



BBDNIIT

Babu Banarasi Das Northern India Institute of Technology



MECHDRISHTI

2023 - 24

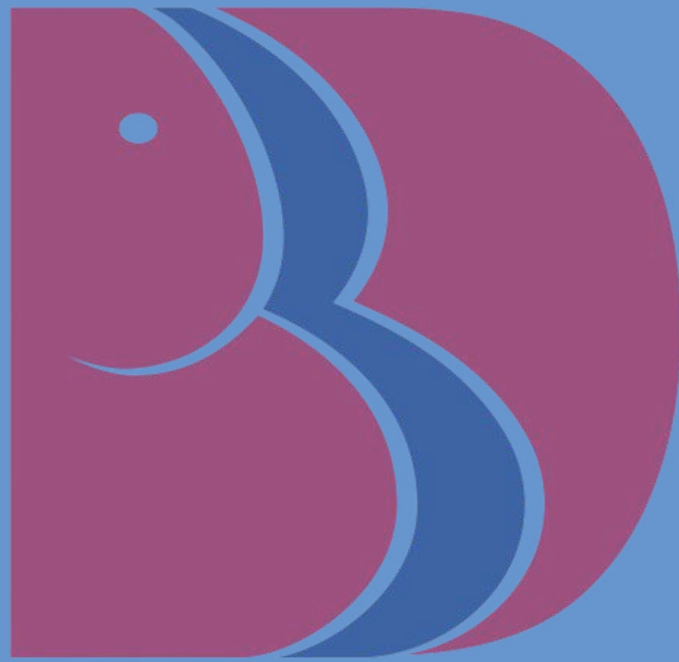
MECHANICAL ENGINEERING DEPARTMENT



Babu Banarasi Das Northern India Institute of Technology

Sector-II, Dr. Akhilesh Das Nagar, Ayodhya Road, Lucknow (U.P.) - 226028, India

Ph.: +91-(522)-6196222/6196223/6196336/Website: www.bbdniit.ac.in/Email: info@bbdniit.ac.in



BBDNIIT

LORD GANESHA'S GRACE

The BBD Campus proudly houses a beautiful Ganesh temple, a spiritual haven that infuses the college with a profound sense of serenity and purpose. The temple's presence on campus is more than just a place of worship; it symbolizes a bridge between the academic and the divine, offering students a space to connect with their spirituality amid their educational journey.

Ganesh Ji, the revered remover of obstacles and the harbinger of wisdom and prosperity, holds a special place in Hindu tradition. His temple at BBD Campus stands as a testament to these values, providing students with a sanctuary where they can seek blessings, reflect, and find solace during their studies. The essence of the temple extends beyond its physical structure, permeating the entire campus with a spirit of peace and positivity.

For many students, college life is a time of immense growth, but it also comes with its share of challenges and uncertainties. The Ganesh temple offers a reassuring presence, reminding students that they are not alone in their journey. It encourages them to pause, pray, and draw strength from their faith, fostering a holistic approach to education that nurtures both the mind and the soul. The act of worshipping together also fosters a sense of community, as students from diverse backgrounds come together in shared reverence, strengthening their bonds and promoting a culture of mutual respect and support.

The choice of a Ganesh temple specifically holds deep significance. Lord Ganesh, revered as the deity of beginnings, is invoked at the start of new ventures to ensure success and remove obstacles. For students embarking on their academic journey, seeking Ganesh's blessings can be a source of immense comfort and confidence. His wisdom and benevolence inspire students to pursue their goals with determination and integrity, knowing they have divine support.

Moreover, the Ganesh Ji temple at BBD Campus serves as a reminder of the cultural and spiritual heritage that underpins our education system. It encourages students to value and preserve these traditions, recognizing that true education encompasses not just intellectual growth, but also moral and spiritual development.

BABU BANARASI DAS JI



Late Babu Banarasi Das Ji
(1912 – 1985)
Ex Chief Minister
Govt. of Uttar Pradesh

“To provide an open opportunity to the young generation for evolving their core competencies and to build their career as world class professionals with broad based foundation, in-depth knowledge & versatile personality to meet the challenges of Global Economy...” – Babu ji’s Vision.

Babu Banarasi Das Ji, a born nationalist, in his early youth, joined hands with Mahatma Gandhi & Jawahar Lal Nehru in the movement to free India from the clutches of British rule.

During his long political career, he worked as a Minister, Speaker and Member of Parliament (both Lok Sabha and Rajya Sabha). He also held the position of the Chief Minister of Uttar Pradesh. His entire life was devoted to secure the dignity of individuals through selfless service to mankind. He was a humanitarian who enabled people to realize their goals. He never believed in surrendering to any forces. Even in the face of death, he would not give in. “Man doth not yield himself to angels, not even unto death, utterly, saved, by the weakness of his feeble will.” Babuji always led and inspired people through his own example, leaving behind a legacy for future generations. We are privileged to inherit that legacy and perpetuate his memory.

AKHILESH DAS GUPTA JI



LATE DR. AKHILESH DAS GUPTA

MBA, LLB, Ph.D.

Ex-Member of Parliament (Rajya Sabha)

Hon'ble Founder Chairman, BBD Group

"We not only make technocrats at BBD, we churn out citizens of the world, perfect in all respect in all respects, be it leadership, competence, confidence, communication, moral or knowledge..." – Akhilesh Das Gupta's Vision.

A distinguished political leader, philanthropist, educationist and social worker, Dr. Akhilesh Das is the pride of Lucknow city. He has established himself as a worthy son of his illustrious father Late Babu Banarasi Das Ji.

Public Life

He has obtained MBA, LLB & Ph.D.(Human Resource Management)degrees, Dr. Akhilesh Das decided to follow his father's footprints by choosing Social Service as his primary goal. In his distinguished public life spanning well over three decades, Dr. Das was first elected as the Mayor of Lucknow in year 1993 and became one of the youngest Mayors of the world. Subsequently, he was elected as a Member of Parliament (Rajya Sabha) in November 1996 and was re-elected for a second term in November 2002 till November 2008. Dr. Das has been elected again as a Member of Parliament (Rajya Sabha) for a third consecutive term in 2008 till 2014.

