VARDHAMAN COLLEGE OF ENGINEERING
ESTD. 1999

MAGAZINE

IMPULSE

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DEPARTMENT OF

ELECTRICAL & ELECTRONICS ENGINEERING

Vision of the Department:

Producing professionally competent graduates in the domain of electrical engineering to serve the industry/society addressing the challenges.

Mission of the Department:

- Provide professional skills in electrical circuit design and simulation to the students.

- Bringing awareness among the students with emerging technologies to meet the dynamic needs of the society

- Develop industry-institute interface for collaborative research, internship and entrepreneurial skills among the stakeholders (Students/Faculty)

- Encourage multi-disciplinary activities through research and continuous learning activities

Program Educational Objectives (PEOs):

PEO1: Graduates will excel to make way to give solutions to real-time problems through technical knowledge and operational skills in the field of Electrical Engineering.

PEO2: Graduates will demonstrate their ability to acquaint with the ongoing trends in the field of Electrical Engineering to address the needs of the society.

PEO3: Graduates will communicate effectively as team players to cope with building a Prospective career.

PEO4: Graduates of the program will act with Integrity and have interpersonal skills in catering the need-based requirements blended with ethics and professionalism.

Program Specific Outcomes(PSOs):

Graduates will be able to,

PSO1: Conceptualize complex electrical and electronics systems, employ control strategies for power electronics related applications to prioritize societal requirements.

PSO2: Design, analyze and create energy efficient and eco-friendly power & energy systems.

Chairman's Message

It gives me great pleasure to share a few words about the Department of Electrical and Electronics Engineering (EEE), one of the most dynamic and esteemed departments at Vardhaman College of Engineering. Over the years, the department has become a center of excellence in technical education, contributing significantly to the college's vision of creating future-ready engineers.

Electrical and Electronics Engineering is a discipline that forms the backbone of modern technology—from power systems and energy management to smart devices and automation. Our EEE department has been at the forefront of imparting quality education and practical skills in these areas, empowering students to become innovators, problem-solvers, and leaders in their fields.

The department boasts of a dedicated faculty team, advanced laboratory facilities, and a robust academic framework that promotes research, creativity, and critical thinking. Students are encouraged to take up real-world challenges, participate in hackathons, collaborate with industries, and contribute to sustainable solutions for society.

We believe in nurturing talent and creating a learning environment that balances academic excellence with strong ethical values. The achievements of our alumni, who are now contributing to prestigious organizations and institutions across the globe, stand as a testament to the department's quality and vision.

As Chairman, I take immense pride in the department's accomplishments and look forward to its continued growth. I am confident that the Department of Electrical and Electronics Engineering will keep playing a pivotal role in shaping the engineers of tomorrow.

Dr. T. Vijender Reddy
Chairman

Principal's Message

It is a matter of great pride to reflect upon the remarkable progress and contributions of the Department of Electrical and Electronics Engineering (EEE) at Vardhaman College of Engineering. The department stands as one of the foundational pillars of our institution, known for its academic rigor, research orientation, and unwavering commitment to producing skilled and socially responsible engineers.

The EEE department offers a rich academic environment supported by a team of highly qualified faculty members, many of whom hold doctorates and have extensive experience in teaching, research, and industry collaboration. The curriculum is thoughtfully designed to bridge theoretical concepts with real-world applications, integrating core electrical engineering topics with emerging technologies such as smart grids, electric vehicles, renewable energy systems, embedded systems, and the Internet of Things (IoT).

The department continuously upgrades its laboratories and infrastructure to provide hands-on training that aligns with industry standards. Through initiatives like internships, industry projects, guest lectures, and technical workshops, students are encouraged to explore, innovate, and apply their learning beyond the classroom.

In addition, the department places a strong focus on student development through participation in national and international conferences, technical fests, student clubs, and entrepreneurship activities. The consistent placement record of EEE graduates in reputed companies, as well as their success in higher studies and competitive exams, speaks volumes about the quality of education and mentoring provided.

I congratulate the faculty, staff, and students of the EEE department for their ongoing achievements and contributions. I am confident that the department will continue to scale new heights and nurture future leaders in electrical and electronics engineering.

Dr. J. V. R. Ravindra
Principal

HoD's Message

It is with great pride and enthusiasm that I present the Department of Electrical and Electronics Engineering (EEE) at Vardhaman College of Engineering. As one of the foundational departments of the institution, EEE has played a vital role in nurturing engineering professionals who are equipped to meet the challenges of an ever-evolving technological landscape.

