

GOVERNMENT ENGINEERING COLLEGE, MODASA

Newsletter

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GECEM E-NEWS

FROM THE PRINCIPAL'S DESK



I am pleased to present GECM E-NEWS – Volume 5, Issue 2, capturing the key academic and co-curricular achievements of Government Engineering College, Modasa during July to December 2025. This period reflects our continued commitment to quality education, skill development, innovation, and value-based learning.

We began the term with an Online AI Workshop held in which introduced faculties and students to emerging AI trends and their relevance in education and industry. Such exposure motivates learners to explore modern tools and prepares them for future employability. Welcoming our new students through Prarambh 2K25 helped create a supportive start for first-year and D2D batches, strengthening their connection with campus culture and opportunities.

The spirit of gratitude and learning excellence was highlighted in “Samarpan”, emphasizing teachers’ contributions and the importance of activity-based learning for developing teamwork, communication, creativity, and problem-solving. Alongside academics, we encouraged life skills through the SEBI Financial Awareness Program, promoting responsible investing and financial literacy.

Innovation remained a focus through the SSIP Internal Hackathon under SIH 2025, where strong participation and mentoring led to 45 team nominations. Industry readiness was further strengthened via RUSA-supported ANSYS and Robotics & Automation trainings at Indo-German Tool Room, Ahmedabad. Our campus also promoted social and environmental responsibility through tree plantation drives, Tiranga Yatra, oath-taking initiatives, and well-being programs like career guidance and meditation. The term concluded with Hostel Cup 2025, fostering sportsmanship and student bonding, and Alumni Meet 2025, reinforcing lifelong alumni–institute relationships.

I appreciate the efforts of all coordinators, faculty, staff, students, and alumni who contributed to these achievements.

Let us keep striving forward with dedication and a commitment to continuous learning.

Principal (I/C)

Prof. Dr. Jeetendra A. Vadher

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AI Workshop (Online)

An online AI workshop was conducted on 05/07/2025 in the presence of Dr. D. D. Trivedi, Dy. Director, Directorate of Technical Education (DTE). The session provided students with an introduction to current AI trends and practical relevance in education and industry. The workshop encouraged students to explore AI-based tools and develop an understanding of how emerging technologies influence learning, employability, and innovation. The session created awareness about skill development pathways and motivated students to engage in technology-driven learning.

Prarambh 2K25

Prarambh 2025 was organized on 21/08/2025 as a welcome event for first-year and D2D students to create a supportive and motivating start to their academic journey. The event was conducted in the presence of the Principal, faculty members, and invited guests, with the objective of building a friendly connection between newcomers and the institute community. The program included interactions and activities that encouraged student engagement, confidence, and belongingness. The event also helped students understand the campus culture, opportunities available for learning and growth, and the importance of active participation in academic and co-curricular activities. Overall, Prarambh 2025 provided a warm and encouraging environment for the new batch.



Samarpan – To Our Teachers Who Shaped Our Lives

“Samarpan – To Our Teachers Who Shaped Our Lives” was organized on 04/09/2025 to recognize the contribution of teachers and highlight the role of activity-based learning in student development. The program showcased how teachers use group discussions, projects, role plays, creative writing, debates, games, and practical tasks to make learning effective and meaningful. These activities were presented as tools to build essential skills such as teamwork, communication, creativity, problem-solving, and discipline, while connecting classroom concepts to real-life situations. The event encouraged students to appreciate the impact of teachers in guiding them beyond academics and preparing them for future challenges through structured learning experiences and positive mentorship.

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SEBI Financial Awareness Program

A SEBI Financial Awareness Program was conducted on 13/10/2025 to promote financial literacy and responsible investing among students. The session was delivered by Ms. Palak Lotiya and focused on essential concepts such as safe investing practices, understanding financial products, and avoiding common investment risks and frauds. Participants were introduced to the SEBI Saathi App as a useful tool for accessing verified investor education resources and making

informed financial decisions. The program encouraged students to develop basic financial planning skills and awareness of regulatory safeguards in the investment ecosystem. Overall, the session supported informed decision-making and promoted a culture of financial responsibility among young learners.



Alumni Meet 2025

Alumni Meet 2025 was organized on 20/12/2025 to strengthen alumni engagement and encourage meaningful reconnect with the institute. More than 140 alumni visited the campus and interacted with faculty members, students, and fellow graduates. The event provided a platform to share experiences, celebrate achievements, and build long-term alumni-institute relations. More than 20 alumni were felicitated in recognition of their contributions in various professional fields. During the program, alumni also contributed to the alumni fund and expressed commitment to support future initiatives, including financial assistance for students in need whenever required. Overall, the meet created a positive environment of pride, gratitude, and collaboration, reinforcing alumni

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support as a valuable pillar for institutional growth and student development.



SSIP CELL

Internal Hackathon under SIH 2025

An Internal Hackathon under SIH 2025 was organized on 24/09/2025 from 10:15 AM to 4:00 PM in offline mode. The inauguration and mentoring rounds were conducted at the LRC Building, while

the evaluation round was held at the Computer/IT Department. A total of 54 teams participated, each consisting of 6 members. The hackathon evaluation involved 33 jury members, ensuring structured assessment and mentoring support. Based on performance, 45 teams were nominated for SIH 2025. Prof. H. R. Patel (Assistant Professor, IT Department) received a certificate of appreciation for contribution as the College SPOC for SIH 2025. The event promoted innovation, teamwork, and problem-solving while streamlining institutional nominations for the national-level competition.

RUSA

ANSYS Training (Indo-German Tool Room, Ahmedabad)

A 12-day ANSYS training program was attended by 6 students of B.E. Semester 7 (Automobile Engineering) at Indo-German Tool Room, Ahmedabad from 11/08/2025 to 26/08/2025. The training focused on ANSYS Workbench as an integrated simulation platform for model creation, analysis, and optimization across engineering physics. Students learned the interface, project workflow, geometry import, meshing strategies, solver setup, and interpretation of simulation results. The program also included training on SpaceClaim for geometry creation and repair, covering sketching, extrusion, Boolean operations, defeaturing, and preparing complex CAD models for meshing. Emphasis was given to simplifying geometry to achieve faster and more stable simulations, enabling students to build industry-relevant simulation skills.

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Robotics and Automation Training (Indo-German Tool Room, Ahmedabad)

A 12-day training program on Robotics and Automation was attended by 12 students of B.E. Semester 7 (Mechanical Engineering) at Indo-German Tool Room, Ahmedabad from 25/08/2025 to 08/09/2025. The training covered theoretical and practical foundations of robotics, including the history of robotics, three laws of robotics, robot classification, components, kinematics and dynamics, and basic robot programming. Students also gained hands-on exposure to industrial robotics through practical sessions on welding robots, robot calibration, and operational practices. In addition, Mastercam sessions were included to introduce supporting manufacturing and automation workflows. The program enhanced students' understanding of modern automation systems and improved readiness for industry-oriented robotics applications.

Gymkhana

Tree Plantation Drive

A tree plantation drive was organized on 05/07/2025 with the presence of Dr. D. D. Trivedi, Dy. Director, Directorate of Technical Education (DTE). The plantation activity was initiated by a senior non-teaching staff member to acknowledge long-standing institutional service and promote inclusive participation. Students, faculty, and staff took part in plantation activities across the campus to enhance green cover and support environmental responsibility. The drive encouraged ecological awareness and strengthened coordination between students and administration through a shared sustainability goal.

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Tree Plantation Drive at LRC

A tree plantation drive was organized at the LRC area on 07/07/2025 under the leadership of Principal Dr. J. A. Vadher to strengthen the institute's commitment to environmental stewardship. The plantation activity promoted eco-friendly campus development and encouraged students and staff to actively contribute to sustainability initiatives. The event emphasized the long-term value of tree plantation in improving campus environment, air quality, and ecological balance, while developing a culture of

responsible environmental practices among participants.



