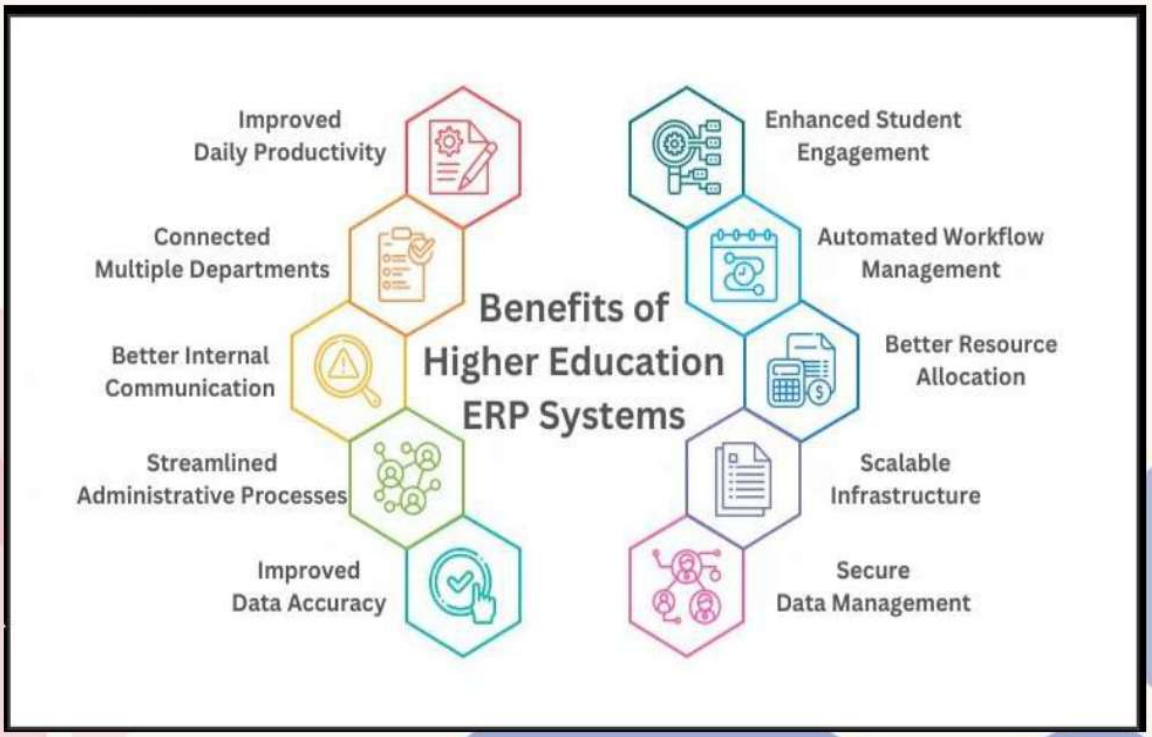
What is an ERP?

An ERP, which stands for Enterprise Resource Planning, is a comprehensive software solution designed to streamline and automate various business processes within an organization. Originally developed for the corporate world, ERP systems have found their way into the education sector due to their ability to enhance efficiency, reduce operational costs, and improve overall productivity.

What Is a Higher Education ERP System?

A Higher Education ERP system is a specialized ERP solution tailored to the unique needs and requirements of educational institutions. It encompasses various functions such as student management, staff administration, academic planning, financial management, and more. These systems are designed to simplify complex administrative tasks, improve communication, and provide real-time insights into an institution's operations.

In the evolving landscape of higher education, autonomous institutions are increasingly adopting Enterprise Resource Planning (ERP) systems to streamline operations, enhance decision-making, and ensure compliance with regulatory standards. These integrated platforms centralize administrative, academic, and financial processes, fostering a cohesive environment conducive to academic excellence.