Dr. Das has been a member of many important parliamentary committees and National level apex advisory & statutory bodies including the AIMS. He has been a member of the Executive Committee of AICTE. He had been the Chairman Parliamentary Standing Committee for Industries. He also served with distinction as the Union Minister of State for Steel and made a place for himself as one of the foremost National leaders.

Contribution To Sports

Dr. Akhilesh Das is an enthusiastic sports person. He underwent an exhaustive training in England as a Junior Badminton player. Later, he represented and captained the U.P. State Badminton team for many years and won many National & International tournaments including the National Doubles Championship. His love for other sports is no less. He has been instrumental in organizing and facilitating many National level tournaments in various sports. Presently he is the president of the U.P. Olympic Association & Chairman of Badminton Association of India.

Contribution To The Cause Of Education

As a social thinker, Dr. Das realized the need of Quality Technical & Professional education for the overall growth and upliftment of the masses and development of the State of Uttar Pradesh. Accordingly, Babu Banarasi Das Educational Society (BBDES) was founded through which the torch for higher professional education was lit in Lucknow, the Capital of U.P. The first institution in the series, Babu Banarasi Das National Institute of Technology & Management (BBDNITM) was established in 1998.

Travels And Experiences

He has travelled extensively to U.K., U.S.A., Japan, France, Switzerland, Spain, Portugal, Sao Paulo etc. on several occasions. Dr. Das has attended several World Seminars and Conferences including UNO sponsored Conference of Mayors (Japan) in 1993 and UNCTAD XI Conference (Brazil) in 2004. As the Mayor of Lucknow, he attended the International Children's Game held in Canada in 1994 and led the Indian Badminton Team as its Chief-de-Mission at the Athens Olympics in August 2004. Dr. Das also led a team of academicians to various European countries to study their education systems in the year 2002.

AKHILESH DAS GUPTA JI

ALKA DAS GUPTA JJ



MRS. ALKA DAS
M.B.A., L.L.B.
Chairperson, BBD Group

A lady with spirit, determination and zeal, Mrs. Alka Das has been the driving force behind her husband Dr. Akhilesh Das. She is the daughter of Late Justice D. P. Gupta, who held high positions in the State of Rajasthan, as its Governor and Chief Justice. She was brought up on Gandhian ideals and philanthropic traditions.

Mrs. Das is a Management expert and a legal luminary who has a long involvement with issues of social justice and women empowerment in our country. She is a legal consultant to several reputed organizations and an active Social Worker. She is connected with many National Social & Educational Organizations. She is also a Life Member of the "Rajasthan High Court Bar Association". The establishment of Northern India Engineering College, Lucknow was an initiative taken by her to provide quality professional education to match the International Standards.

She has travelled extensively to countries like Denmark, Italy, Japan, France, Switzerland, UK and USA to study the pattern of education and facilities provided to the students there. As a Co-founder of Babu Banarasi Das Group of Educational Institutions, Mrs. Das has made a fertile attempt to nurture a generation of self-made and highly motivated students with an inbuilt commitment to do something constructive for the Country

VIRAJ SAGAR DAS JJ



Mr. Viraj Sagar Das
B.A LL.B (Hons.),
Advocate
President, BBD Group

"Education is the most powerful weapon which you can use to change the world"

- Nelson Mandela

Babu Banarasi Das University has its roots lying deep in quality education practices that equip each student with broad outlooks to prepare them for this futuristic world. We are committed to providing the education that fulfils the needs of today's world. Today, education is not limited to textbook courses and their practical implementation. Education has been through a major transformation where apart from the syllabus, it has become imperative to inculcate some extra skills in the students so that they could truly succeed in their lives. We encourage our students to perform well in their academics and also to take active participation in all the co-curricular activities to develop interpersonal skills, take up challenges, be self-dependent and most importantly, have a good time while learning.

To quote Dr. A.P.J.Abdul Kalam, "Learning gives creativity, creativity leads to thinking, thinking provides knowledge, and knowledge makes you great".

DIRECTOR'S MESSAGE



Prof. (Dr.) V. K. Singh
Director (Engg.), BBDNIIT, Lucknow

Dear Readers,

"Education is the most powerful weapon which you can use to change the world."
– Nelson Mandela

It gives me immense pleasure to introduce our Mechanical Engineering Departmental college magazine at Babu Banarasi Das Northern India Institute of Technology (BBDNIIT), Lucknow. Since its inception, BBDNIIT has been committed to providing quality technical education and developing competent technocrats who are socially sensitive and committed to excellence on a global scale.

For over 17 years, BBDNIIT has stood as a beacon of academic excellence and innovation in the field of engineering. Our esteemed faculty, state-of-the-art infrastructure, and rigorous academic processes are all geared towards nurturing talent and fostering an environment of growth and learning.

In this magazine, you will find a vibrant showcase of the creativity, dedication, and hard work of our students and faculty. It reflects the dynamic and inclusive community we have cultivated, where every student is encouraged to pursue their passions and excel both academically and personally. Our systematic teaching-learning process prepares students for the challenges ahead, equipping them with the knowledge, skills, and ethical values necessary to make significant contributions to society.

The global technology landscape is evolving rapidly, and to remain competitive, our students must be prepared to face new challenges head-on. BBDNIIT is dedicated to training students to meet these challenges with confidence and competence. We continue to strive for excellence in professional education, aiming for new heights and fostering a thinking, professional order.

I encourage all students to make the most of their time with our dedicated faculty and staff, to develop their proficiency, and to grow both personally and professionally. The doors of our faculty members are always open for guidance and support.

With best wishes for your continued success and growth.

HOD'S MESSAGE



Prof.(Dr.) N. K. Mishra
Head of department

Dear Readers,

"Education is the most powerful weapon which you can use to change the world."
– Nelson Mandela

It is an honor to share my thoughts with you in this edition. The sustained growth and prominence of our college are reflections of our collective endeavor; every one of us has played an instrumental role in shaping the legacy of excellence we share today.