Tiranga Yatra

A Tiranga Yatra was organized on 12/08/2025 from Umiya Chowk to the college campus, Modasa. The rally aimed to promote national pride, unity, and civic responsibility among students and staff. Participants marched in an organized manner

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carrying the national flag and spreading the message of collective responsibility, discipline, and respect for national values. The event encouraged community participation and fostered a strong spirit of togetherness and patriotism on campus.



Oath Taking Ceremony (Swadeshi Adoption and Drug-Free India)

An oath taking ceremony was organized on 07/10/2025 at the LRC to promote a healthy lifestyle, responsible choices, and awareness initiatives aligned with national programs. The event encouraged students to adopt positive habits, avoid substance abuse, and support local products as part of self-reliance and responsible citizenship. The program included patriotic and awareness-themed activities to create a motivating environment and strengthen student participation in value-based initiatives.



Birsa Munda Yatra Participation (Shamlaji)

The institute participated in the Birsa Munda Yatra held at Shamlaji on 08/11/2025. Faculty and participants represented the institute and joined the event to support social awareness, cultural values, and community engagement. The activity encouraged student involvement in public initiatives and promoted respect for national icons and heritage. Participation helped strengthen civic awareness and motivated students to contribute positively to society through collective and value-based activities.

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Career Guidance & Meditation Workshop (GGRC / Brahma Kumaris)

A Career Guidance & Meditation Workshop was organized on 22/09/2025 in collaboration with Gujarat Global Retreat Centre (GGRC) and Prajapita Brahma Kumaris Ishwariya Vishwa Vidyalaya. The session was delivered by B. K. Gowri Shankar and focused on career direction, personal discipline, and mental clarity through meditation-based practices. Students were guided on stress management, self-motivation, goal clarity, and maintaining focus during academic and career preparation. The workshop created a positive learning environment and encouraged students to balance personal well-being with professional development.



Hostel Cup 2025

Hostel Cup 2025 was organized from 04/12/2025 to 08/12/2025 to promote sportsmanship, physical fitness, and positive hostel engagement among students. The event included multiple indoor and outdoor competitions such as volleyball, cricket, badminton, chess, and carrom. Students from Hostel Blocks A, B, C, and E actively participated in various matches and tournaments, demonstrating teamwork, discipline, and competitive spirit. The program created a vibrant and energetic campus atmosphere and encouraged healthy interaction among hostel residents through structured sports activities. Overall, the Hostel Cup strengthened student bonding, boosted morale, and supported holistic development through active participation in sports and recreational events.



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Applied Mechanics & Civil Engineering Department

Informative Session on AI-Based Resume Creation

On 17/07/2025, an informative session on Artificial Intelligence-based resume creation was conducted at the QEEE Hall, Main Building, GEC Modasa for 7th-semester students preparing for their final placement cycle. The session was led by Dr. Ankit J. Patel and focused on using AI tools to design high-impact, ATS-friendly resumes aligned with current recruitment practices. Students were guided on structuring sections such as projects, internships, skills, and achievements, along with improving clarity, professional tone, and formatting. Dr. Patel demonstrated how AI can support keyword optimization, role-based customization, and error-free presentation to match job descriptions effectively. The session helped students translate academic and technical strengths into industry-ready resumes, improving their preparedness for campus placements and the evolving digital hiring landscape.

Expert Session on How to Create a LinkedIn Profile

On 30/07/2025, an expert session on LinkedIn profile creation and professional resume building was organized at the QEEE Hall, Main Building, GEC Modasa for students from all semesters. The session was conducted by Dr. A. J. Patel and focused on building a strong digital professional identity to support internships and placements. Students were guided on optimizing key LinkedIn sections such as headline, "About", education, skills, projects, certifications, and recommendations, along with improving profile

visibility through relevant keywords and networking practices. In addition, Dr. Patel explained practical methods to develop ATS-friendly resumes that effectively highlight engineering competencies, academic projects, and achievements. The session helped students align their technical background with industry expectations and encouraged proactive career planning through a professional online presence.



One-Day Workshop on "Concrete Mix Design"

On 19/08/2025, the Department of Civil Engineering, GEC Modasa, in collaboration with UltraTech Cement, organized a one-day workshop on "Concrete Mix Design" for 3rd, 5th, and 7th semester students. The workshop was conducted by Mr. Jay Shah (Industry Expert, UltraTech Cement) along with Dr. Ankit J. Patel (GEC Modasa), offering a balanced understanding of mix design concepts and practical construction requirements. The session covered the significance of proportioning materials, quality control measures, and standards followed in modern concrete production. A major highlight was the hands-on laboratory demonstration in the

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main building, where students actively participated in concrete preparation and performed a slump test to evaluate workability. The workshop concluded with casting of concrete cubes for subsequent compressive strength testing, providing students with practical exposure to testing procedures and field-oriented learning.



Orientation Programme for 1st Year and 3rd Semester D2D Students

On 20/08/2025, GEC Modasa conducted an orientation programme for newly admitted 1st-year students and 3rd semester Diploma-to-Degree (D2D) entrants of the Civil Engineering Branch. The session was led by Dr. A. J. Patel and Dr. P. K. Shah with the objective of ensuring a smooth academic transition for both freshers and lateral-entry students. The programme introduced students to the department's academic structure, course expectations, and available learning resources, along with an overview of laboratory facilities and safety practices. The coordinators also explained the Gujarat Technological University (GTU) examination system, attendance and assessment requirements, and the importance of professional discipline, time

management, and early engagement with core civil engineering subjects. The interactive session helped students feel welcomed, clarified academic pathways, and provided a clear roadmap for their upcoming academic journey at GEC Modasa.

GOVERNMENT ENGINEERING COLLEGE, MODASA
CIVIL ENGINEERING AND APPLIED MECHANICS DEPARTMENT
Cordially Invites You for
An Orientation program for newly admitted First Semester & 3rd Semester (D2D) Students

Know Your College -
Know Your Department-
Know Your Course

20/08/2025 11:00 a.m. QEEE (1227)

Patron	Head, Civil Engineering Department.	Head, Applied Mecha. Dept.	Faculty Coordinators
Dr. J. A. Vadher, Principal, GEC-Modasa	Dr. U. K. Khare, Professor, Civil.Engg. Dept. GEC-Modasa	Dr. D.R.Tarachandani, Associate Professor, Appl. Mecha. Dept. GEC-Modasa	Dr. A.J.Patel, Dr.P.K.Shah

MoU with Khodiyar eSolution LLP, Ahmedabad

On 30/11/2025, Government Engineering College (GEC), Modasa signed a three-year Memorandum of Understanding (MoU) with Khodiyar eSolution LLP, Ahmedabad to strengthen industry-institute collaboration and enhance student employability. The MoU focuses on structured skill development and outcome-based training to provide hands-on

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exposure to industry-relevant software and engineering tools. The collaboration also supports internship opportunities and placement assistance, enabling students to connect directly with professional roles in design and manufacturing-oriented sectors. In addition, the agreement encourages joint activities such as R&D support, technical consultancy, expert talks, and real-world project collaboration, offering students and faculty an opportunity to work on industrial problem statements. This partnership is expected to enrich practical learning, improve career readiness, and promote innovation-driven academic engagement at the institute.

Electrical Engineering Department

Set Your Goal – Roadmap to Successful Career

An expert lecture titled “Set Your Goal – Roadmap to Successful Career” was conducted on 21/08/2025. The session was delivered by Shri Hiren Thaker (Counselor and Founder, Ayanaa Academy) to guide students on goal setting, strategic planning, and personal development for career success. The talk focused on identifying strengths, defining achievable goals, improving focus and discipline, and adopting habits that support long-term growth. Practical guidance was shared on time management, skill-building, communication, and maintaining motivation during academics and placements. The interactive nature of the session encouraged students to build a personal career roadmap aligned with industry expectations and professional opportunities.