Key Benefits of ERP in Autonomous Institutions

- **Centralized Data Management**
  ERP systems consolidate student records, faculty information, attendance, and financial data into a unified database. This centralization ensures real-time access to accurate information, facilitating informed decision-making and reducing data redundancy.
- **Automation of Administrative Processes**
  By automating tasks such as admissions, fee processing, timetable scheduling, and examination management, ERPs minimize manual errors and administrative workload. This automation allows staff to focus on strategic initiatives, thereby improving overall institutional efficiency .
- **Enhanced Communication and Collaboration**
  ERP platforms often include communication modules that enable seamless interaction among students, faculty, and administrative staff. Features like notifications, alerts, and messaging systems promote transparency and foster a collaborative academic environment.
- **Financial Management and Compliance**
  Managing finances in autonomous institutions is complex. ERP systems offer integrated tools for budgeting, payroll, fee collection, and financial reporting. These tools ensure transparency, facilitate compliance with regulatory requirements, and support data-driven financial planning.
- **Data-Driven Decision Making**
  With built-in analytics and reporting capabilities, ERP systems provide insights into student performance, resource utilization, and institutional effectiveness. This data empowers administrators to make proactive decisions aimed at continuous improvement and alignment with institutional goals.
- **Scalability and Customization**
  ERP solutions are scalable, accommodating the growth of institutions. They offer customizable modules that can be tailored to meet the specific needs of various departments, ensuring that the system evolves in tandem with the institution's objectives.
- **Conclusion**
  For autonomous institutions, ERP systems are more than just software solutions; they are catalysts for transformation. By integrating diverse functions into a single platform, ERPs enhance operational efficiency, support data-driven decision-making, and ensure compliance with regulatory standards. As educational institutions strive for excellence and autonomy, ERP systems play a pivotal role in shaping their future.

Madhur Kumar Dubey
(ERP Coordinator)
MIET, Meerut

Nature Inspired Engineering: Bio-mimicry

Bio-mimicry is an innovative approach that seeks sustainable solutions to human challenges by learning from nature's time-tested patterns and strategies. Simply put, it is the art of observing designs in nature and applying them to develop modern technologies.

A remarkable example comes from Japan, where engineers faced a challenge with the **Shinkansen (bullet train)**. The train was so fast that it produced a loud booming noise when entering tunnels. To solve this, engineers turned to nature for inspiration. They redesigned the nose of the train based on the **streamlined beak of the kingfisher bird**, which allows it to dive into water with minimal splash.

This simple yet brilliant redesign not only eliminated the noise problem but also made the train **10% faster** and **15% more energy-efficient**. It stands as a perfect example of how nature can inspire ground breaking engineering solutions.

I encourage our students to explore this exciting field of bio-mimicry, as it opens endless opportunities to design sustainable, innovative, and future-ready technologies by learning from nature itself.

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Exploring the Similarities between Thermodynamics and Heat & Mass Transfer

Abstract

Thermodynamics and heat and mass transfer are two fundamental subjects in mechanical and chemical engineering. While thermodynamics deals with the principles governing energy and its transformations, heat and mass transfer focus on the mechanisms by which energy and matter move from one region to another. At first glance, these disciplines may appear distinct—one rooted in laws of equilibrium and the other in transport processes. However, a closer examination reveals deep similarities in their governing principles, mathematical treatment, and physical interpretations. This article explores these parallels, highlighting how a unified understanding strengthens engineering applications.

Introduction

Thermodynamics is often regarded as the science of energy, describing how it is conserved, converted, and degraded in various processes. On the other hand, heat and mass transfer study the rates at which energy and matter migrate. Engineers frequently approach these subjects separately during academic training, yet real-world problems—from power plant efficiency to advanced material processing—demand their integration. Recognizing their similarities enhances both conceptual clarity and practical problem-solving.

Governing Principles: A Shared Foundation

1. Conservation Laws

- Thermodynamics is built on the first law (energy conservation) and second law (entropy production).
- Heat and mass transfer processes also follow conservation principles: conservation of energy (for conduction, convection, radiation) and conservation of species (for diffusion and convection of mass).In both cases, a balance approach is applied—what enters a control volume, what leaves, and what accumulates.