It is highly encouraging to observe the faculty's unwavering commitment to academic enrichment, as evidenced by their continuous organization of conferences, training programs, and workshops. Additionally, the strategic implementation of expert lectures across various departments plays a crucial role in maintaining our alignment with cutting-edge developments in science and technology.

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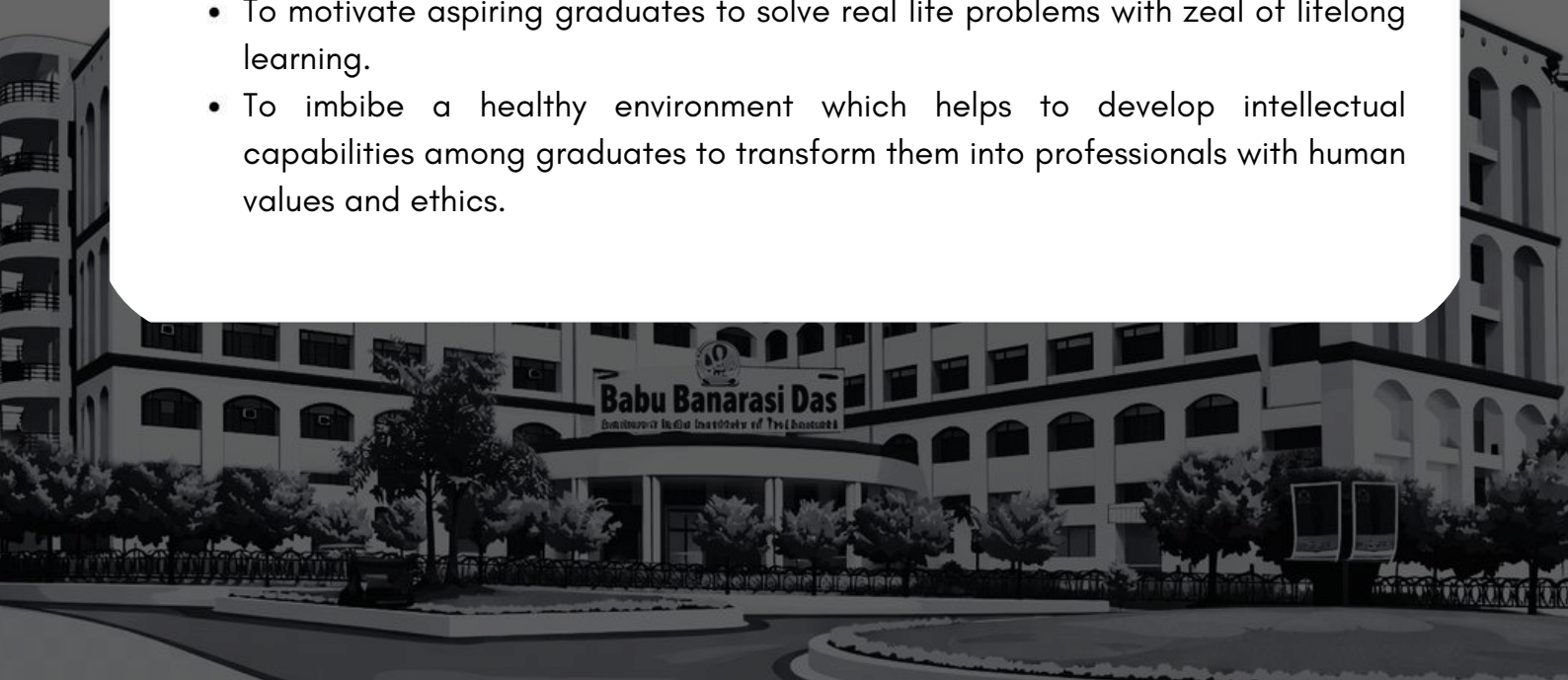
Institute Vision

To establish a multi-disciplinary environment with excellence in technical education and research for developing competent professionals who meet the challenges of industrial and societal development with human values and ethics.



Institute Mission

- To provide an excellent environment with supporting infrastructure to prepare globally competent professionals acceptable to industry and society.
- To inculcate a spirit of research, innovation and entrepreneurship by exposing multi-disciplinary approach.
- To motivate aspiring graduates to solve real life problems with zeal of lifelong learning.
- To imbibe a healthy environment which helps to develop intellectual capabilities among graduates to transform them into professionals with human values and ethics.





Department's Vision

To be a leading center in Mechanical Engineering by providing value-based quality education that nurtures competent, versatile, and entrepreneurial professionals capable of excelling at the global level.