Student Sensitization Event of SSIP 2.0

A “Student Sensitization Event of SSIP 2.0” was organized for first-year students on 19/08/2025, conducted by Dr. H. S. Pandya. The session aimed to introduce students to the Student Startup & Innovation Policy (SSIP 2.0) and motivate them towards innovation, startup culture, and patent-oriented activities. A total of 28 students actively participated. The policy framework was explained with clarity, highlighting how SSIP 2.0 supports students in converting ideas into proof-of-concepts and prototypes through mentorship, financial assistance, and incubation opportunities. The session encouraged early participation in innovation initiatives and helped students understand how structured support systems can strengthen technical confidence and entrepreneurial mindset.

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MOOC Course Awareness Session

An awareness session on Massive Open Online Courses (MOOCs) was conducted on 25/07/2025 by Prof. K. K. Bhatt and Prof. S. V. Banker for B.E. students. The objective was to encourage students to pursue online certification courses alongside the regular curriculum to strengthen knowledge and improve employability. Students were guided on selecting relevant MOOCs, managing self-paced learning, and building competency in emerging tools and technologies. The session also highlighted how MOOC certifications can add value to resumes and LinkedIn profiles, support internship readiness, and promote lifelong learning habits. Overall, the session motivated students to adopt continuous upskilling to remain competitive in evolving technological domains.



Know Your College and Department, Know Your Course

An introductory session titled “Know Your College and Department, Know Your Course” was conducted on 19/08/2025 for the newly admitted students. Delivered by Prof. C. K. Bariya and Prof. D. U. Thakar, the session aimed to familiarize students with departmental facilities, laboratory resources, course structure, and academic expectations. Students were briefed about the scope of electrical engineering, learning pathways, assessment practices, and academic opportunities. The faculty also emphasized discipline, regularity, participation in technical activities, and skill development for holistic growth. The session helped students gain clarity about their academic roadmap and available support systems, enabling a confident start to their engineering journey.

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Demystifying Electrical Vehicle

An expert lecture titled “Demystifying Electrical Vehicles” was organized on 03/09/2025. The session was delivered by Mr. Tejas Sharma (Founder and Director, Trackon Power India Pvt. Ltd.) to provide participants with fundamental understanding of EV technology and the growing e-mobility sector. The talk covered key EV components such as batteries, motors, power electronics, charging infrastructure, and energy management systems, along with current industry trends and future scope. The session highlighted skill requirements and career opportunities in EV-related domains and encouraged students to explore emerging research and innovation areas. The interactive discussion helped connect theoretical concepts with real-world applications in sustainable mobility.



State-of-the-Art Power Electronics Solutions for Sustainable E-Mobility

An expert lecture on “State-of-the-Art Power Electronics Solutions for Sustainable E-Mobility” was conducted on 22/08/2025 by Shri Chirag Chauhan (Founder & Lead Consultant, ENLEC Solutions, Ahmedabad). The session provided insights into the latest power electronics technologies enabling efficient electric mobility. Topics included modern converter topologies, EV powertrain requirements, charging technologies, energy efficiency improvements, and reliability considerations. Industry trends and implementation challenges were discussed, helping participants understand how power electronics plays a central role in scalable e-mobility solutions. The session encouraged students to explore projects, internships, and research opportunities in EV and sustainable energy domains by linking core concepts with practical applications.

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Industrial Visit: 132 kV Substation (IPR, Ahmedabad)

An industrial visit to the 132 kV Substation at the Institute for Plasma Research (IPR), Ahmedabad was organized on 14/08/2025 to provide practical exposure to high-voltage substation systems and safety protocols. A total of 21 students participated. The visit enabled students to observe major substation components such as transformers, circuit breakers, isolators, bus bars, protection relays, and control panels, along with operational and maintenance practices. Technical guidance highlighted the importance of earthing, safety compliance, switching procedures, and reliability requirements in HV systems. The visit strengthened understanding of power system operation, substation design, and protection concepts through real-time observation and expert interaction.



Electronics & Communication Department

Nasha Mukta Bharat Abhiyan Event

A “Nasha Mukta Bharat Abhiyan” awareness event was organized on 13/08/2025 to sensitize students about the harmful effects of drug and substance abuse and to promote a healthy, addiction-free lifestyle. The program included awareness activities emphasizing prevention, community participation, and personal responsibility in building a drug-free society. Around 35 students actively participated in the pledge ceremony, guided by faculty members, demonstrating their commitment to avoid substance abuse and support positive social change. The event encouraged students to adopt healthy habits, make informed choices, and contribute toward a

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healthier and more responsible nation through collective effort and awareness.



Know Your College, Know Your Branch, Know Your Course

The orientation program “Know Your College, Know Your Branch, Know Your Course” was conducted on 19/08/2025 for newly admitted first-year and D2D students, along with their parents. The event aimed to introduce participants to the academic environment, departmental structure, and curriculum framework. Faculty members explained the department’s vision and mission, laboratory facilities, academic regulations, and co-curricular opportunities. The sessions also provided guidance on training and placement support, skill expectations for EC engineers, career prospects, higher education pathways, and emerging technology areas. The program strengthened student–faculty interaction, encouraged participation in academic and departmental activities, and provided a clear roadmap for academic excellence and professional development.



Computer Engineering & Information Technology Department

Guru Purnima 2025

Guru Purnima 2025 was celebrated in the college seminar hall on 10/07/2025 to emphasize the role of teachers and mentors in shaping students’ values, learning, and character. The program included speeches and interactive activities that highlighted the importance of guidance, discipline, and lifelong learning. Faculty members and students participated actively, creating a respectful and positive atmosphere. The celebration encouraged students to acknowledge the contribution of teachers and reflect on the value of knowledge and ethical conduct in academic and personal life. Overall, the event served as a meaningful platform to promote gratitude, inspiration, and a strong teacher–student relationship within the campus community.

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Vocab Vault

Vocab Vault was conducted on 19/07/2025 as an engaging word-based competition designed to strengthen students' vocabulary, communication, and quick-thinking skills. Participants took part in time-bound activities such as solving word puzzles, identifying meanings, and framing correct sentences. The event created a lively and competitive environment while supporting language proficiency and confidence in expression. Teamwork and creative thinking were encouraged through interactive rounds that required collaboration and fast decision-making. Overall, the activity promoted learning through participation and helped students improve their language skills in a fun and motivating manner.



Equation of Empowerment

The “Equation of Empowerment” activity was organized on 02/08/2025 to motivate participants toward self-confidence, growth, and positive change. The session highlighted how knowledge, skills, and awareness contribute to empowerment and personal development. Through interactive tasks and discussions, students were encouraged to build leadership qualities, teamwork, and decision-making abilities. The activity also promoted values of equality, inclusivity, and self-reliance, helping participants reflect on their potential and responsibilities. Overall, the program served as a motivating platform to develop a strong mindset and inspire students to

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become active contributors to society through informed actions and positive attitudes.



Healthy Bite – Bright Mind

“Healthy Bite – Bright Mind” was organized on 30/08/2025 to promote healthy eating habits and raise awareness about nutrition and well-being. The event featured an expert talk on mindful eating, followed by a creative fire-free cooking competition that encouraged students to prepare nutritious dishes using safe and healthy methods. Participants demonstrated innovation, teamwork, and presentation skills while learning the importance of balanced nutrition for academic performance and overall health. The activity created a positive environment that motivated students to adopt healthier lifestyle choices and develop practical awareness about food quality and daily habits. Overall, the event successfully combined learning with creativity and encouraged students to make health-conscious decisions.



Mental Health Awareness Session

A Mental Health Awareness Session was organized on 17/12/2025 to educate students about mental well-being and encourage healthy coping practices. The session focused on reducing stigma, promoting open discussion, and increasing awareness about stress, anxiety, and emotional health commonly faced during academic life. Students were guided on practical strategies for stress management, emotional resilience, time management, and building supportive peer connections. The session also emphasized recognizing early signs of mental health concerns and seeking appropriate help when needed. Overall, the program created a supportive environment and encouraged students to maintain a balanced academic and personal life through positive habits and informed awareness.