Our department is committed to excellence in teaching, research, and industry collaboration. With a forward-looking curriculum, experienced faculty, and well-equipped laboratories, we aim to provide a strong theoretical base while encouraging practical application and innovation. Our programs are designed to keep pace with emerging trends such as electric mobility, renewable energy, smart grids, automation, and embedded systems.

We focus on holistic student development by promoting not only academic learning but also co-curricular and extracurricular activities. Students are encouraged to participate in technical competitions, internships, research projects, and entrepreneurship initiatives. We also maintain active industry-institute partnerships to bridge the gap between academics and real-world applications.

I extend my sincere gratitude to all stakeholders—faculty, students, alumni, and industry partners—for their continuous support. Together, we are committed to building a department that not only imparts knowledge but also contributes meaningfully to society and the nation.

Dr. N. Karuppiah

HoD EEE

Faculty's Message

As a Senior Professor in the Department of Electrical and Electronics Engineering at Vardhaman College of Engineering, I take immense pride in being part of a department that consistently strives for academic excellence and technological innovation. We focus on equipping our students with a strong foundation in electrical and electronics engineering, while also fostering creativity and critical thinking.

We believe in holistic development, guiding our students to become not just proficient engineers but also responsible professionals. The department encourages students to participate in various technical events, internships, and research projects, which help them grow as leaders in their field. With a dedicated and experienced faculty team, I am confident that the EEE department will continue to play a crucial role in shaping the future of electrical and electronics engineering.

Dr. H. S. Jain

Senior Professor

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Chief Mentors

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Principal

Dr. N. Karuppiah

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Meet the Final Year

Meet the Final Year

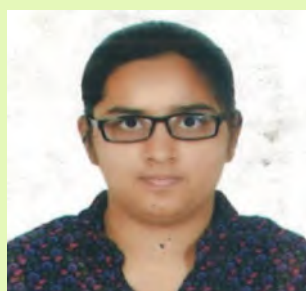|			
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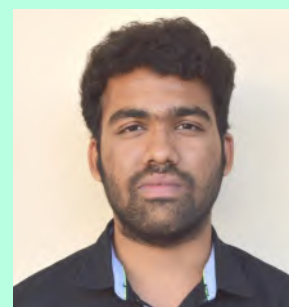
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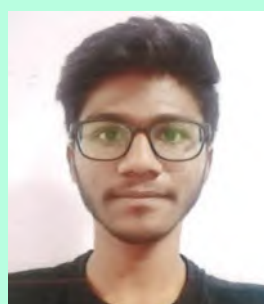
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Meet the Final Year

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Meet the Final Year

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As you step into a new chapter of your life, we take immense pride in the journey you've made with us. Your dedication, enthusiasm, and growth have been truly inspiring. Remember, challenges are opportunities in disguise—face them with confidence and integrity.

Wishing you all success, happiness, and fulfilment in your future endeavours. You will always remain a cherished part of the EEE family.

-EEE Faculty

Faculty Insights

Lessons from Failed Electric Machine Projects: What Went Wrong?

Failure in engineering projects, though often undesirable, offers a unique opportunity to learn and improve. In the field of electric machines, understanding the reasons behind failed projects can lead to more robust designs, improved processes, and better project management. This article explores some of the common pitfalls and the lessons they teach.

Case Example: A motor designed for a high-temperature environment failed prematurely because the insulation materials used were not rated for the required temperature range.

Lesson: Collaborate closely with stakeholders during the requirements phase to ensure all operational conditions and constraints are well-defined.

Case Example: A generator designed for renewable energy systems experienced core saturation due to improper selection of magnetic materials, leading to significant energy losses.

Lesson: Perform detailed material analysis and testing, and consider the trade-offs between cost, performance, and longevity.

Case Example: A high-power motor for industrial applications failed due to insufficient cooling, as the design did not account for prolonged operation at peak loads.

Lesson: Integrate thermal management systems, such as improved cooling channels or advanced heat sinks, early in the design process.

Case Example: A novel motor design incorporating multiple new features failed because the manufacturing process could not achieve the required precision, resulting in misaligned components.

Lesson: Strive for simplicity in design. Validate innovative features with prototypes and ensure compatibility with manufacturing capabilities.

Case Example: A wind turbine generator failed in the field because the prototype was not tested under extreme wind conditions, leading to structural damage during a storm.

Lesson: Develop comprehensive testing protocols that simulate real-world operating conditions, including edge cases.