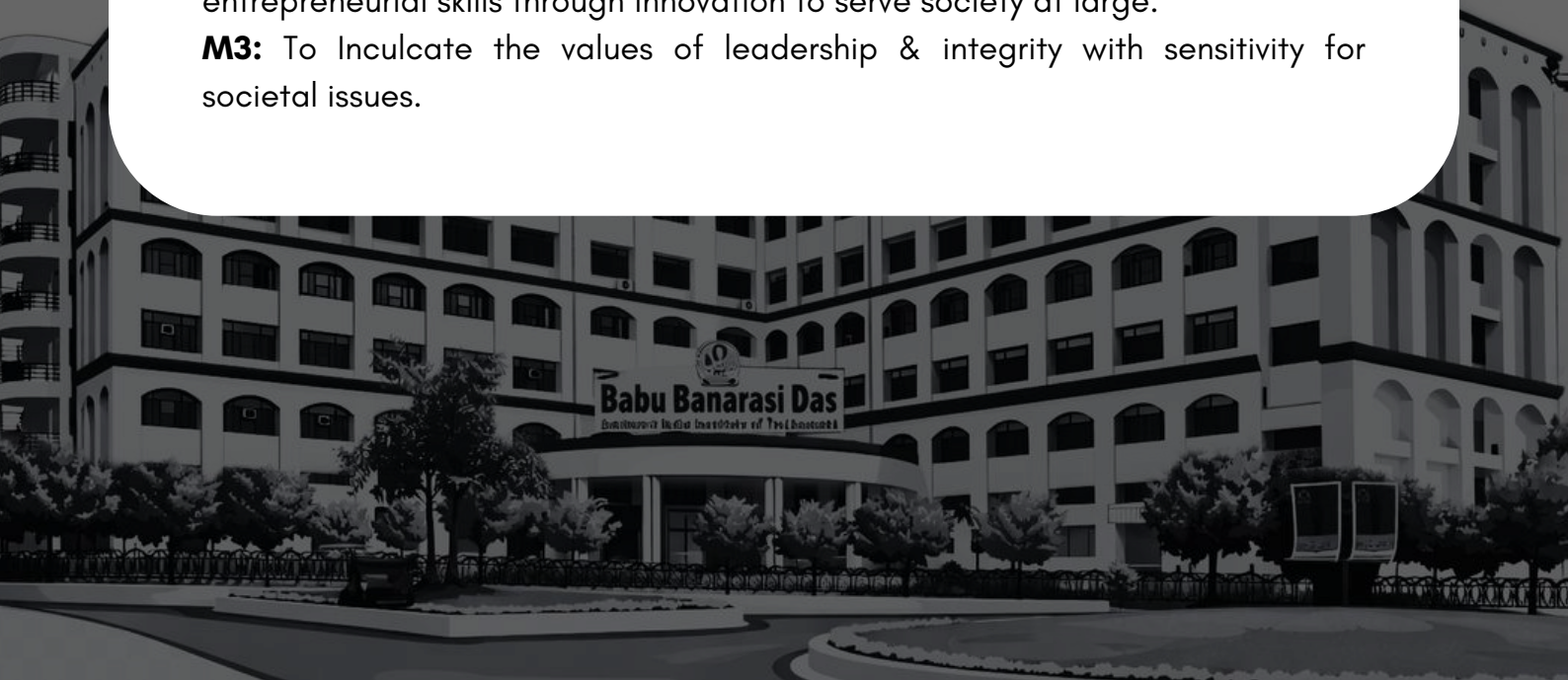


Department's Mission

M1: To deliver quality education using cutting edge infrastructure for producing competent professionals.

M2: To encourage students to pursue higher education and explore entrepreneurial skills through innovation to serve society at large.

M3: To inculcate the values of leadership & integrity with sensitivity for societal issues.



PROGRAMME OUTCOMES

Program Outcomes (POs)

PO1: Engineering knowledge:

- Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis:

- Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions:

- Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex 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.

PO5: Modern tool usage:

- Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society:

- Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PROGRAMME OUTCOMES

PO7: ENVIRONMENT AND SUSTAINABILITY:

- Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: ETHICS:

- Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: INDIVIDUAL AND TEAM WORK:

- Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: COMMUNICATION:

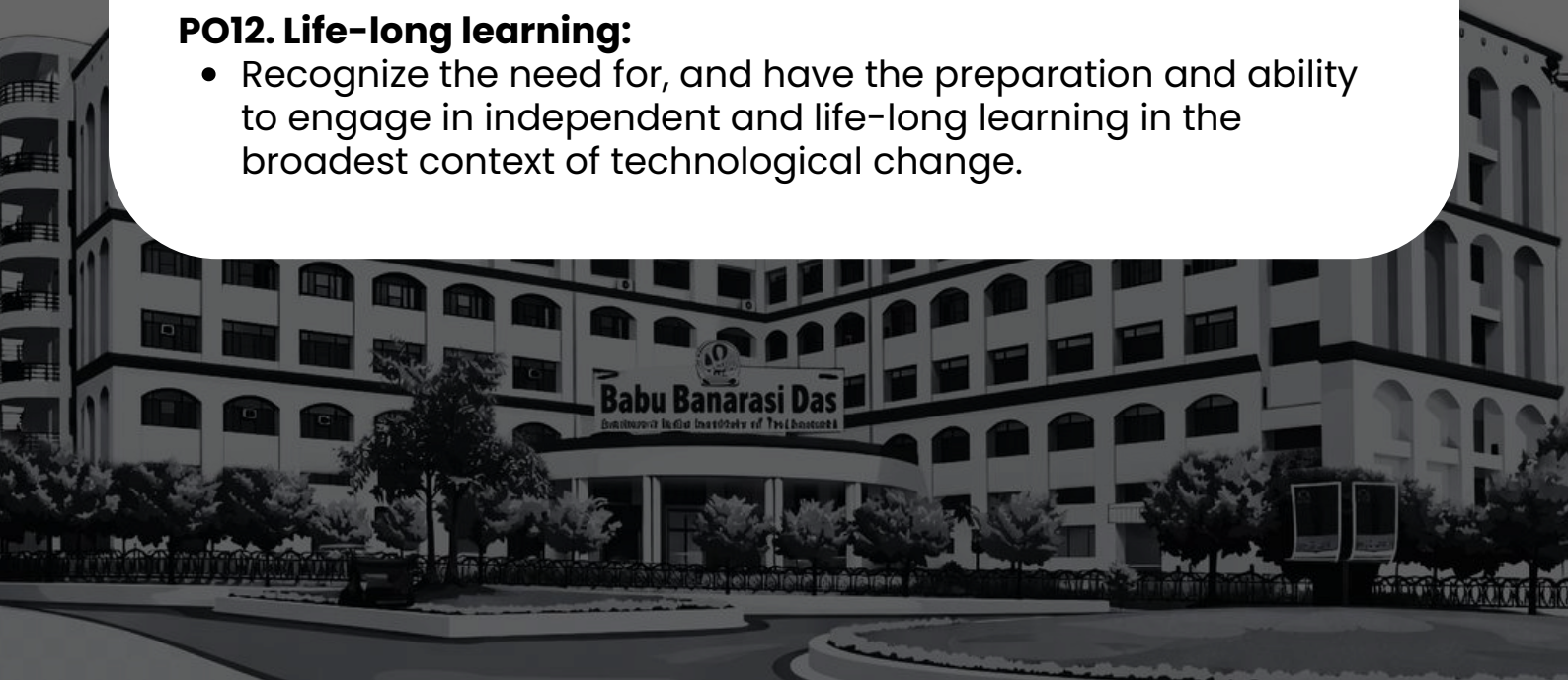
- Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: PROJECT MANAGEMENT AND FINANCE:

- Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning:

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



PROGRAMME EDUCATIONAL OBJECTIVES

Program Educational Objectives (PEOs)

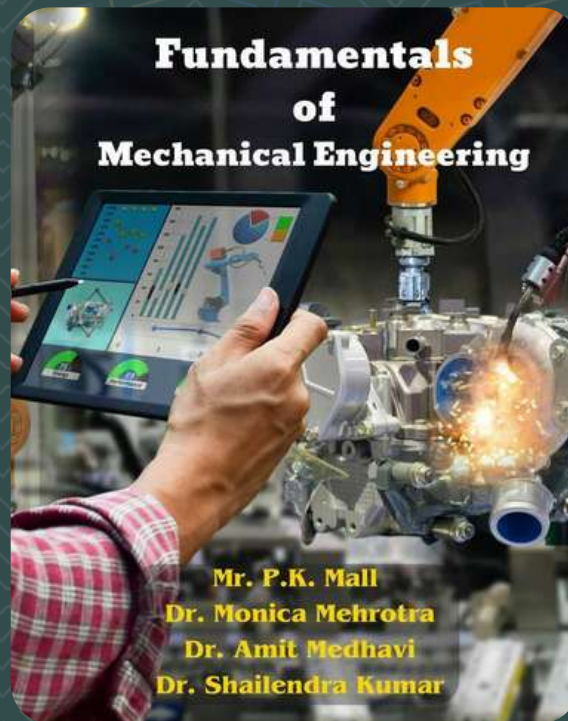
- **PEO 1:** Graduates will be able to apply domain knowledge for employment, advanced studies, entrepreneurial activities and for facing challenges in professional life.
- **PEO 2:** Graduates will exhibit professionalism through effective communication skills, ethical values, and social responsibility.
- **PEO 3:** Graduates will demonstrate team spirit and leadership qualities and engage in lifelong learning to contribute to nation-building.

PROGRAMME SPECIFIC OUTCOME

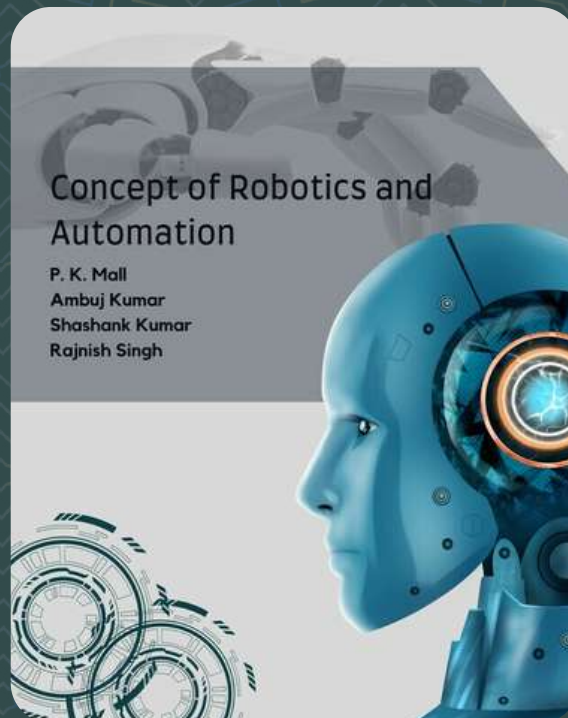
Program Specific Outcomes (PSO)

- **PSO-1:** Graduates will be able to apply the fundamentals of thermal engineering, production engineering, and design engineering to provide solutions in the field of Mechanical Engineering and interdisciplinary areas.
- **PSO-2:** Graduates will have the ability to develop advanced mechanical systems and processes using tools of Mechanical Engineering for practical applications.

Our Published Books

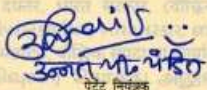


Author: Dr. P.K. Mall
ISBN: 9789359113722



Author: Dr. P.K.Mall
ISBN13:9789359115795
& 9359115797

Our Patent

 INTELLECTUAL PROPERTY INDIA REGISTERED TRADEMARKS GEOGRAPHICAL INDICATIONS	 सत्यमेव जयते	क्रम सं./SL No.:011226574 
पेटेंट कार्यालय, भारत सरकार The Patent Office, Government Of India		
पेटेंट प्रमाण पत्र Patent Certificate		
(पेटेंट नियमावली का नियम 74) (Rule 74 of The Patents Rules)		
पेटेंट सं. / Patent No.	581268	
आवेदन सं. / Application No.	202311018317	
फाइल करने की तारीख / Date of Filing	17/03/2023	
पेटेंटी / Patentee	1.P. K. Mall 2.Dr. Amit Medhavi 3.Dr. Monica Mehrotra 4.Shailendra Kumar	
प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में यथाप्रकटित ADAPTABLE WALKING ASSISTIVE DEVICE नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख मार्च 2023 के सत्रहवें दिन से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है। It is hereby certified that a patent has been granted to the patentee for an invention entitled ADAPTABLE WALKING ASSISTIVE DEVICE as disclosed in the above mentioned application for the term of 20 years from the 17th day of March 2023 in accordance with the provisions of the Patents Act, 1970.		
अनुदान की तारीख Date of Grant	23/02/2026	
		
 पेटेंट नियंत्रक Controller of Patents		
टिप्पणी - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, मार्च 2025 के सत्रहवें दिन को और उसके परवर्ती प्रत्येक वर्ष में उसी दिन देय होगी। Note. - The fees for renewal of this patent, if it is to be maintained, will fall / has fallen due on 17th day of March 2025 and on the same day in every year thereafter.		
*यदि पेटेंटी व आविष्कारकों की संख्या अधिक है, पेटेंटी व आविष्कारकों के नाम एक संख्या 2 पर जारी हैं। *Since the Number of Patentees / Inventors is more, the name of Patentees / Inventors are continued on Page No. 2		

Departmental Events & Seminars

Swachh Bharat Mission



BBDNIIT[AKTU College Code: 056] has organized activity under Swachh Bharat Mission on October 01, 2023.