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Industry Visit at BISAG

An industry visit to Bhaskaracharya Institute for Space Applications and Geo-Informatics (BISAG), Gandhinagar was organized on 30/07/2025 for academic enrichment of Computer Engineering and Information Technology students. A total of 85 students from the 3rd and 5th semesters participated. The objective was to bridge classroom learning with real-world applications by exposing students to technologies such as Geographic Information Systems (GIS), remote sensing, satellite communication, e-governance solutions, and software development practices. Technical demonstrations and interaction with professionals helped students understand industrial workflows, current standards, and emerging trends. The visit enhanced awareness of applied engineering domains and motivated students to explore future opportunities in advanced technology-driven sectors.

Industry Visit at TOPS Technologies

An industry visit to TOPS Technologies, Ahmedabad was organized on 06/08/2025 to enhance practical exposure for Computer Engineering and Information Technology students. A total of 60 students from the 3rd and 5th semesters participated. The visit aimed to introduce students to a professional IT environment and industry-oriented training practices. Students received insights into software development life cycle processes, programming technologies, web and mobile application development, data science, and career-focused skill development. Experts interacted with participants to discuss current industry trends, in-demand skills, and the importance of project-based learning for employability. The visit supported industry readiness by helping students understand workplace expectations and the skill roadmap needed for career growth in the IT sector.

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Mechanical & Automobile Engineering Department

Industrial Visit – Radhe Ice Makers

An industrial visit to Radhe Ice Makers, Gajan was organized on 19/08/2025 to provide students with practical exposure to industrial refrigeration and manufacturing operations. Students observed the complete ice production cycle, including water treatment, freezing, harvesting, and storage. The visit also offered clear understanding of key refrigeration components such as compressors, condensers, expansion valves, and safety mechanisms, along with basic operational controls. Emphasis was given to industrial safety practices and quality control measures followed in production and storage. The visit helped students relate theoretical concepts of thermodynamics and refrigeration to real industrial systems and strengthened their understanding through direct observation and interaction. Overall, the visit effectively bridged classroom learning with field-level industrial applications.

Know Your College – Know Your Department – Know Your Course Program

An orientation and introductory presentation was conducted on 19/08/2025 for newly admitted first-semester and D2D students to familiarize them with the academic environment and departmental ecosystem. The session covered the institution's background, vision and mission, department overview, laboratory facilities, curriculum structure, academic regulations, and available student support and development opportunities. Students were also informed about learning resources, co-curricular platforms, and how to plan their academic journey effectively from the first semester. The program helped build clarity regarding course expectations and encouraged students to actively participate in academic and departmental activities. Overall, the session supported a smooth transition for new students and provided a clear roadmap for academic and professional growth.

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Creating an Impactful LinkedIn Profile and Effective Resume Building Using AI Tools

A workshop on “Creating an Impactful LinkedIn Profile and Effective Resume Building Using AI Tools” was conducted on 27/07/2025 at 11:00 AM to help students build a strong digital professional identity and prepare industry-ready resumes. Students from 1st, 3rd, 5th, and 7th semesters participated actively. The session guided students on optimizing LinkedIn sections such as headline, about, skills, projects, certifications, and networking practices. It also demonstrated how AI tools can support resume structuring, keyword alignment, clarity improvement, and role-based customization to match industry expectations. The workshop encouraged students to showcase technical strengths effectively and improve placement readiness through professional online presence and well-structured resumes.

58th Engineer’s Day Celebration

The 58th Engineer’s Day was celebrated on 15/09/2025 at 2:00 PM in Seminar Hall (6206) to commemorate the birth anniversary of Sir M. Visvesvaraya and to highlight the contribution of engineers in nation-building. The program included speeches and interactions that emphasized innovation, professionalism, and ethical responsibility in engineering practice. Students were motivated to pursue excellence, adopt problem-solving mindset, and contribute to society through technical knowledge and dedication. The event created an enthusiastic and inspiring atmosphere, encouraging participants to align their academic learning with real-world engineering challenges. Active involvement of student coordinators added energy and engagement to the celebration, making the event meaningful and memorable for all attendees.



RESEARCH AND OUTREACH

Applied Mechanics & Civil Engineering Department

Dr. U. K. Khare published “Assessing Water Quality through Remote Sensing: A Regression-Based Approach with Sentinel-2 Data” in *Nature Environment and Pollution Technology* (ISSN: 9726268), 2025.

Dr. U. K. Khare published “Integrated Treatment of Ozonation and Aerobic Biodegradation for Mixed Azo Dyes” in *International Journal of Latest Technology in Engineering, Management & Applied Science (IJLTEMAS)* (ISSN: 2278-2540), Vol. 14, Issue 10.

Electrical Engineering Department

Prof. D. U. Thakar authored the research article “Fuzzy Based Direct Torque Control of Induction Motor for Electric Vehicles” in the *Journal of Information Systems Engineering and Management* (ISSN: 2468-4376) dated 28/02/2026

Computer Engineering & Information Technology Department

Prof. S. A. Vahora published “XMal-CNN: An Explainable Deep Neural Model for Automated Malaria Detection from Blood Smear Images” in the *Journal of Innovative Image Processing* (ISSN: 2582-4252), Vol. 7, Issue 3, on 01/09/2025

Prof. N. N. Maltare published “From Algorithms to Connectivity: A Comprehensive Review of Traffic Signal Optimization and Communication Based Cooperative Control” in *Archives of*

Computational Methods in Engineering (ISSN: 1886-1784), Nov 2025 (Publisher: Springer | Impact Factor: 11.9).

Prof. V. R. Patel published “From Algorithms to Connectivity: A Comprehensive Review of Traffic Signal Optimization and Communication Based Cooperative Control” in *Archives of Computational Methods in Engineering* (ISSN: 1886-1784), Nov 2025.

Prof. R. J. Prajapati published “An In-Depth Comparative Study of Adaptive k-Anonymity Methods for Streaming Data Privacy” in the *Journal of Trends in Computer Science and Smart Technology* (ISSN: 2582-4104), Vol. 7, Issue 3, pp. 438–458, Sep 2025.

Prof. M. M. Goyani published “Enhanced Content-Based Image Retrieval Using Multivisual Features Fusion” in the *International Journal of Computers and Applications* (ISSN: 1925-7074), Vol. 47, Issue 10, pp. 1–22, Jul 2025

Prof. P. J. Patel published “A Secure Medical Image Encryption Framework Using Three-Dimensional Chaotic Systems and Dynamic DNA Encoding” in the *Journal of Applied Bioanalysis* (ISSN: 2405-710X), Vol. 11, Issue 13, pp. 99–110, Dec 2025

Dr. M. M. Goyani delivered an expert session on “AI in HealthCare” at CITE, North Eastern Mindanao State University, Rosario, Tandag, Philippines, under iTECHCONNECT: International Technofair on Computer Science and Emerging Technologies dated 17/11/2025.

Dr. M. M. Goyani delivered a talk on “Unsupervised Learning: Clustering and Dimensionality Reduction” during the One Week ATAL FDP on “Advancements in Data Science and Machine Learning: Concepts to Applications” at

RESEARCH AND OUTREACH

Government Engineering College, Modasa dated 08/09/2025.

Prof. P. J. Patel delivered an expert talk on “Linear Regression and KNN” at SPEC, Anand dated 22/09/2025.

Prof. P. J. Patel delivered a talk on “Supervised Learning: Regression and Classification in Practice” during the One Week ATAL FDP on “Advancements in Data Science and Machine Learning: Concepts to Applications” at Government Engineering College, Modasa dated 09/09/2025.

Prof. P. J. Patel delivered a session on “Psychology of Indian Society” in a Teacher Training Program organized by Safal Vidyalaya at Safal Vidyalaya, Gandhinagar dated 03/11/2025.

Prof. P. J. Patel delivered a session on “Future of AI in Education” in a Teacher Training Program organized by Safal Vidyalaya at Safal Vidyalaya, Gandhinagar dated 03/11/2025.