2. Driving Forces and Potentials

- In thermodynamics, heat flows because of temperature difference, and work results from pressure difference. In heat transfer, conduction is driven by temperature gradients (Fourier's law), while mass transfer is driven by concentration gradients (Fick's law).

Both phenomena can be generalized as: Flux $\propto$ Driving Force (Gradient of Potential).

Mathematical Analogies

The following equations demonstrate the structural similarities:

- Fourier's Law (Heat Conduction): $q = -k \, dT/dx$
- Fick's Law (Mass Diffusion): $J = -D \, dC/dx$
- Ohm's Law (Electrical Conduction): $I = -\sigma \, dV/dx$

These laws share the same mathematical form: a flux is proportional to a gradient of a potential. This reveals a deep analogy between heat, mass, and even momentum transfer (Newton's law of viscosity).

Entropy and Irreversibility

Both thermodynamics and transport processes emphasize irreversibility:
-Thermodynamics explains that all real processes increase entropy.
- Heat and mass transfer phenomena are inherently irreversible because gradients (temperature or concentration) spontaneously diminish over time, tending toward equilibrium.

Thus, entropy production is a common thread linking equilibrium thermodynamics with non-equilibrium transport.

Comparative Analogy Chart

Concept	**Thermodynamics**	**Heat & Mass Transfer**
Basis of Study	Energy transformations	Energy/mass transport mechanisms
Governing Law	1st & 2nd Laws of Thermodynamics	Fourier's, Fick's, Newton's Laws
Driving Force	Temperature/Pressure differences	Temperature & Concentration gradients
Focus	Possibility & Limits of processes	Rates of processes

Applications in Engineering

Energy Systems: Boilers, condensers, and turbines require thermodynamic cycle analysis (efficiency) as well as heat transfer analysis (heat exchangers). Material

Processing: Drying, distillation, and chemical reactors rely on both mass transfer (species diffusion) and thermodynamics (phase equilibrium).Modern Technologies: Fuel cells, batteries, and solar cells involve simultaneous consideration of thermodynamics, heat, and mass transport for optimal design. Environmental Engineering: Air pollution dispersion, climate control, and renewable energy systems all integrate both fields.

Conclusion

Thermodynamics and heat and mass transfer are not isolated subjects but complementary perspectives on energy and matter interactions. Thermodynamics sets the limits of possibility, while heat and mass transfer determine the rates at which processes occur. Their shared mathematical structure, common reliance on conservation principles, and unified treatment of irreversibility make them inseparable in practice. Recognizing these similarities not only enhances theoretical understanding but also leads to more effective engineering solutions in energy, environment, and manufacturing sectors.

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Green Hydrogen: The Fuel of the Future

In the era of rising energy demands and increasing concerns over climate change, the world is searching for sustainable alternatives to fossil fuels. Among the various clean energy solutions, **green hydrogen** has emerged as a promising candidate that can potentially revolutionize the global energy landscape.

What is Green Hydrogen?

Hydrogen is the most abundant element in the universe, but it does not exist freely in nature. It has to be extracted from compounds such as water or hydrocarbons. Depending on the method of production, hydrogen is classified as grey, blue, or green.

- **Grey Hydrogen** is produced from natural gas or coal, releasing carbon dioxide in the process.
- **Blue Hydrogen** is produced similarly but includes carbon capture and storage to reduce emissions.
- **Green Hydrogen** is produced using **electrolysis of water powered by renewable energy sources** such as solar, wind, or hydro. Since no greenhouse gases are released, it is the cleanest and most sustainable form of hydrogen.