Induction and Orientation



- Organised by the Technical committee to enhance students's interest in IoT and robotics.
- The program provided students with hardwares so that they can learn and perform task.

Internal Hackathon for SIH 2023



- BBDNIIT conducted an internal hackathon to select top talent for the Smart India Hackathon (SIH) 2023. The event encouraged students to
- develop creative solutions for real-world problems under the MoE's Innovation Cell initiative.

Industrial Visit



BBDNIIT-Industrial Visit to Britannia Industries Limited for BTech Mechanical Engineering & Electrical Engineering Students organized on Dec 13, 2023

Gears, Grid, and Generative Design: Mechanical Engineering in the AI Era

The scent of machine oil and the heavy hum of lathes once defined the quintessential mechanical engineering experience. For decades, the discipline was proudly and exclusively tangible. You could see the gears mesh, feel the heat of thermodynamics, and measure the physical strain on a load. But as a B.Tech student navigating the modern engineering landscape, I can tell you that the defining sound of our workshops is changing. The heavy machinery is still there, but it is increasingly accompanied by the quiet, relentless processing of artificial intelligence.

We are standing at a fascinating crossroads in engineering education. The syllabus that trained the minds behind the industrial revolution is undergoing its own radical upgrade. Today, thermodynamics, kinematics, and fluid mechanics are no longer standalone subjects; they are foundational datasets waiting to be optimized by algorithms.

Consider the design process. Historically, students spent hours hunched over drafting tables, and later CAD software, iterating designs through trial and error. Now, AI-driven generative design has flipped the script. We input the constraints—material properties, weight limits, load-bearing requirements—and the AI generates hundreds of optimal designs in minutes. Many of these solutions look more like organic bone structures than traditional manufactured parts. Education is rapidly shifting from teaching us how to draw the part to teaching us how to set the parameters and critically evaluate the AI's solutions.

This raises a vital question in lecture halls: if AI can design, simulate, and predict failures, what is the role of the modern mechanical engineer?

The answer lies in synergy, not replacement. AI is brilliant at pattern recognition and rapid iteration, but it lacks physical intuition. It doesn't understand the real-world grit of manufacturing tolerances, the chaotic unpredictability of physical deployment, or the subtle nuances of material fatigue in untested environments. Therefore, our education is evolving to create hybrid problem-solvers. We are still rigorously trained in the fundamental laws of physics—because you cannot train a machine learning model on fluid dynamics if you do not fundamentally understand Navier-Stokes equations yourself. But we are also learning to write code, build neural networks, and integrate sensors into physical prototypes. We are learning to treat AI as a collaborator.

Predictive maintenance is a perfect example of this fusion. Instead of learning just how a gearbox fails, we are learning how to deploy IoT sensors to monitor vibrations and train AI models to predict a failure weeks before a human ear could catch the grinding sound. The wrench and the algorithm are becoming inseparable tools.

For engineering faculties, the challenge is immense. They must bridge the gap between traditional mechanical theory and cutting-edge computer science without overloading the curriculum. For us students, it means embracing a steeper, broader learning curve. We can no longer afford to be purists. The mechanical engineers of tomorrow will not just design engines or turbines; they will design intelligent physical systems that teach themselves to run more efficiently.

The age of AI is not the end of traditional mechanical engineering—it is its most exciting renaissance. The grease on our hands might be metaphorical now, replaced in part by lines of Python, but the core mission remains unchanged: building robust, efficient systems that move the world forward. Only now, the world is moving much faster, and our tools have finally learned to think alongside us.

*Author: Dr. Nagendra Kumar Mishra
Professor and Head of Dept.
Mechanical Engineering*

Closing the Loop: How Mechanical Engineering is Driving the Circular Economy

The industrial revolution was built on a remarkably straightforward, yet ultimately flawed, premise: extract resources, build products, use them until they break, and throw them away. For over a century, mechanical engineering was the undisputed engine of this **"take-make-dispose"** model. We mastered mass production, rapid assembly, and economies of scale. But today, standing on the precipice of resource scarcity and environmental crisis, the old paradigms are failing. The future of our discipline no longer lies solely in how efficiently we can build things, but in how we sustain, reuse, and eventually un-build them. Welcome to the era of green manufacturing and the circular economy.

The transition to a circular economy does not begin on the factory floor; it starts on the engineer's drafting screen. Historically, consumer and industrial products were often designed for permanent assembly—welded shut, heavily glued, and essentially impossible to repair without destruction. Today, mechanical engineers are pioneering **"Design for Disassembly" (DfD)**. We are replacing permanent welds with modular fasteners, utilizing standardized joints, and creating accessible architecture. The goal is to design products that can be effortlessly taken apart at the end of their primary lifecycle, allowing core components like actuators, gears, and micro-compressors to be harvested and reused. This shift requires a fundamental reimagining of materials, heavily prioritizing alloys and polymers that maintain their structural integrity through multiple lifecycles.

But smarter design is only half the battle. Green manufacturing is radically transforming the physical act of creation. We are slowly pivoting away from traditional subtractive manufacturing—where a block of metal is aggressively machined down, generating heaps of scrap—toward additive manufacturing. Industrial 3D printing allows us to build complex, lightweight topologies using only the exact amount of material required. Furthermore, modern factory floors are being rigorously optimized for energy efficiency. Engineers are retrofitting legacy equipment with smart sensors and automated drives, ensuring industrial machines draw heavy power only when actively doing work. We are also closing the loop on resources within the plant itself, designing closed-loop fluid systems and recovering waste heat to power secondary manufacturing processes.

Perhaps the most exciting frontier for the modern mechanical engineer is remanufacturing. It is important to distinguish this from simple recycling, where materials are melted down at an exceptionally high energy cost. Remanufacturing involves taking a severely worn product—such as a heavy-duty diesel block or an industrial wind turbine gearbox—tearing it down to its bare components, cleaning, re-machining, and rebuilding it to meet or exceed its original factory specifications. Mechanical engineers are developing advanced, non-destructive testing methods to accurately assess the fatigue life of these used components, ensuring that a second-life part is just as reliable as one fresh off the line.