Mechanical Engineering Department

Dr. J. A. Vadher published “An Impact of Reinforcement on Aluminum Metal Matrix Composites: A Critical Review” in the International Journal of Computational and Experimental Science and Engineering (IJCESN) (ISSN: 2149-9144), Vol. 11, Issue 3, pp. 6576–6590, dated 21/08/2025

Dr. J. A. Vadher published “Investigation of Mechanical and Morphological Properties of ADC-12/SiC Reinforced Metal Matrix Composite Using Bottom Pouring Stir Casting Process” in the Journal

of Advanced Research in Applied Mechanics (ISSN: 2289-7895), Vol. 140, Issue 1, pp. 124–138, dated 06/07/2025.

Prof. M. G. Patel delivered an expert lecture on “Solar Still” at Jawahar Navodaya Vidyalaya, Vejalpur, Panchmahal dated 25/09/2025.

Dr. P. M. Mistri delivered an expert lecture on “Introduction to Solar Energy and Career Guidance” at Jawahar Navodaya Vidyalaya, Vejalpur, Panchmahal dated 25/09/2025.

Science and Humanities Department

Prof. K. B. Naik published “An Integrated Retail Inventory Optimization Under Time-and Price-Based Demand Considering Promotional Efforts, Preservation Technology, and Green Investment” in Process Integration and Optimization for Sustainability (Publisher: Springer Nature; Impact Factor: 2.5).

PARTICIPATION

Applied Mechanics & Civil Engineering Department

Name	Training/Program	Organization	Duration
Prof. M. M. Bhunga	FDP: Smart Teaching with AI Tools (Animation and Storytelling)	TOP Technologies	31/12/2025 – 31/12/2025
Prof. M. M. Bhunga	MOOC: Bridge Engineering and Geotechnical Engineering – 2	SWAYAM, NPTEL	12 Weeks (Dates not provided)
Prof. M. M. Bhunga	Webinar: Teaching Tools for Next Generation Students	KCG (Education Department, Government of Gujarat)	04/12/2025 – 04/12/2025
Dr. S. S. Singh	FDP: A Hands-on Approach to Well-being and Sustainability	GP Ahmedabad	08/10/2025 – 09/10/2025
Dr. P. K. Shah	Innovation and Sustainable Technologies for Water Treatment: Trends and Future Perspectives	PDEU	08/09/2025 – 13/09/2025
Dr. P. K. Shah	Empowering Women in Cyber Security	KCG Ahmedabad	15/12/2025 – 19/12/2025
Dr. P. K. Shah	Adani Cement Future X Conclave	Adani University	26/09/2025 – 26/09/2025
Dr. P. K. Shah	GIAN Course: AI and ML Algorithms – A Comprehensive Study	GTU	15/09/2025 – 20/09/2025

Electrical Engineering Department

Name	Training/Program	Organization	Duration
Prof. K. R. Patel	Soft Skill Development	Knowledge Consortium of Gujarat (Education Department, Government of Gujarat)	17/10/2025 – 17/10/2025
Prof. K. R. Patel	Smart Teaching with AI Tools: Enhancing Classroom Delivery Through Animation and Storytelling	TOPS Technologies	31/12/2025 – 31/12/2025
Dr. Nirav Patel	Artificial Intelligence, Law and Justice	SWAYAM, NPTEL (MOOC)	18/08/2025 – 10/10/2025

PARTICIPATION

Computer Engineering & Information Technology Department

Name	Training/Program	Organization	Duration
Prof. S. A. Vahora	AICTE ATAL Academy FDP: "Advancements in Data Science and Machine Learning: Concepts to Applications"	GEC Modasa (Online)	08/09/2025 – 13/09/2025
Prof. N. N. Maltare	AICTE ATAL Academy FDP: "Advancements in Data Science and Machine Learning: Concepts to Applications"	GEC Modasa (Online)	08/09/2025 – 13/09/2025
Prof. N. N. Maltare	MOOC: Joy of Computing with Python	SWAYAM, NPTEL (IIT Kharagpur) (Online)	21/07/2025 – 10/10/2025
Prof. V. A. Rathod	MOOC: Joy of Computing with Python	SWAYAM, NPTEL (IIT Kharagpur) (Online)	21/07/2025 – 10/10/2025
Prof. U. R. Bhoi	MOOC: Joy of Computing with Python	SWAYAM, NPTEL (IIT Kharagpur) (Online)	21/07/2025 – 10/10/2025
Prof. N. V. Nagekar	MOOC: Joy of Computing with Python	SWAYAM, NPTEL (IIT Kharagpur) (Online)	21/07/2025 – 10/10/2025
Prof. V. A. Rathod	AICTE ATAL Academy FDP: "Advancements in Data Science and Machine Learning: Concepts to Applications"	GEC Modasa (Online)	08/09/2025 – 13/09/2025
Prof. N. D. Goriya	AICTE ATAL Academy FDP: "Advancements in Data Science and Machine Learning: Concepts to Applications"	GEC Modasa (Online)	08/09/2025 – 13/09/2025
Prof. U. R. Bhoi	AICTE ATAL Academy FDP: "Advancements in Data Science and Machine Learning: Concepts to Applications"	GEC Modasa (Online)	08/09/2025 – 13/09/2025
Prof. N. V. Nagekar	AICTE ATAL Academy FDP: "Advancements in Data Science and Machine Learning: Concepts to Applications"	GEC Modasa (Online)	08/09/2025 – 13/09/2025
Dr. M. N. Patel	AICTE ATAL Academy FDP: "Advancements in Data Science and Machine Learning: Concepts to Applications"	GEC Modasa (Online)	08/09/2025 – 13/09/2025
Dr. M. M. Goyani	AICTE ATAL Academy FDP: "Advancements in Data Science and Machine Learning: Concepts to Applications"	GEC Modasa (Online)	08/09/2025 – 13/09/2025

PARTICIPATION

Name	Training/Program	Organization	Duration
Prof. S. R. Patel	AICTE ATAL Academy FDP: "Advancements in Data Science and Machine Learning: Concepts to Applications"	GEC Modasa (Online)	08/10/2025 – 13/09/2025
Prof. N. V. Nagekar	MOOC: Introduction to Industry 4.0 and Industrial Internet of Things	SWAYAM, NPTEL (IIT Kharagpur) (Online)	21/07/2025 – 10/10/2025
Prof. H. R. Patel	AICTE ATAL Academy FDP: "Advancements in Data Science and Machine Learning: Concepts to Applications"	GEC Modasa (Online)	08/09/2025 – 13/09/2025
Prof. U. G. Chauhan	AICTE ATAL Academy FDP: "Advancements in Data Science and Machine Learning: Concepts to Applications"	GEC Modasa	08/09/2025 – 13/09/2025
Prof. P. J. Patel	GIAN Course FDP: Artificial Intelligence and Machine Learning Algorithms: A Comprehensive Study	GTU (GIAN)	15/09/2025 – 19/09/2025
Prof. P. J. Patel	NPTEL Online Course: Joy of Computing with Python	Online NPTEL	21/07/2025 – 10/10/2025
Prof. P. J. Patel	NPTEL Online Course: Programming in Modern C++	Online NPTEL	21/07/2025 – 10/10/2025
Prof. P. J. Patel	Online Webinar: Financial Awareness	KCG, GoG	16/12/2025 – 16/12/2025
Prof. P. J. Patel	Online Webinar: Mental Health Importance in Education System	KCG, GoG	21/11/2025 – 21/11/2025
Prof. P. J. Patel	Online Webinar: Winter, Food & Fitness	KCG, GoG	12/11/2025 – 12/11/2025

Mechanical & Automobile Engineering Department

Name	Training/Program	Organization	Duration
Prof. M. G. Patel	NPTEL-AICTE FDP: Sustainable Energy Technology	SWAYAM, NPTEL (Online)	21/07/2025 – 10/10/2025
Prof. M. G. Patel	NPTEL-AICTE FDP: Artificial Intelligence in Industrial and Management Engineering	SWAYAM, NPTEL (Online)	18/08/2025 – 10/10/2025

