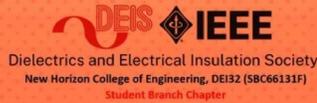




Department of Electrical and Electronics

**EXPERT LECTURE ON IMPACT OF 5G AND IOT ON DIELECTRIC STRESS IN SMART CITIES:
EMF INFLUENCE, MATERIAL CHALLENGES, AND INSULATION STRATEGIES**



Guest Lecture

Impact of 5G & IoT on Dielectric Stress in Smart Cities: EMF Influence, Material Challenges, and Insulation Strategies

 28th November 2025

 11:00 AM - 01:00 PM

 Tejas Seminar Hall

 5th Semester Students
(A & B Section)



Mr. Gaurav Pathak
Consulting Engineer
CISCO

Faculty Coordinator

Prof. Pooja Jose

Assistant Professor - EEE

Convenor

Dr. S Sujitha

HoD - EEE

Dr. Revathi V

Dean - R&D

Dr. R J Anandhi

Dean - Academics

Dr. Manjunatha

Principal

Organised by

Department of Electrical and Electronics Engineering

The Department of Electrical and Electronics Engineering organized a seminar aimed at providing students with an in-depth understanding of next-generation communication technologies—particularly 5G and IoT—and their impact on dielectric stress within smart city infrastructures. The session was delivered by **Mr. Gaurav Pathak, Consulting Engineer at CISCO**, who offered valuable industry perspectives on emerging challenges and solutions.

Key Themes Covered

1. Electromagnetic Field (EMF) Influence in Smart Cities

Mr. Gaurav highlighted how the rapid expansion of **5G base stations** and **IoT ecosystems** has intensified EMF exposure in urban environments. This increased EMF activity can elevate dielectric stress, posing risks to essential infrastructure such as **underground power cables, distribution transformers, and sensor networks**. Through real-world case studies, he emphasized the significance of **predictive modeling techniques**, which enable engineers and urban planners to forecast EMF-induced effects and develop resilient, long-lasting smart city systems.

2. Challenges with Insulation Materials

The lecture also addressed the growing limitations of conventional insulation materials like **PVC** and **XLPE** when exposed to high-frequency EMF conditions associated with 5G and dense IoT networks. Mr. Gaurav discussed the potential of **nanocomposites** and **advanced polymer blends** as next-generation solutions due to their superior durability, thermal stability, and sustainability. He underscored the importance of adopting materials that can withstand long-term dielectric stress while aligning with the environmental priorities of modern smart cities.

Expert Insights from Mr. Gaurav Pathak

Mr. Gaurav elaborated on Cisco's crucial role in building **secure, robust, and scalable communication infrastructures** for smart cities. He stressed the need for **interdisciplinary collaboration** among communication engineers, material scientists, and urban planners to effectively address the complex challenges introduced by large-scale 5G and IoT integration. Drawing from his professional experience, he spoke about the practical difficulties encountered in balancing high system performance with sustainability—an ongoing challenge in designing future-ready smart infrastructure.

Student Engagement and Discussion

The seminar attracted students from electrical, electronics, and computer engineering backgrounds. During the interactive Q&A session, participants explored topics such as:

- Long-term health effects of EMF exposure
- Feasibility and future potential of biodegradable insulation materials
- The role of AI and machine learning in **predictive dielectric stress modeling**

Students showed strong enthusiasm for research opportunities at the intersection of IoT deployment and material innovation.

Conclusion

The seminar effectively connected theoretical knowledge with current industry practices. Mr. Pathak's insights offered students a comprehensive understanding of how 5G and IoT technologies influence dielectric stress, and how advanced insulation materials and design strategies can ensure the reliability and safety of smart city infrastructures.





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 12/2/2025

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