## **Innovations by Faculty in Teaching and Learning**

In addition to standard classroom teaching and learning, the department implements innovative ideas and their subsequent implementation through initiatives to enhance students' learning experiences.

The department is always working to:

• Use creative methods to improve student learning.

• Enhance students' understanding and proficiency with innovative techniques and approaches.

• Use creative approaches to broaden students' understanding of new academic tools and technologies as well as current and social challenges. Through various club activities, encourage students to think, create, and perform in novel ways.

Innovative methods are implemented in our E & TC department. Our teaching faculty utilizes at least one innovative teaching method as shown in figure 1.



### Fig.1. Innovative Teaching-Learning Method

Method	Description	Activity/TOOLS	Impact
Use of Virtual Labs and Simulation	Digital replicas of laboratory setups allow experimentation and learning without physical constraints.	Virtual Labs, YouTube and NPTEL links, MATLAB Simulink, NI, Multisim, Proteus	-Facilitates remote experimentation and Visualization of abstract concepts
Project-Based Learning (PBL)	Curriculum is designed around real-world problems where students apply engineering concepts to create working prototypes or solutions.	Sponsored projects ,and Mini projects, PBL	- Enhances critical thinking, teamwork and problem- solving skills.
Integration of ICT Tools	Using digital tools like smart boards, online platforms, and educational apps for content delivery and interaction.	Google Classroom, Kahoot, ERP, Microsoft Team	- Enhances interactivity, immediate feedback, and student participation.
Industry Collaboration for Curriculum Delivery	Involving industry experts in teaching, mentoring, and course design.	Interaction with company experts, Faculty Industry Visit, Guest Lecture	- Bridges the gap between academia and industry
Continuous Assessment through Innovative Tools	Use of online quizzes, peer evaluation, and analytics for on going evaluation.	Quiz, presentations, seminars	- Ensures holistic and fair assessment of learning outcomes.
Open-Ended Laboratory Experiments	Lab work designed with multiple possible outcomes, encouraging exploration.	Slicing workshop SDR, CANoe	- Promotes innovation, creativity, and a dipper understanding of concepts.
Mini MOOCs and Micro- Credentials	Short online courses and certifications on focused skills/technical topics.	Virtual Labs, YouTube and NPTEL links	Broadens knowledge and improves employability.
Competitions	Engaging students in challenges such as hackathon, debates, etc.	IETE National Level Project Competition, Aerathon, Robocon	Builds Confidence, teamwork, and problem-solving. - Encourages healthy competition and creativity.
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 Table 1. Innovative Teaching Learning Methods- Activities

	such as Role play, group work & blended learning executed.	Educational Game/ Quiz, Seminars, Workshops, Conference, Symposium	students into active contributors rather than passive listeners.
Gamification of Learning	Applying game mechanics (points, levels, rewards) to enhance practical and logical thinking.	Technical Social Program conducted by department Participation in different technical events such as ETSA, e BAHA	Increases student engagement, overall development and retention of concepts.
Cross- Disciplinary Teaching Approaches	Honors Courses .	Hands on Training, Expert Lecture, Workshop, Seminar, Club: Aerothon, Robocon, Electro Infinity	Encourages integrated thinking and prepares students for emerging fields.
Flipped Classroom Model	Students review lecture materials (videos, notes, PPTs) before class; class time is utilised for technical discussions and active problem-solving.	Videos, Lecture notes, PPTs, Study Materials	Improves Students engagement and active learning; students take ownership of thinking.

Industry Collaboration for Curriculum Delivery : Guest Lectures: Outcome: Attendees were introduced to new tools, methodologies, or techniques relevant to the topic, contributing to their skill enhancement. The speaker shared realworld experiences and case studies, bridging the gap between academic learning and industry expectations. Participants gained deeper insights into topics. Participants got a clear idea about industrial opportunities in networking and cyber security domain.



 Industry Visits: Regular industry visits expose students to the most recent advancements.
 Outcome: Interaction with Industry inculcated the ability to engage in independent and life- long learning.



Industrial Visit at GMRT On 28th Feb 2024

• Industrial Visit at Megha Embedded Systems on 10 Oct 2023



Megha Embedded Systems



• MAHAGENCO Shirsuphal, Tal.Baramati, Pune



• Encourage active participation and idea exchange, support experiential and hands-on learning, and contribute to the development of teamwork and leadership abilities.



• Interaction of faculty with company experts, Faculty Industry Visits: Outcome: Faculty visited to industry to enhance innovative skills and to reduce the gap between industry and academia.



### > Competitions:

Outcome: IETE National Level Project Competition conducted every year, , Participation in different technical events such as Aerathon, Robocon, ETSA, e BAHA technical competitions lead to recognition through awards and prizes, enhance both technical and soft skills, provide networking and mentorship opportunities, foster innovation and creativity, and support academic and professional growth through resume building and future opportunities.