Working Principle

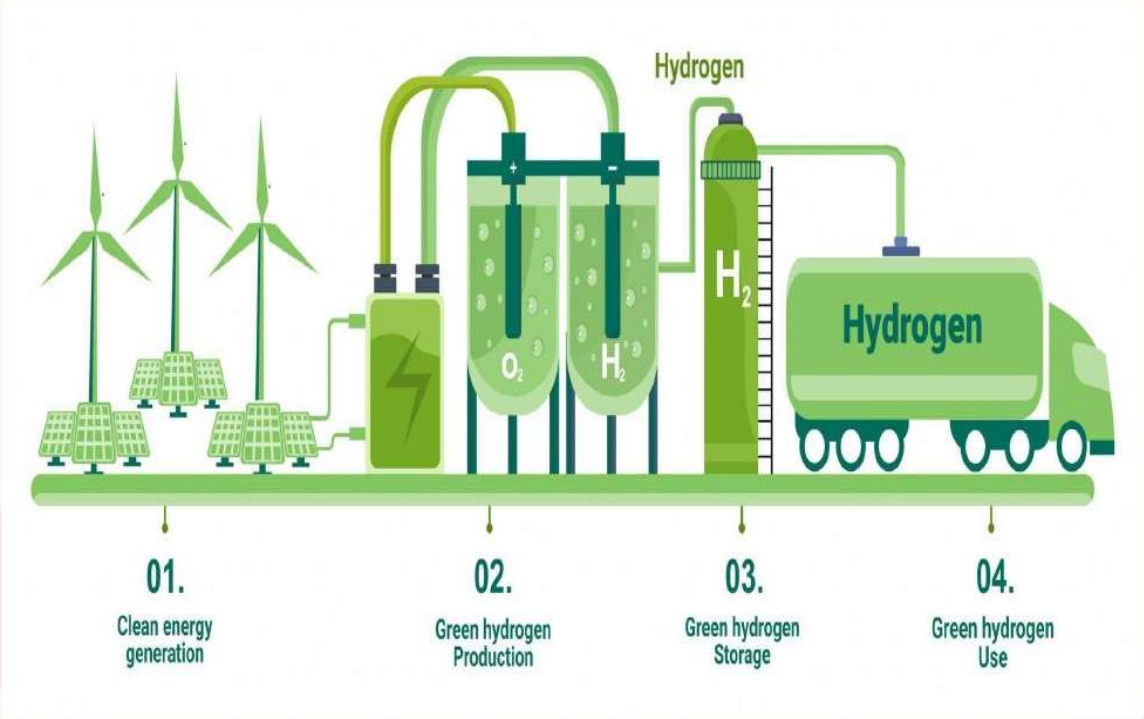
Green hydrogen is generated through the process of **electrolysis**. In this method, electricity from renewable sources splits water molecules into hydrogen and oxygen. The hydrogen obtained can then be stored, transported, and used as a fuel in various applications, while oxygen is released as a harmless by-product.

Applications of Green Hydrogen

1. **Transportation** – Hydrogen fuel cells can power cars, buses, trains, and even airplanes with zero tailpipe emissions.
2. **Industry** – Green hydrogen can replace fossil fuels in steel, cement, and chemical industries that require high temperatures.
3. **Energy Storage** – Hydrogen can act as a medium to store excess renewable energy, balancing supply and demand.
4. **Power Generation** – It can be used in gas turbines or fuel cells to produce electricity.

Advantages

- Zero greenhouse gas emissions.
- Can decarbonize hard-to-abate sectors like steel and cement.
- High energy density compared to batteries.
- Helps in achieving global net-zero targets.



Challenges

- High production cost due to expensive electrolyzers and renewable electricity.
- Lack of infrastructure for storage and distribution.
- Safety concerns related to hydrogen's flammability.
- Limited large-scale commercial deployment.

Future Prospects

With declining renewable energy costs and technological advancements, green hydrogen is expected to become more affordable and widespread in the coming decades. Many countries, including India, have launched **National Green Hydrogen Missions** to promote research, infrastructure, and industrial adoption. If supported by proper policies and investments, green hydrogen could become the backbone of a **carbon-free global economy**.

Conclusion

Green hydrogen stands as a beacon of hope in our fight against climate change. While challenges remain, its potential to reshape industries, power systems, and transportation networks is undeniable. The journey towards a sustainable future will not be easy, but green hydrogen promises to be a critical step forward in achieving energy security and environmental sustainability.