PARTICIPATION

Name	Training/Program	Organization	Duration
Prof. M. G. Patel	NPTEL-AICTE FDP: Psychology of Learning	SWAYAM, NPTEL (Online)	21/07/2025 – 10/10/2025
Prof. M. G. Patel	ATAL-AICTE FDP: Recent Developments in Micro/Nano Machining in the Context of Industry 4.0	GEC Dahod (ATAL-AICTE) (Online)	15/09/2025 – 20/09/2025
Prof. H. I. Chaudhari	NPTEL-AICTE FDP: Sustainable Energy Technology	SWAYAM, NPTEL (Online)	21/07/2025 – 10/10/2025
Prof. H. I. Chaudhari	NPTEL-AICTE FDP: Artificial Intelligence in Industrial and Management Engineering	SWAYAM, NPTEL (Online)	18/08/2025 – 10/10/2025
Prof. H. I. Chaudhari	NPTEL-AICTE FDP: Psychology of Learning	SWAYAM, NPTEL (Online)	21/07/2025 – 10/10/2025
Prof. H. I. Chaudhari	ATAL-AICTE FDP: Recent Developments in Micro/Nano Machining in the Context of Industry 4.0	GEC Dahod (ATAL-AICTE) (Online)	15/09/2025 – 20/09/2025
Dr. P. M. Mistri	NPTEL-AICTE FDP: Artificial Intelligence in Industrial and Management Engineering	SWAYAM, NPTEL (Online)	18/08/2025 – 10/10/2025
Dr. P. M. Mistri	NPTEL-AICTE FDP: Psychology of Learning	SWAYAM, NPTEL (Online)	21/07/2025 – 10/10/2025
Dr. P. M. Mistri	ATAL-AICTE FDP: Recent Developments in Micro/Nano Machining in the Context of Industry 4.0	GEC Dahod (ATAL-AICTE) (Online)	15/09/2025 – 20/09/2025
Dr. P. M. Mistri	Paper Presentation: “Biogas for Rural Prosperity: Review on Enhancing Yield, Stability, and Socioeconomic Impact” (Udayamayatra 2025 – AICTE-VAANI)	Government Polytechnic, Ahmedabad (AICTE-VAANI)	31/07/2025 – 02/08/2025
Dr. P. M. Mistri	Co-authorship Paper Presented: “Recent Developments and Innovations in Hybrid Solar Drying: A Review” (Udayamayatra 2025 – AICTE-VAANI)	Government Polytechnic, Ahmedabad (AICTE-VAANI)	31/07/2025 – 02/08/2025

PARTICIPATION

Name	Training/Program	Organization	Duration
Dr. D. R. Shah	NPTEL-AICTE FDP: Sustainable Energy Technology	SWAYAM, NPTEL (Online)	21/07/2025 – 10/10/2025
Dr. D. R. Shah	NPTEL-AICTE FDP: Psychology of Learning	SWAYAM, NPTEL (Online)	21/07/2025 – 10/10/2025
Dr. J. C. Gamit	NPTEL-AICTE FDP: Artificial Intelligence in Industrial and Management Engineering	SWAYAM, NPTEL (IIT Kanpur) (Online)	18/08/2025 – 10/10/2025
Dr. J. C. Gamit	NPTEL-AICTE FDP: Public Speaking	SWAYAM, NPTEL (IIT Roorkee) (Online)	21/07/2025 – 10/10/2025
Dr. J. C. Gamit	NPTEL-AICTE FDP: Sustainable Power Generation Systems	SWAYAM, NPTEL (IIT Guwahati) (Online)	21/07/2025 – 10/10/2025
Dr. J. C. Gamit	NPTEL-AICTE FDP: Interfacial Fluid Mechanics	SWAYAM, NPTEL (IIT Hyderabad) (Online)	21/07/2025 – 10/10/2025
Dr. J. C. Gamit	NPTEL-AICTE FDP: Educational Technology and ICT	SWAYAM, NPTEL (Visva-Bharati University) (Online)	20/01/2025 – 11/04/2025
Dr. J. C. Gamit	NPTEL-AICTE FDP: Non-conventional Energy Resources	SWAYAM, NPTEL (IIT Madras) (Online)	20/01/2025 – 11/04/2025
Dr. J. C. Gamit	ATAL-AICTE FDP: Recent Developments in Micro/Nano Machining in the Context of Industry 4.0	ATAL-AICTE (GEC Dahod) (Online)	15/09/2025 – 20/09/2025

Science and Humanities Department

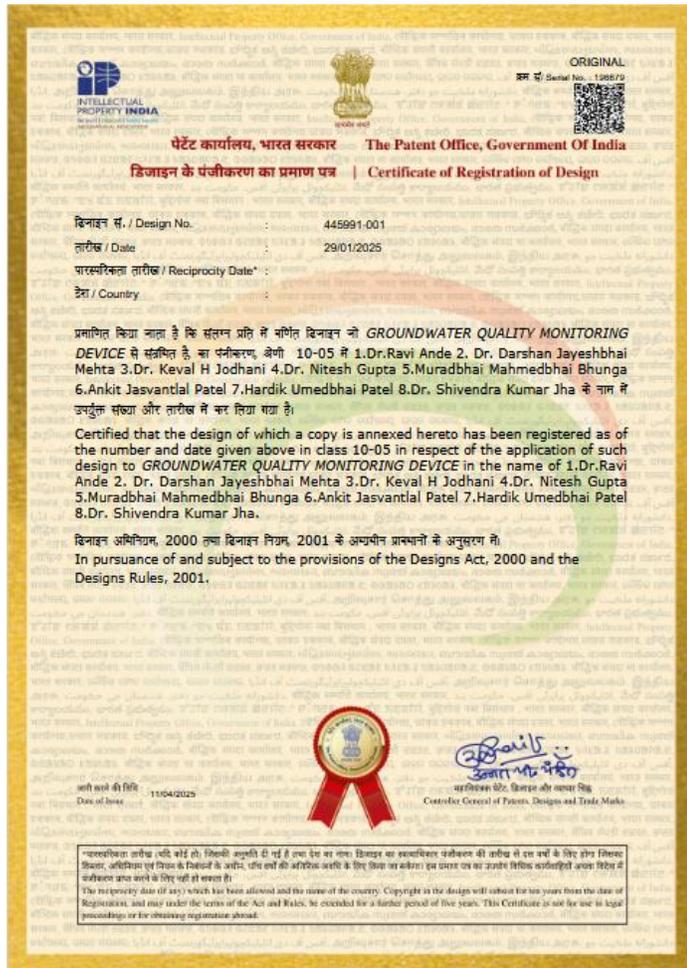
Name	Training/Program	Organization	Duration
Prof. M. A. Patel	MOOC: Mathematics for Economics – I	NPTEL-AICTE (MOOC Online)	21/07/2025 – 10/10/2025
Prof. D. J. Prajapati	MOOC: Mathematics for Economics – I	NPTEL-AICTE (MOOC Online)	21/07/2025 – 10/10/2025

ACHIEVEMENTS

FACULTY ACHIEVEMENTS

Prof. H. K. Sharma from Civil Department was awarded the Best Sector Officer for Aravalli District in recognition of his notable contributions and effective performance in assigned sector responsibilities, reflecting professional excellence and impactful service.

Dr. A. J. Patel from Applied Mechanics Department received approval for a design patent on the “Groundwater Quality Monitoring Device,” highlighting the institute’s innovation culture and strengthening intellectual property outcomes through a practical, technology-oriented solution.



Prof. M. M. Bhunga from Civil Engineering Department was awarded the NPTEL Discipline Star by NPTEL, IIT Madras, acknowledging active participation and consistent contribution in NPTEL courses, demonstrating commitment to continuous learning and quality teaching–learning practices.