Case Example: A large-scale motor development project failed because of misaligned goals among the design, manufacturing, and marketing teams, resulting in delays and a subpar product.

Lesson: Adopt robust project management practices, such as setting clear milestones, fostering cross-functional collaboration, and maintaining transparent communication.

Case Example: An electric drive system failed to meet international electromagnetic compatibility (EMC) standards, causing interference with other equipment and legal penalties.

Lesson: Stay updated on relevant standards and integrate compliance checks throughout the design and testing process.

Case Example: A motor in an industrial setting required frequent disassembly for maintenance, causing production delays and increased operational costs.

Lesson: Design for maintainability by considering ease of access, modular components, and predictive maintenance technologies.

Case Example: A decision to use lower-grade bearings in an electric vehicle motor led to frequent replacements and customer complaints.

Lesson: Balance cost optimization with performance and reliability. Conduct a cost-benefit analysis to identify areas where compromises can be made without jeopardizing the product.

Case Example: A motor manufacturer faced repeated failures due to a flaw in the control software, which was only identified after multiple customer complaints.

Lesson: Establish post-deployment monitoring and feedback mechanisms to continuously improve the product.

Conclusion

While failures in electric machine projects can stem from various sources, they often share common underlying causes, such as inadequate planning, poor communication, or lack of attention to detail. By studying these failures and implementing lessons learned, engineers and project managers can enhance the reliability, efficiency, and success of future electric machine projects.

Dr. S. Ravi Varman

Professor

Machine Learning in Fault Tolerant Control of Electric Machines

Electric machines play a crucial role in industries ranging from manufacturing to transportation and renewable energy. Ensuring their reliable operation is vital, as unexpected failures can lead to downtime, increased costs, and safety risks. Fault-tolerant control (FTC) systems aim to maintain or restore the performance of electric machines in the presence of faults. Machine learning (ML), with its ability to process and analyze large amounts of data, has emerged as a powerful tool in enhancing FTC strategies.

Fault-tolerant control is a set of techniques designed to detect, isolate, and compensate for faults in a system without compromising its operational integrity. In electric machines, faults such as winding failures, rotor misalignments, or power electronic malfunctions can degrade performance or lead to catastrophic failures. FTC systems ensure that the machine can continue operating, albeit sometimes at reduced capacity, until repairs can be made.

Machine learning algorithms excel at identifying patterns, making predictions, and adapting to new data. These capabilities make ML a natural fit for enhancing FTC systems. Key applications include fault detection and diagnosis (FDD), fault prognostics, adaptive control strategies, and feature extraction through sensor fusion. For example, neural networks trained on vibration and current signals can accurately classify faults such as bearing wear or stator winding failures, while recurrent neural networks (RNNs) can analyze historical data to predict impending rotor imbalance.

Despite its potential, integrating machine learning into fault-tolerant control systems presents several challenges. High-quality, labelled data covering diverse fault scenarios is essential for training ML models, but collecting such data can be time-consuming and expensive. Real-time fault diagnosis requires efficient algorithms capable of operating within the constraints of embedded systems. Moreover, ML models trained on specific machines or conditions may struggle to generalize to new environments.

Future research is focusing on hybrid approaches that combine traditional model-based control methods with machine learning, leveraging the strengths of both techniques. Edge computing offers the potential to deploy ML models on devices close to the machine, enabling real-time fault detection without reliance on cloud infrastructure. Transfer learning can help reduce retraining efforts by adapting pre-trained models to new machines or fault conditions. Explainable AI (XAI) is gaining traction to improve trust in ML-based systems by making their decisions more transparent.

Dr. Md. Asif

Associate Professor

Electric Machines in Unmanned Aerial Vehicles (UAVs)

Unmanned Aerial Vehicles (UAVs), or drones, rely heavily on electric machines to power their propulsion systems, enabling their diverse applications in defence, agriculture, delivery, and surveillance. Among these, brushless DC (BLDC) motors are the most commonly used due to their high efficiency, lightweight design, and precise control. These motors ensure extended flight time, agility, and quiet operation, making them ideal for sensitive tasks like surveillance and wildlife monitoring.

Key considerations in designing electric machines for UAVs include optimizing the power-to-weight ratio, ensuring effective thermal management, and enhancing durability to withstand environmental challenges. Recent advancements in lightweight materials, advanced magnetic components, and AI integration are further improving performance and adaptability. As electric machines evolve, they continue to drive innovations in UAV technology, expanding their capabilities and applications across industries.