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Intellectual Property Rights (IPR): Safeguarding Creativity and Driving Innovation

In today's knowledge-driven world, ideas, creativity, and innovation are more valuable than ever before. Nations no longer rely only on natural resources or physical capital; instead, intellectual capital has become the foundation of growth and competitiveness. To protect this intellectual wealth, the concept of **Intellectual Property Rights (IPR)** plays a crucial role.

What is IPR?

Intellectual Property Rights refer to the legal rights granted to individuals or organizations over their creations or inventions. These rights ensure that the creator has control over the use of their intellectual output and prevents unauthorized exploitation by others. In simple terms, IPR acts as a shield that protects one's ideas, giving innovators the confidence to invest time, effort, and resources in developing new concepts.

Types of Intellectual Property Rights

1. **Patents:** Protect new inventions, processes, or products that are novel, useful, and non-obvious. For example, technological devices, machinery, or pharmaceuticals are often patented.
2. **Copyrights:** Provide protection to literary, artistic, and creative works such as books, music, films, software, and artworks.
3. **Trademarks:** Safeguard brand names, logos, symbols, and slogans that distinguish one product or company from another in the marketplace.
4. **Industrial Designs:** Protect the unique appearance, shape, or configuration of a product, giving it aesthetic value.
5. **Geographical Indications (GI):** Identify products that originate from a particular region and possess qualities or reputations specific to that area—for instance, Darjeeling Tea or Banarasi Sarees.
6. **Trade Secrets:** Protect confidential business information such as formulas, manufacturing techniques, or customer databases.

Why is IPR Important?

- **Encourages Innovation:** When creators know their ideas are protected, they are motivated to continue innovating.
- **Economic Growth:** Patents, trademarks, and copyrights foster entrepreneurship, boost industry, and open global market opportunities.

- **Employment Opportunities:** New industries and businesses built on intellectual property generate jobs and skill development.
- **Global Recognition:** Strong IPR policies give countries an international reputation for supporting creativity and technological advancement.
- **Cultural Preservation:** Copyrights and geographical indications also help safeguard cultural heritage and traditional knowledge.

Challenges in IPR

While IPR offers many benefits, it also faces certain challenges. Issues such as piracy, counterfeiting, patent infringement, and lack of awareness hinder its effective implementation. Moreover, in developing nations, balancing the rights of innovators with the needs of society such as access to affordable medicines remains a major concern.

The Indian Perspective

India has made significant progress in strengthening its IPR ecosystem. With updated patent laws, GI registrations, and awareness campaigns, India is encouraging startups, researchers, and entrepreneurs to protect their innovations. Initiatives like the **National IPR Policy (2016)** aim to create a holistic framework to foster creativity and innovation.

Intellectual Property Rights are not just legal safeguards but also engines of creativity, innovation, and economic growth. They empower individuals and organizations to transform ideas into reality while ensuring that the benefits of innovation are enjoyed by the rightful creators. In a rapidly globalizing world, respecting and strengthening IPR is the key to sustainable development and progress.

Mr. Shallender Singh Bhati

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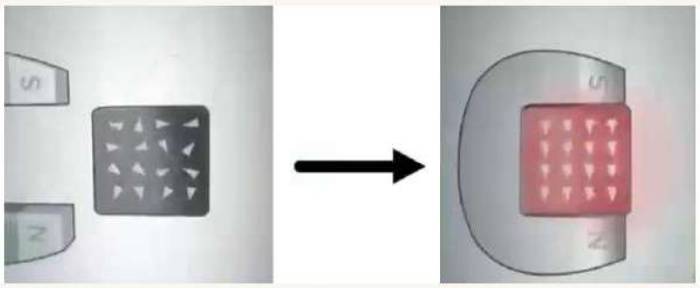
Magnetic Refrigeration: A Sustainable Cooling Technology

Magnetic refrigeration is emerging very rapidly in cooling technology at present that offers a more energy-efficient and environmentally friendly alternative to traditional gas-compression refrigeration. It is based on the **magnetocaloric effect (MCE)**, a phenomenon where a specific magnetocaloric materials heat up when exposed to a magnetic field and cool down when the field is removed. The refrigeration cycle begins by applying a magnetic field to a magnetocaloric material, which causes the material to warm up. The heat is then transferred to a heat sink. When the magnetic field is removed, the material cools down below its initial temperature and can absorb heat from the space that needs to be cooled. This process is repeated in cycles to maintain consistent cooling. It is a general way to move heat from hot to cold or from cold to hot. So, it can be applied to a wide range of cooling or heating applications, operating effectively from below -50°C to above +50°C.