Dr. N. D. Patel received an Elite-Gold grade by securing a position among the top 5% toppers in the SWAYAM–NPTEL online MOOC proctored examination. The achievement was earned in the course titled “Artificial Intelligence, Law and Justice”, completed during the period 18/08/2025 to 10/10/2025.

Dr. H. R. Patel successfully completed the Ph.D. on 21/07/2025, marking a significant academic milestone and strengthening the institute’s research capacity through advanced scholarly achievement.

Dr. P. J. Patel coordinated a one-week AICTE Training and Learning (ATAL) Academy FDP on “Advancements in Data Science and Machine Learning: Concepts to Applications”, conducted in online mode from 08/09/2025 to 13/09/2025, contributing to capacity building and upskilling of faculty participants in emerging AI/ML domains.

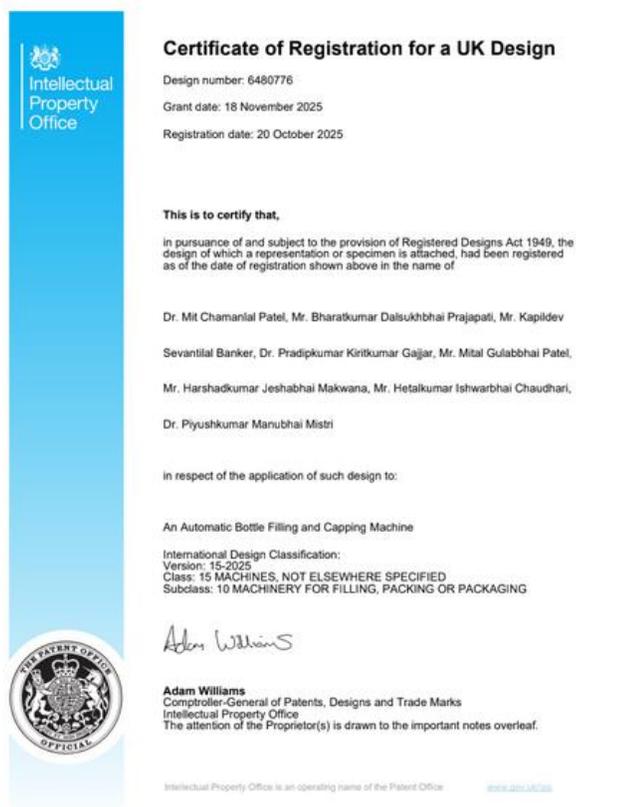
Chauhan Meeta successfully completed the Doctor of Philosophy (Ph.D.) in Mechanical Engineering under the guidance of **Dr. J. A. Vadher** in August 2025, marking a significant research milestone and strengthening the department’s postgraduate research outcomes.

Prof. M. G. Patel was recognized as an NPTEL Motivated Learner under the NPTEL Stars initiative for the period July–December 2025, a prestigious recognition conferred by NPTEL, IIT Madras for sustained engagement in technology-enhanced learning.

ACHIEVEMENTS

Prof. H. I. Chaudhari was recognized as an NPTEL Motivated Learner under the NPTEL Stars initiative for the period July–December 2025, awarded by NPTEL, IIT Madras for active participation and consistent performance in NPTEL learning activities.

Dr. P. M. Mistri, Prof. M. G. Patel, and Prof. H. I. Chaudhari achieved a major intellectual property milestone with the registration of a UK Design Patent under the Certificate of Registration (Design Number: 6480776), granted on 18/11/2025 by the UK IPO Office, highlighting innovation and global IP outreach.



Prof. Kunal V. Fadadu authored the book “Vehicle Testing and Homologation”, which has been adopted as a reference/textbook in the syllabus of VNIT Nagpur (M.Tech Electric Vehicle Technology course), reflecting academic impact and national-level recognition. The same book “Vehicle Testing and Homologation” by Prof. Kunal V. Fadadu has also been included as a reference/textbook in the syllabus of VIT

Chennai for the B.Tech Automobile course, demonstrating wide acceptance and relevance in automobile engineering education.

Dr. J. C. Gamit was recognized as an NPTEL Motivated Learner (July–December 2025) under the NPTEL Stars initiative for appearing in 12 NPTEL examinations across four semesters with a 100% success rate, reflecting exceptional consistency and commitment to continuous learning.

Dr. J. C. Gamit was also recognized as an NPTEL Believer (July–December 2025) under the NPTEL Stars initiative for appearing in 4 NPTEL exams and achieving certification in all courses during that semester, demonstrating strong academic discipline and performance.

Dr. J. C. Gamit earned the title of NPTEL Discipline Star (July–December 2025) under the NPTEL Stars initiative by successfully completing NPTEL courses totaling 124 weeks in Mechanical Engineering, with final scores of 55 or above in each course.

Dr. J. C. Gamit also achieved NPTEL Discipline Star (January–April 2025) under the NPTEL Stars initiative by completing NPTEL courses totaling 64 weeks in Humanities and Social Sciences, maintaining scores of 55 or above in each course.

Dr. J. C. Gamit secured a Top-5% rank in the NPTEL course “Sustainable Power Generation Systems” (July–October 2025), organized through SWAYAM–NPTEL (IIT Guwahati), highlighting strong merit-based performance in a core energy systems domain.

Dr. J. C. Gamit secured a Top-1% rank in the NPTEL course “Non-Conventional Energy Resources” (January–April 2025), conducted through SWAYAM–NPTEL (IIT Madras), reflecting outstanding achievement at the national level.

ACHIEVEMENTS

STUDENT ACHIEVEMENTS

The boys' volleyball team won the GTU Zone-2 Zonal Tournament, securing the championship title through strong coordination and competitive performance.

The boys' chess team reached the finals in the GTU Zonal Tournament, demonstrating consistent strategic play and discipline.

The girls' chess team also reached the finals in the GTU Zonal Tournament, reflecting excellent teamwork and competitive consistency.

The girls' badminton team won the GTU Zone-2 Zonal Tournament, achieving the championship with strong match performance.

The boys' badminton team reached the semi-finals in the GTU Zone-2 Zonal Tournament, showing commendable effort and competitive spirit.

Three girl students were selected for the AIU Interzonal level, highlighting their high-level sporting achievement and future competitive potential.

The boys' kabaddi team reached the semi-finals in the GTU Zonal Tournament, contributing to the institute's overall sports performance.

"Science is a language that transcends boundaries; it is a universal tool for understanding the world."

Sir Chandrasekhara Venkata

"C. V." Raman

Electric Vehicles in the Era of Power Electronics, Intelligence, and Energy Transition: The Electric Mobility Inflection Point

Electric vehicles (EVs) have evolved from experimental alternatives into fully integrated electro-mechanical–digital systems, driven by advances in power electronics, electrochemical storage, control theory, and energy economics. Global EV sales exceeded 14 million units in 2023, representing nearly 18% of global new vehicle sales, while India crossed 1.5 million registered EVs, dominated by two-wheelers, three-wheelers, and shared mobility fleets [1], [10]. This transition is no longer purely policy-driven; it reflects deep technological maturation that has closed performance and cost gaps with internal combustion platforms.

Vehicular Architecture and Power Electronics Evolution

Contemporary EVs increasingly employ skateboard vehicle architectures, where battery packs serve as structural elements, improving torsional rigidity, crash safety, and packaging efficiency. A major technological shift has occurred in traction inverters, moving from silicon IGBT-based designs to silicon carbide (SiC) MOSFET power electronics, enabling higher switching frequencies (20–40 kHz), reduced conduction losses, and power-density improvements exceeding 30%. Global manufacturers are also transitioning toward 800 V DC architectures, which reduce current levels, lower copper losses, and enable ultra-fast charging beyond 300 kW, improving overall vehicle efficiency [5], [8].

Traction Motor Technologies and Electromagnetic Optimization

Permanent Magnet Synchronous Motors (PMSMs) dominate current EV platforms due to their high torque density (>5 Nm/kg) and peak efficiencies above 96%. However, rare-earth material supply constraints have renewed interest in PM-assisted synchronous reluctance motors and advanced induction machines. High-fidelity finite-element electromagnetic optimization, combined with model predictive torque control, AI-assisted flux weakening, and adaptive vector control, has significantly improved efficiency across wide speed and load ranges [2], [6].