Project-Based Learning (PBL): PBL was introduced for FE and SE students with the intention of encouraging learning through collaborative problem-solving in groups. PBL is a student-centred methodology that uses a dynamic approach. It is thought that by actively exploring real-world issues and problems, students develop a deeper knowledge.

### > Use of Virtual Labs and Simulation:

Outcome : Virtual labs enhance conceptual understanding through interactive simulations, provide safe and repeatable environments for experimentation, improve accessibility to practical learning regardless of location, promote self-paced learning, develop technical and analytical skills, and bridge the gap between theoretical knowledge and practical application.

https://cse29-iiith.vlabs.ac.in/Objective.html https://java-iitd.vlabs.ac.in/exp/introduction-java/

# Active learning:

Outcome: Active learning methods like role plays, educational games, and quizzes lead to enhanced engagement, deeper understanding of concepts, improved critical thinking and problem-solving skills, better retention of knowledge, increased motivation, development of communication and teamwork skills, and a more enjoyable, student-centred learning environment.



Gamification of Learning: Technical Social Program conducted by department ETSA, e-BAHA



Cross-Disciplinary Teaching Approaches: Honours Courses, Hands on Training, Club Acitivities, Workshop, Seminar

Outcome: The competition fostered an environment of innovation, collaboration, and learning, It was a platform that combined technical expertise, industrial exposure, and the joy of interacting with like-minded individuals passionate about engineering and technology.



- Active Learning : Conference, Symposium Outcome:
- Knowledge Sharing and Collaboration,
- Networking and Partnerships,
- Innovation and Technological Advancements,
- Development of future roadmaps or action plans to address global or sector-specific challenges.





International Symposium: Synergy 2025



### **Innovations by Faculty in Teaching and Learning Summary:**

- An innovative teaching-learning approach implemented by combining the flipped classroom model in TE Cellular Networks with experiential learning. I&E competitions on marketing strategies, idea generation, and pitching for BE students are taken. The objective was to enhance self-learning, entrepreneurial mind set, and communication skills. As a result, students showed improved understanding of core concepts, better presentation and teamwork skills, and greater engagement through practical, real-world applications.
- A role play activity had conducted for TE students in the Network Security and Computer Networks (CN) course to simulate real-world network security scenarios. Students assumed various roles (e.g., network administrators, hackers) to understand network vulnerabilities, security protocols, and attack prevention. This interactive method improved critical thinking, teamwork, and communication skills, while enhancing students' practical knowledge of network security concepts.
- An online quiz competition using the Quiz platform had conducted for TE students under the subject Electromagnetic Field Theory (EFT) to enhance engagement and conceptual understanding through gamified learning. To motivate students, a prize offered for the top performer. This innovative approach led to increased participation, better grasp of EFT concepts, and positive student feedback. It promotes technology-based, student-centric, and innovative teaching-learning practices.
- A flipped classroom approach implemented for BE Android Development, where students prepared PPTs on assigned topics and presented them in seminar. This student-centric method promoted self-learning, peer teaching, and active participation. As a result, students improved their understanding of Android concepts, enhanced their presentation skills and engaged more effectively in the learning process.
- Interactive methods such as seminars, role play, and group discussions were implemented in the SE ESD (Electronic skill Development) course to promote active learning and real-world understanding. These activities enhanced student engagement, improved communication and teamwork skills, and deepened comprehension of software development concepts through experiential and collaborative learning.

- A case study-based approach executed in the Digital Marketing course for BE students to bridge the gap between theory and real-world practice. Students analysed real or hypothetical business scenarios, enhancing their understanding of digital marketing strategies. This method improved critical thinking, problem-solving, and teamwork, while giving students hands-on exposure to industry-relevant digital marketing tools and techniques.
- In Project Management (TE B), case studies of successful entrepreneurs like Elon Musk were used to enhance students' understanding of project management, strategic thinking, and leadership by analysing real-world business scenarios. This activity helped students develop decision-making and risk management skills.
- For ESD in SE B, students presented non-fiction book reviews to improve reading comprehension, critical thinking, and communication skills. The activity encouraged students to connect software development concepts with practical insights from industry-related books, enhancing their ability to analyse and present complex ideas effectively.
- Collaborative learning had implemented in FJP and AJP subjects, where TE students worked in teams to design a GUI application for example Servlets for making calculator, login credentials. Also Collaborative learning was implemented in DBM for BE students for an online product details web page. This method encouraged peer learning, teamwork, and practical application concepts. As a result, students enhanced their technical skills, improved communication and collaboration, and gained hands-on experience in real-world web application development.
- As a part of our innovative teaching-learning practices in the subject *Control Systems*, we have been implementing a blended learning approach since last academic year. Video lectures on selected topics were shared with students beforehand, and they were asked to prepare handwritten notes independently. A guest lecture was then conducted on the same topics, where students actively participated with great enthusiasm and confidence. The guest faculty appreciated their preparedness and interaction, and this approach has also led to noticeable improvement in students' academic performance.