Demagnetized and Magnetized position of material

Unlike conventional refrigeration methods that use harmful refrigerants like hydrofluorocarbons (HFCs), magnetic refrigeration employs solid-state magnetocaloric materials, making it an environmentally friendly superior cooling solution. Although magnetic refrigeration offers high initial investment but with no moving parts and the absence of compressors, it operates quietly and require significantly less maintenance, which results very less maintenance cost. The reliability and equipment lifespan is also better. Specialized technicians with gas handling training are no longer required for repairs or servicing.

Significant progress has been achieved but the industry is still working on scaling the production methods and improving material efficiency. So recent focus has been shifted from material discovery to practical manufacturing solutions. Furthermore, current dependence on Chinese permanent magnets has sparked innovation in alternative magnetic materials. New developments promise higher-performance, lower-cost permanent magnets that can be produced globally in coming years. The primary challenge lies in attracting investment to scale the technology and reduce costs. While initial costs may be higher than traditional cooling systems, the technology offers a competitive total cost of ownership with payback periods in future.

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Mechatronics:
Modern Engineering in Action

Mechatronics is where traditional mechanical engineering meets the fast-evolving worlds of electronics and computer control. This multidisciplinary field focuses on designing smart machines — from automated robots and drones to intelligent washing machines and cars with advanced safety features. By uniting sensors, actuators, and microcontrollers with mechanical design, mechatronics enables engineers to create products that are more efficient, flexible, and adaptable to changing needs.

Over the last few years, mechatronics has become essential for innovation in industries like manufacturing, healthcare, and transportation. As devices become more compact and intelligent, engineers skilled in both hardware and software are now leading the way toward a more automated and connected world. Whether it's designing a robotic hand or improving the efficiency of renewable energy systems, mechatronics is shaping the future of engineering today.

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Nanotechnology:
Changing the future at atomic Scale

Nanotechnology: Changing the Future at Atomic Scale

Nanotechnology is the science and engineering of manipulating matter at an atomic and molecular level, typically within the range of 1 to 100 nanometres. At this scale, materials behave differently from their larger counterparts, offering unique physical, chemical, and biological properties.

The potential of nanotechnology to transform industries is immense. In medicine, it enables targeted drug delivery systems, improved imaging, and early disease detection. In electronics, it contributes to faster, smaller, and more energy-efficient devices. Environmental applications include water purification, pollution control, and renewable energy solutions like more efficient solar panels.

Nanotechnology also plays a crucial role in materials science, creating stronger, lighter, and more durable materials used in construction, transportation, and sports equipment.

However, with great power comes responsibility. Ethical concerns, safety issues, and environmental impacts need careful consideration as nanotechnology advances.

In conclusion, by working at the atomic scale, nanotechnology is reshaping how we approach problems, innovate solutions, and create a sustainable future. It holds the promise of revolutionizing healthcare, energy, communication, and much more—truly changing the world, one atom at a time.

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Artificial Intelligence: Shaping the Future

Artificial Intelligence (AI) refers to the development of computer systems that can perform tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, speech recognition, and decision-making.

AI is transforming various fields such as healthcare, education, finance, and transportation. In healthcare, it helps diagnose diseases and personalize treatments. In education, AI-powered tools assist with learning and grading. In finance, it improves fraud detection and investment strategies, while in transportation, it plays a major role in self-driving cars and traffic management.

The benefits of AI are vast, including increased efficiency, accuracy, and innovation. However, it also raises concerns like job displacement, privacy issues, and ethical dilemmas.

As technology continues to evolve, AI is becoming an essential part of our daily lives. With responsible development and use, it has the potential to solve complex problems and create a smarter, more connected world.