The shift toward green manufacturing and a circular economy represents a profound philosophical evolution in mechanical engineering. We are no longer just the creators of machines; we are the stewards of materials and energy. The ultimate engineering challenge of the **21st century** is not merely figuring out how to make mechanisms move faster or lift heavier loads. It is figuring out how to achieve that progress while leaving zero trace behind. The gears of industry are still turning, but today, they are finally learning to turn in a closed loop.

Engineering the Horizon: The Mechanical Path to Net-Zero

For decades, the measure of mechanical engineering was power: how fast an engine could rev, how much weight a turbine could pull, or how efficiently a plant could mass-produce goods. But as a B.Tech student looking at the future of our industry, I can see that the metric of success has profoundly shifted. The ultimate challenge of our generation is no longer just generating power; it is generating it without a carbon footprint. The global mandate to achieve net-zero carbon emissions is not merely a political or environmental goal—it is fundamentally a massive mechanical engineering problem waiting to be solved.

The transition away from fossil fuels places mechanical engineers at the very forefront of the clean energy revolution. We are the architects tasked with designing and maintaining the systems that harness solar, wind, hydro, and geothermal energy. When you look at a modern wind farm, you are seeing advanced mechanical design in action—from optimizing the aerodynamic efficiency of turbine blades to developing lightweight, durable composite materials that can extract power even in low-wind conditions. Furthermore, integrating these variable energy sources into our existing power grids requires a deep understanding of fluid mechanics and thermodynamics to maximize conversion efficiency.

However, generating clean energy is only half the battle; storing it is where the real complexity lies. Because the sun does not always shine and the wind does not always blow, energy storage is the critical bottleneck in a low-carbon economy. Mechanical engineers are pioneering breakthroughs in this space. We are heavily involved in developing utility-scale solutions like pumped hydro storage, which requires highly efficient pumps and turbines to store excess energy by moving water to higher elevations. Simultaneously, we are optimizing the thermal management and charge efficiency of advanced battery systems, ensuring that massive installations can stabilize the grid reliably.

Beyond renewables, we must confront the reality of hard-to-abate sectors like heavy manufacturing and transportation. This is where **Carbon Capture and Storage (CCS)** technology becomes vital. Mechanical engineers are designing the complex capture mechanisms, high-pressure compression systems, and safe storage infrastructure necessary to sequester carbon dioxide before it ever reaches the atmosphere.

In tandem, we are meticulously redesigning **industrial machinery and HVAC systems**. By utilizing thermal simulations and variable-speed technologies, we can drastically reduce the baseline energy consumption of commercial buildings and factories without sacrificing performance.

Reaching net-zero is not a task that can be accomplished through policy alone; it requires physical, tangible innovation. Our role goes far beyond traditional machines—we are bridging the critical gap between technological capability and environmental responsibility. As engineering students entering this field, we are not just learning how to build engines; we are learning how to redesign the very infrastructure of modern life to exist in harmony with our planet's ecosystem. The gears of industry must keep turning, but it is up to us to ensure they turn without leaving a trace of carbon behind. It is the most daunting engineering challenge in history, but also the most exhilarating.

*Author: Aman Yadav
3rd year*

DEPARTMENT TOPPERS

4th Year

MOHD ALTAMASH

3rd Year

AMAN YADAV

2nd Year

ESHAN SONKAR

EFFECT OF DESIGN CONDITIONS ON REHEAT GAS TURBINE COMBINED CYCLE POWER USING TRANSCRITICAL CARBON DIOXIDE AND AMMONIA WATER MIXTURE

Research Paper

Authors: Jyoti Singh, Dr. Mayank Maheshwari, Dr. Apurva Anand.

Publishing Journal: European chemical bulletin (ECB) SCOPUS indexed.

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Keywords: Reheat Gas Turbine Cycle, Transcritical carbon dioxide, Concentration of Ammonia, Heat recovery generator.

ABSTRACT

It is continually being researched and improved upon how to make thermodynamic power cycles as efficient as the Carnot cycle. Various strategies that have been tested and are performing well are included in these efforts to improve the thermal efficiency of the cycle. Due to their high efficiency, coupled cycles have become a popular option for power cycles. However, there is still room for improvement by making more changes to the thermodynamic cycle's thermal efficiency. Based on the first and second laws of thermodynamics, the present study examines the impact of ambient temperature and design parameters such as cycle pressure ratio and turbine inlet temperature in a combined cycle using transcritical carbon dioxide, and a binary mixture of ammonia and water. The result of the energy and exergy analysis of considered combined cycle using ammonia water mixture show that when maximum work output is obtained then the first law efficiency and second law efficiency are at value of 62.01% and 60.27% respectively. This lesser value of second law efficiency opens opportunities for removing sources of inefficiencies to make combined cycles much more efficient.

A CONCISE REVIEW ON OPTIMIZATION POTENTIALS ON WORKING FLUIDS USED IN POWER CYCLES

Research Paper

Authors: Jyoti Singh, Dr. Mayank Maheshwari, Dr. Apurva Anand.

Publishing Journal: European chemicalbulletin (ECB) SCOPUS indexed.

Key words: ORC(Organic rankine cycle), TRC(Transcritical rankine cycle), WHR(Waste heat recovery, LNG (Liquefied natural gas), CO₂-based Transcritical Power Cycle (CTPC), (carbondioxide transcritical power cycle) CDTPC,TIT(Turbine inlet temperature), ultra-supercritical(USC), combined power and cooling(CPC),Absorption cooling system(ACS), combined cycle gas turbine (CCGT),Inlet guide vane(IGV).

ABSTRACT

In industrial field, the gas turbines has been extensively used in combined power plant cycles that depicts low efficiency. These power plants are developed of steam and gas turbines. The gas turbine power plants are lighter and smaller that the steam power plants where the cost of every unit is less and the time required for delivering the gas turbine is comparatively shorter. This review discuss on various refrigerant fluids for increasing the efficiency or output of the power plants associated with trans-critical carbon di oxide, gas turbine and ammonia water solution. Energy conservation is prominent globally irrespective of non-renewable or renewable types. The refrigerants needs to be optimized in ventilation, heating, air conditioning to overcome several hazardous effects due to ozone depletion impact and greenhouse effect. Among those the carbon di oxide refrigeration cycle are primary and hence crucial importance has to be provided to this scenario. This review also discussed the various modified technologies with prominent performance and features. Accordingly potential future developments are also summarized in this review.