Dr. B. Praveen Kumar

Associate Professor

Hybrid Energy Systems and Their Control Techniques

Hybrid energy systems (HES) combine multiple renewable and non-renewable energy sources to meet energy demand efficiently and sustainably. These systems typically integrate sources such as solar, wind, and diesel generators, with energy storage solutions like batteries or supercapacitors, to provide reliable and consistent power. The combination of diverse energy sources helps to mitigate the intermittency issues associated with renewable energy, ensuring stable power delivery even during variable weather conditions.

The control of hybrid energy systems is crucial for optimizing performance and minimizing operational costs. Advanced control techniques, such as model predictive control (MPC), fuzzy logic control, and adaptive control, are employed to manage the energy flow between the different components. These methods ensure that energy generation, storage, and consumption are balanced effectively, avoiding overloading or energy shortages.

In conclusion, hybrid energy systems are a promising solution for sustainable energy generation. By incorporating intelligent control techniques, these systems can maximize the potential of renewable sources while minimizing reliance on conventional energy, contributing to a greener and more resilient energy future.

Dr. Patil Mounica

Assistant Professor

TechTalk
by
Students

The Role of Smart Meters in Energy Efficiency

Smart meters are transforming how we manage and consume energy. By providing real-time data on electricity usage, they enable consumers to make informed decisions about their energy habits. The detailed feedback helps identify energy-draining behaviours and encourages individuals to adopt more energy-efficient practices. For utility companies, the data from smart meters enhances grid management, reducing energy losses and improving system reliability. Additionally, smart meters allow for the implementation of time-of-use pricing, which promotes energy conservation by encouraging consumers to use electricity during off-peak hours. Ultimately, smart meters play a crucial role in reducing waste, lowering costs, and improving sustainability.

Smart meters are not only beneficial for individual consumers but also for the power grid as a whole. These devices provide utilities with detailed data that can be used to optimize grid performance and reduce energy losses. With smart meters, utilities can detect and address problems such as outages or inefficiencies in real-time, minimizing disruptions and preventing waste. The data also facilitates demand response programs, which allow utilities to adjust power distribution during peak demand times, ensuring that the grid operates more efficiently. As a result, smart meters help conserve energy, reduce operating costs, and pave the way for a more sustainable energy future.

Smart meters have proven to be a powerful tool in encouraging energy-saving behavior among consumers. By providing accurate and immediate feedback on energy consumption, these devices make it easier for individuals to see the impact of their actions on their energy bills. As consumers gain a better understanding of their usage patterns, they are more likely to adopt energy-efficient behaviors such as switching to LED lighting, using appliances more efficiently, or adjusting heating and cooling systems. The real-time data offered by smart meters empowers users to take control of their energy consumption, ultimately leading to reduced costs and a more sustainable approach to energy use.

Naldiga Asritha

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The Role of Renewable Energy in Microgrid Load Sharing

Renewable energy microgrids are revolutionizing energy distribution by integrating clean, sustainable power sources such as solar, wind, and hydropower into localized grids. These microgrids can function independently from the main grid, providing a reliable power supply in remote or underserved areas. Load sharing within a microgrid is crucial to maintaining balance between the energy generated and the demand. By using energy storage systems and smart controls, microgrids can store excess renewable energy during low demand periods and release it when consumption spikes.

The integration of renewable energy into microgrids has opened new opportunities for sustainable power solutions. Microgrids powered by solar, wind, or geothermal energy can be deployed in isolated areas or urban settings to enhance energy resilience. Effective load sharing is central to these systems, as it ensures that electricity demand is met through a combination of renewable sources, energy storage, and even backup generators when necessary. By utilizing smart algorithms, microgrids dynamically balance energy production and consumption, ensuring that energy storage devices are charged during periods of surplus energy and that energy use is optimized during peak demand. This approach not only reduces the carbon footprint but also contributes to a more stable and resilient grid.

Renewable energy microgrids are paving the way for a more sustainable and decentralized energy future. By integrating renewable sources such as solar, wind, and hydro, these microgrids provide communities with a cleaner, more reliable power supply. Load sharing mechanisms play a key role in balancing supply and demand within these systems, ensuring that renewable energy is maximized and that energy storage solutions are efficiently utilized. Smart controls allow for dynamic adjustments to energy usage, optimizing the flow of electricity and reducing reliance on traditional fossil fuels. As microgrids continue to evolve, they are proving to be an essential part of achieving energy efficiency, reducing carbon emissions, and enhancing energy independence.