Battery Chemistry, Pack Design, and Thermal Integrity

Lithium-ion batteries remain the backbone of EV energy storage. Globally, nickel-rich NMC chemistries dominate long-range vehicles, while lithium iron phosphate (LFP) chemistry has gained strong traction in India due to lower cost, improved safety, and thermal robustness. Commercial EV battery packs currently achieve 180–220 Wh/kg, while solid-state and semi-

solid laboratory prototypes have demonstrated energy densities exceeding 350 Wh/kg [4], [6]. Advanced liquid and immersion cooling systems are essential to maintain cell temperature gradients below 5 °C, directly impacting fast-charging capability, degradation rates, and thermal safety.

Battery Management Systems as Intelligent Energy Supervisors

The Battery Management System (BMS) has evolved into a safety-critical cyber-physical controller. Modern BMS implementations use Kalman filter-based state-of-charge estimation, electrochemical impedance analysis, and machine-learning-driven state-of-health prediction. Fleet-scale data analytics indicate that AI-assisted BMS strategies can extend usable battery life by 10–20%, particularly under high-temperature and high-utilization conditions common in Indian operating environments [4], [6].

Advanced Braking Mechanism and Energy Recovery

Regenerative braking is a defining efficiency advantage of EVs, enabling recovery of approximately 15–30% of kinetic energy during urban driving cycles [2]. Brake-by-wire architectures blend regenerative and friction braking through coordinated electro-hydraulic control. Recent research focuses on AI-based brake blending algorithms that dynamically optimize energy recovery while preserving vehicle stability, pedal feel, and compliance with functional safety standards [3].

Deep Learning, AI, and Software-Defined Vehicles

EVs are increasingly designed as software-defined vehicles, where performance characteristics are governed by control algorithms rather than fixed hardware parameters. Deep learning models are used for energy optimization, range prediction, driver behavior modeling, and fault diagnostics. Neural-network-based battery degradation models and OTA-enabled powertrain updates have become standard practices, fundamentally changing vehicle lifecycle management and post-sale performance optimization [5], [8].

Autonomous Functions and Advanced Driver Assistance Systems

Advanced Driver Assistance Systems (ADAS), including adaptive cruise control, lane-keeping assistance, and autonomous emergency braking, are becoming standard features across EV segments. Sensor fusion using cameras, radar, and ultrasonic sensors enables Level-2 autonomy, while experimental platforms approach Level-3 autonomy in constrained domains. Power-efficient perception and decision algorithms are critical to avoid excessive auxiliary energy consumption in electric platforms [5].

Safety, Standards, and Functional Reliability

EV safety engineering integrates ISO 26262 functional safety, ASIL-D compliant motor controllers, and multi-layer battery protection strategies. In India, AIS-156 and AIS-038 regulations mandate stringent thermal runaway containment, electrical isolation, and fault detection requirements, significantly improving EV safety under tropical and high-load operating conditions [7], [10].

Indian Technical Sidebar: EV Engineering Tailored for Local Conditions

Tata Motors has localized LFP battery pack manufacturing and developed its Ziptron powertrain architecture, achieving real-world drivetrain efficiencies above 90%.

Ola Electric uses centralized vehicle controllers with OTA-enabled energy optimization across its scooter platforms.

Ather Energy integrates predictive thermal management and fast-charging-optimized battery packs designed specifically for Indian urban duty cycles.

Outlook: The Next Decade of Electric Mobility

According to the International Energy Agency, electric vehicles are projected to account for 35–40% of global new vehicle sales by 2030, driven by declining battery costs, power electronics innovation, and tightening emission regulations [1]. Economic and technology assessments by McKinsey & Company indicate that software, power electronics, and digital services will contribute nearly 45% of total EV value creation by 2035, underscoring the strategic importance of AI and embedded intelligence in future EV platforms [8].

Research roadmaps published in Nature Energy and the Journal of Power Sources forecast that solid-state and semi-solid battery technologies will push pack-level energy densities beyond 300 Wh/kg, while simultaneously improving safety and cycle life [4], [6]. Parallel studies highlight growing industrial momentum toward rare-earth-light motor technologies to mitigate supply-chain risks and geopolitical dependencies [2], [6].

From a power-system perspective, coordinated charging and vehicle-to-grid (V2G) integration could provide 10–20% peak-load flexibility in renewable-dominated grids by 2035, as projected by the International Energy Agency and the U.S. National Renewable Energy Laboratory [1], [9]. For India specifically, NITI Aayog estimates that large-scale EV adoption could reduce oil imports by USD 60–70 billion annually by 2030, while enabling deeper integration of renewable energy into the national grid [10]. Collectively, these trends position EVs not merely as transportation devices, but as intelligent, grid-interactive energy assets central to future mobility and power ecosystems.

TRENDING TECH TALKS

References

1. International Energy Agency, Global EV Outlook 2024, Paris, France.
2. M. Ehsani, Y. Gao, and A. Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles, CRC Press.
3. J. Neubauer and E. Wood, “The impact of range and charging infrastructure on EV adoption,” Energy Policy.
4. B. Scrosati et al., “Lithium-ion batteries: Status and future,” Nature Energy.
5. IEEE Spectrum, “Silicon carbide and the future of EV power electronics.”
6. Journal of Power Sources, Q1 review and roadmap articles on EV batteries and motors.
7. SAE International, Electric Vehicle Functional Safety and Standards.
8. McKinsey & Company, The Future of Electric Mobility.
9. National Renewable Energy Laboratory, Vehicle-to-Grid Integration Studies.
10. NITI Aayog & Rocky Mountain Institute, India’s Electric Mobility Transformation.

Dr. Vipulkumar Upadhyay

Professor and Head

Electrical Engineering Department

GEC Modasa

વિજ્ઞાન જ્યોત



માત્ર વિષય નથી વિજ્ઞાન , એ જીવવાની એક રીત
માનવ વિકાસના સર્વ પડકારો, ઝીલવાની એની પ્રીત

શોધ સંશોધનની કેડીઓ, કંડારે એ નવનીત
શક્તિ એની અનંત અસીમ, તોય રહે વિનીત

વૈજ્ઞાનિક અભિગમની હિમાયત, બંધારણમાં પ્રતીત
લઈશું એમાં બહુ કિફાયત, વિચાર જણાય એ પતિત

કસોટી કરીએ સઘળી વાતોની, તર્કના સક્ષમ એરણે
ભ્રમણાઓના વહાણ થંભાવીએ, માહિતીના આ રણે

CREATIVE CORNER

નથી નસીબની રેખામાં, કે નથી ગ્રહોના પ્રવાસમાં
સફળતા તો અચૂક છુપાઈ, માનવ તણા પ્રયાસમાં

હોય શ્રદ્ધાનો જો વિષય, તોય પુરાવાની જરૂર
કાર્ય-કારણ નો સંબંધ સ્થાપવો, આજનો સુરુર

ચાર દીવાલોના બંધનથી, પ્રયોગશાળા ન બંધાય
મનવિચારના પ્રયોગથી, ગ્રેવિટી અનંત ફેલાય

ખોટું પડે વિજ્ઞાન તો, પોતે સહર્ષ સ્વીકારે
નિયમો એના તુરંત સુધારી, ખુદને એ વિસ્તારે

જાતિ ધર્મ કે પ્રાંતથી ઉપર, માનવતાનો ધર્મ
વિજ્ઞાનપ્રસારના સર્વ પ્રયાસો, સાચ્યે ઉન્નત કર્મ

વિજ્ઞાન જ્યોત ઝળહળતી રહે, માનવ કલ્યાણને કાજ
માનવ મસ્તકે સદા સોહે, પાવન પ્રગતિનો તાજ

 - પ્રો. મિતુલ મકવાણા

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