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Plastic Fuel: Turning Waste into Energy

Plastic fuel is an innovative solution that transforms waste plastics into usable energy. Plastics, which take hundreds of years to decompose, pose a serious threat to the environment. By converting plastic waste into fuel, this technology helps reduce pollution while providing an alternative energy source.

The process, often called pyrolysis, involves heating plastic in the absence of oxygen to break it down into oil, gas, and other fuels. These fuels can be used in industries, transportation, and power generation, reducing reliance on conventional fossil fuels.

Plastic fuel offers a sustainable way to manage growing plastic waste while addressing energy shortages. However, it requires strict regulations and proper handling to avoid harmful emissions. Overall, plastic fuel is a promising step towards a cleaner environment and a more resource-efficient future, making waste a valuable asset rather than a burden.

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Robotics and Automation: Transforming Industry and Everyday Life

Robotics and automation are rapidly changing the way we live and work. Robotics involves designing and using machines that can perform tasks automatically, while automation refers to using technology to control processes without constant human intervention.

These technologies are widely used in industries like manufacturing, healthcare, agriculture, and logistics. Robots can assemble products, assist in surgeries, monitor crops, and handle heavy materials, improving efficiency, precision, and safety.

Automation helps reduce human error, lower costs, and increase productivity. It also allows people to focus on more creative and complex tasks by handling repetitive or dangerous jobs.

While robotics and automation bring many benefits, they also raise concerns about job displacement and ethical issues. Proper planning, training, and regulation are essential to ensure these technologies are used responsibly.

In summary, robotics and automation are driving innovation and efficiency across sectors, shaping a smarter and more advanced future.

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Aerospace Engineering and Aerodynamics: Exploring the Skies

Aerospace engineering is the branch of engineering that focuses on the design, development, and testing of aircraft, spacecraft, and related systems. It plays a vital role in advancing transportation, defence, and space exploration.

Aerodynamics, a key part of aerospace engineering, is the study of how air flows around objects like airplanes and rockets. Understanding airflow helps engineers design shapes that reduce air resistance, improve fuel efficiency, and enhance stability and safety.

With innovations in materials, propulsion systems, and control technologies, aerospace engineering has enabled faster, safer, and more efficient flight. From commercial jets to satellites and space missions, its applications are transforming how we travel and explore the universe.

Aerospace engineering and aerodynamics together are pushing the boundaries of technology, opening up new possibilities for global communication, defence, and space discovery, and shaping the future of human advancement.

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Additive Manufacturing and 3D Printing

Additive Manufacturing (AM), commonly known as 3D Printing, is a revolutionary technology that builds objects layer by layer from digital designs. Unlike traditional manufacturing methods, which involve cutting, drilling, or moulding materials, additive manufacturing adds material only where it is needed. This process enables the creation of complex and customized parts with high precision and minimal waste.

3D printing has transformed industries such as aerospace, healthcare, automotive, and consumer goods. It allows rapid prototyping, reducing product development time and costs. In healthcare, 3D printing is used to create custom implants, prosthetics, and even tissue scaffolds. In aerospace and automotive sectors, lightweight and strong components are produced to enhance efficiency and performance.

As the technology advances, it continues to shape the future of manufacturing by promoting sustainability, personalization, and innovation. Additive manufacturing is no longer limited to prototypes—it's now playing a critical role in full-scale production and transforming the way products are designed and made.

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Energy Systems and Sustainability

Energy systems are the networks and technologies that produce, distribute, and use energy in various forms like electricity, heat, and fuel. Ensuring that these systems are sustainable is essential for protecting the environment, supporting economic growth, and meeting the needs of future generations.

Sustainable energy systems focus on using renewable sources such as solar, wind, hydro, and biomass, which produce little or no greenhouse gas emissions. These systems also aim to improve energy efficiency, reduce waste, and lower the dependence on fossil fuels.

Adopting sustainable energy solutions helps combat climate change, conserve natural resources, and promote clean air and water. It also supports innovation, creates jobs, and encourages responsible consumption.

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