Kukkala Manasa

21881A0233

Solid-State Transformers

Solid-State Transformers (SSTs) are an advanced form of electrical transformer that incorporate power electronic components to perform voltage transformation, isolation, and control functions more efficiently and flexibly than traditional transformers. Unlike conventional transformers, which rely solely on electromagnetic induction using copper windings and iron cores, SSTs use high-frequency converters and semiconductor switches—such as IGBTs, silicon carbide (SiC), or gallium nitride (GaN) devices—to achieve their function.

One of the major benefits of SSTs is their ability to support **bidirectional power flow**, which is essential for integrating renewable energy sources like solar panels and wind turbines into the grid. SSTs can also regulate voltage and frequency dynamically, offering precise control over the output. In smart grids and microgrids, this enables real-time power flow optimization, fault isolation, and load balancing. Moreover, SSTs can be designed to interface with both AC and DC systems, making them highly versatile for modern energy applications.

Despite these advantages, SSTs do come with certain challenges. They are currently more expensive than traditional transformers due to the cost of high-performance semiconductors and the need for complex control systems. Thermal management is also critical, as power electronic components can generate significant heat during operation. Reliability and protection under fault conditions are areas that still require further development to ensure long-term durability in harsh grid environments.

S Charan Kumar

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Railways and Data Centers

In **railway systems**, Solid-State Transformers are increasingly being explored as replacements for conventional transformers in traction substations. Traditional railway transformers are large and heavy, and they primarily serve to step down high-voltage transmission power for train operations. SSTs, on the other hand, offer several advantages including compactness, better voltage regulation, and the ability to handle varying loads more efficiently. Their fast switching and high-frequency operation allow for precise control of the power delivered to the trains, improving energy efficiency and reducing mechanical wear on electrical equipment.

In **data centers**, where power quality, reliability, and efficiency are critical, SSTs can significantly enhance energy management. Data centers operate with large and sensitive electronic loads that require stable and uninterrupted power. SSTs provide precise voltage regulation and can protect against voltage sags, surges, and other power disturbances. Additionally, SSTs support both AC and DC output, which is advantageous for data centers using direct current (DC) distribution architectures to improve efficiency and reduce conversion losses. Their smart control capabilities also enable real-time monitoring and fault isolation, contributing to the high reliability demanded by mission-critical data processing operations.

Tuhin Mandal

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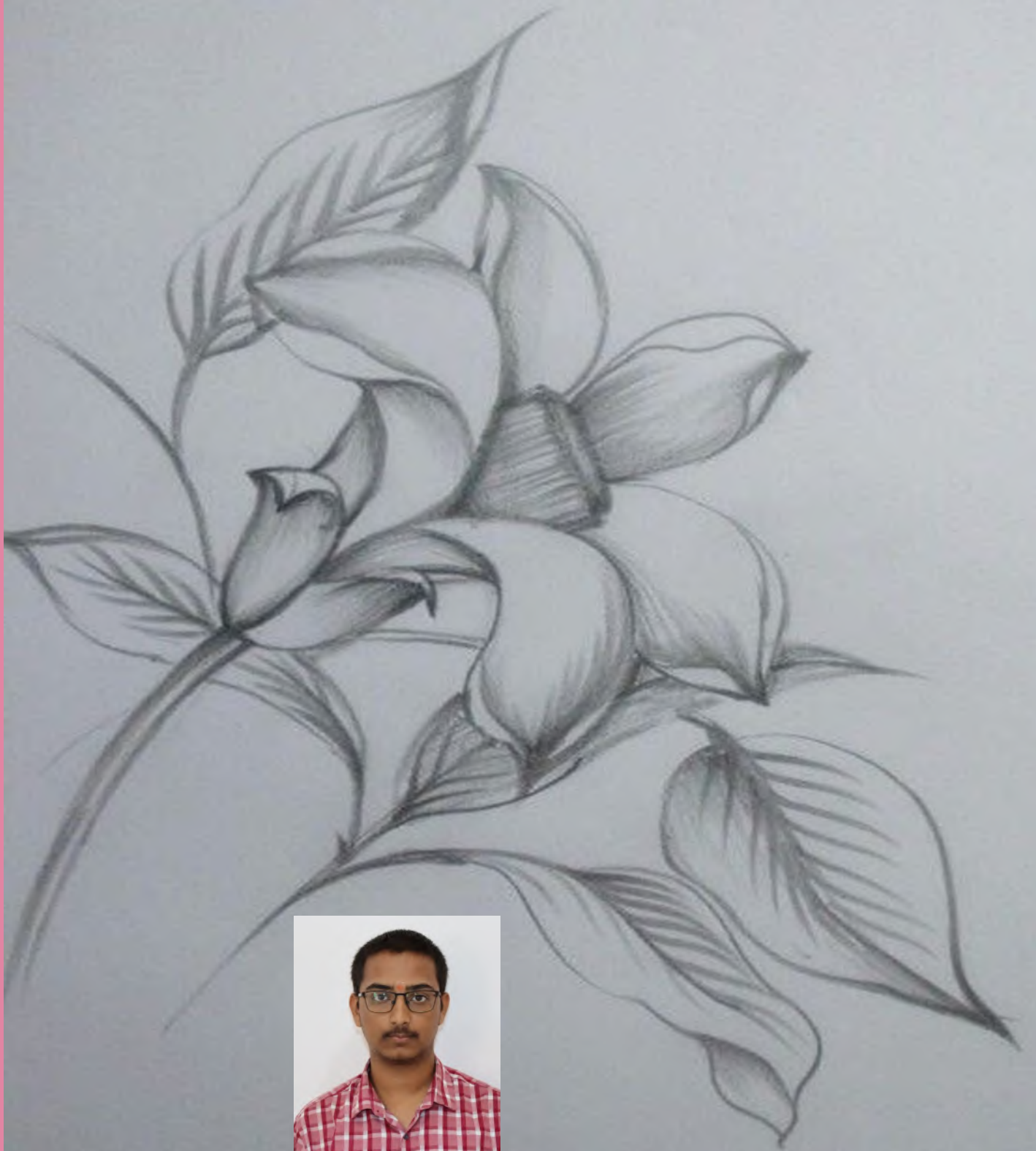
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S Sri Chandana