DESIGN AND FABRICATION OF SEMI- AUTOMATIC NOODLES MAKING MACHINE

Research Paper

Authors: Mohd Altamash, Kaushal Sagar, Ankur Srivastava.

Publishing Journal: International Journal of IJERT.

DOI: <http://www.ijert.org>

ABSTRACT

Noodles, a staple food across many cultures, are typically made from starch-based dough that's stretched, extruded, or rolled flat and cut into various shapes. While traditionally made from grain flours, modern noodles can also be crafted from alternative sources like cassava, yams, or potatoes.

While industrial noodle-making machines exist, they are complex, expensive, and bulky, usually requiring multiple operators. These machines are not suitable for smaller-scale use due to their cost and reliance on specialized components. However, they are efficient for large-scale noodle production, transforming dough into uniform noodles through a series of operations such as rolling, cutting, and shaping.

This project aims to help people in making noodles easily, quickly and on a wider scale. The first stage of the project with brainstorming, visualizing the idea, forecasting all our needs in the project and deeper research was held between all competitive noodle machines in the market. Design and development of noodle machine by integrating all ideas together and testing of Semi Automatic noodle machine which is operated by AC-power source.

TECHNO-ECONOMIC ANALYSIS AND DESIGN OF HYBRID SOLAR POWER GENERATION OPTIMIZATION IN UDAIPUR, INDIA

Research Paper

Authors:: Garima Singh, Bharat Raj Singh.

Publishing Journal: International Journal of Applied Engineering & Technology.

DOI: <https://doi.org/10.1063/5.0255985>

Keywords: Solar power, Wind energy, Hybrid solar power, Techno-economic, Analysis and design, HOMER software.

ABSTRACT

This research paper presents a comprehensive investigation into the techno-economic aspects and design optimization of hybrid solar power generation in Udaipur, India, utilizing the advanced features of the HOMER software. Integration of solar energy with other power sources is pivotal for improving reliability, efficiency, and economic feasibility. Through extensive simulations and analyses, the study aims to offer valuable insights into the optimal configuration of a hybrid solar power system tailored to the unique characteristics of the Udaipur region.

The paper concludes by summarizing key findings, discussing implications for the deployment of hybrid solar power systems in Udaipur, and providing recommendations for future research. The techno-economic analysis and design optimization presented herein provide valuable guidance for policymakers, energy planners, and researchers striving for sustainable energy solutions in similar regions.

The analysis from Case-I (Base cost system uses Generic Flat Plate PV 36.0 kW whereas lowest cost system uses Generic Flat Plate PV 36.0 kW and XANT M-21(100kW) wind turbine), Case-II (Base cost system uses XANT M-21 (100kW) wind turbine, converter 0.33kW and battery storage LI ASM 3.00 whereas lowest cost system uses Generic Flat Plate PV 36.0 kW and XANT M-21(100kW) wind turbine), and Case-III (Base cost system uses XANT M-21 (100kW) wind turbine whereas lowest cost system uses Generic Flat Plate PV 36.0 kW and XANT M-21(100kW) wind turbine) sheds light on the cost-effectiveness and performance of various hybrid solar power system setups. Results indicate that integrating wind energy alongside solar power leads to economic advantages over the project's lifetime. Specifically, the integration of wind energy in hybrid systems demonstrates potential savings and enhanced cost-effectiveness.

Thus, the research underscores the economic viability and cost-saving potential of hybrid solar power systems incorporating wind energy. These findings emphasize the importance of considering hybrid configurations for sustainable and economically beneficial renewable energy solutions, particularly in regions like Udaipur.

From the Editors Pen.....

Respected Readers,

We proudly welcome you to the inception of Mechdrishti—the premier edition of the official magazine brought to you by the Department of Mechanical Engineering at BBDNIIT. This first issue goes far beyond a simple compilation of articles; it serves as a dynamic blueprint of our vibrant energy, shaped by the creativity, precision, and unstoppable determination inherent in our field.

The editorial team has meticulously crafted this publication, ensuring it perfectly echoes the mechanical pulse of our department. Spanning from the methodical brilliance found in our drafting labs to the loud hum of innovation across the workshop floors, Mechdrishti mirrors a collective committed to transforming untapped potential into concrete achievements. We pay tribute to the creators, designers, and fabricators who are constantly pushing the boundaries of contemporary engineering

Inside this volume, you will discover the documentation of our shared progress:

- **Scientific & Academic Advancements:** Documenting critical discoveries in thermodynamics, material sciences, and structural evaluations that continually deepen our theoretical foundations.
- **Applied Technical Prowess:** Spotlighting immersive training in Robotics, CAD/CAM, Automotive Design, and Advanced Manufacturing, effectively linking core mechanical principles with real-world industry standards.
- **Ingenuity & Fabrication:** Recognizing the tenacity of our competitive design teams, automotive builders, and the groundbreaking projects brought to life by our talented students.

Ultimately, Mechdrishti is a profound reflection of our unified goals and unbreakable resolve. As you navigate through these articles, we encourage you to immerse yourself in the concepts driving us ahead and to observe the gears of human intellect in motion.

With Unyielding Gratitude,

The Editorial Team

Student : Mohd Altamash, 4th year, Mechanical Engineering

Guided By: Prof. (Dr.) N.K. Mishra (HOD, ME)



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"You don't have to be great to start,
but you have to start to be great."

Department of Mechanical Engineering



Babu Banarasi Das Northern India Institute of Technology

Sector-II, Dr. Akhilesh Das Nagar, Ayodhya Road, Lucknow (U.P.) - 226028, India

Ph.: +91-(522)-6196222/6196223/6196336/Website: www.bbdniit.ac.in/Email: info@bbdniit.ac.in