23881A0252

K Shiva Bhargavi

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P S N Harshavardhan

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Faculty

S.N	Name of the faculty	Designation
1	Dr. Md. Asif	HOD & Assoc.Prof
2	Dr. H.S Jain	Professor
3	Dr. S. Ravi Varman	Professor
4	Dr. N. Karuppiah	Professor
5	Dr. Muruga Perumal	Assoc. Prof
6	Dr. B. Praveen Kumar	Assoc. Prof
7	Mr. B. Raja Gopal Reddy	Assistant. Prof
8	Mr. N. Srinivas	Assistant. Prof
9	Mr. A. Rama Krishna	Assistant. Prof
10	Mr. A. Ananda Kumar	Assistant. Prof
11	Ms. P. Mounica	Assistant. Prof
12	Ms. G. Indira Rani	Assistant. Prof
13	Mr. B. Mohan	Assistant. Prof
14	Ms. Fatima Unnisa	Assistant. Prof
15	Ms. G. Andalu	Assistant. Prof
16	Ms. K. Haleema	Assistant. Prof
17	Mr. S. Vinod Reddy	Assistant. Prof
18	Ms. G. Meghana	Assistant. Prof
19	Ms. K. Anusha	Assistant. Prof
20	Ms. K. C. Archana	Assistant. Prof
21	Ms. G. Swetha	Assistant. Prof
22	Ms. D. Sharanya	Assistant. Prof
23	Ms. K. Bhavani	Assistant. Prof

Vision

- To be a pioneer institute and leader in engineering education to address societal needs through education and practice.

Mission

- To adopt innovative student centric learning methods.
- To enhance professional and entrepreneurial skills through industry institute interaction.
- To train the students to meet the dynamic needs of society.
- To promote research and continuing education.

Quality Policy

We at Vardhaman College of Engineering, endeavor to uphold excellence in all spheres by adopting the best practices in effort and effect.

Core Values:

- **ACADEMIC INTEGRITY**

Achieving success by being sincere, loyal and ethical in all our practices

- **MUTUAL RESPECT**

Extending courtesy to all the stakeholders and promoting a culture of inclusion and fairness.

- **SOCIAL RESPONSIBILITY**

Being responsible citizens, share our collective achievements and contributions to the world around us.
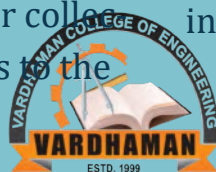
- **ACCOUNTABILITY**

Accountable for our actions to the stakeholders in general and students in particular.

- **ADAPTABILITY**

Embrace change as a path to progress, success and innovation.

- **CREATIVITY**

Become a change agent to performance, innovation and student success.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Affiliated to **JNTUH**, Approved by **AICTE**, Accredited by **NAAC** with **A++** Grade, **ISO 9001:2015** Certified

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