MET's Institute of Engineering, Nashik

Department of Engineering Sciences and Mathematics

Name of the program: One Week Short-Term Faculty Development Programme (FDP) "Innovations in Nanotechnology: Opportunities & Challenges"	
Date: 5/10/2026 to 9/10/2026	**Time:** 10.00 to 5.00 pm
Day: Monday to Friday	**Venue:** IOE Seminar
Activity Coordinator: Dr.Vinod Khairnar	
Cocordinator :	Dr. Pradnya Raut
	Prof. Shilpa Shinde
	Prof. Rajkumar Rajkuvar
No. of Participants: 43	

Objectives of Session:-

1. To develop a fundamental understanding of nano science and nanotechnology and explore their future prospects.
2. To introduce various synthesis techniques used for the preparation of nanomaterials.
3. To understand advanced characterization techniques such as XRD, SEM, TEM, STM and AFM.
4. To explore the applications of carbon-based nanostructures in science and engineering.
5. To understand the role of nanotechnology in nano-electronic devices, nanomagnetism and memory devices.
6. To explore the applications of nanotechnology in medicines, healthcare and biomedical research.
7. To understand the contribution of nanotechnology towards clean energy, green environment and sustainable development.
8. To introduce AI tools, nanoscale modelling and simulation techniques for advanced research.
9. To promote interdisciplinary research and encourage faculty members to integrate nanotechnology concepts into teaching and research activities.

A Short-Term Faculty Development Programme (FDP) on **"Innovations in Nanotechnology: Opportunities & Challenges"** was organized jointly by MET's Institute of Engineering (MET IOE), Nashik, and NITTTR, Chandigarh, from 05th to 09th October 2026 in hybrid mode.

The programme aimed to provide faculty members with comprehensive knowledge of recent developments, emerging technologies, synthesis techniques, characterization methods and applications of nanotechnology in various fields of science and engineering.

The FDP included expert lectures, interactive sessions, demonstrations and practical exposure to advanced characterization techniques. Eminent resource persons from NITTTR Chandigarh, PEC, NIT Jalandhar, PGI and other reputed institutions shared their expertise and research experiences.

Day 1 – 05 October 2026 (Monday) -Introduction to Nanotechnology

The programme commenced with registration and inauguration. Dr. BC Choudhary delivered an expert lecture on Nano-Science & Technology: An Overview with Future Outlook. He introduced the fundamental concepts of nanoscience, the importance of nanotechnology, and its emerging applications in science and engineering. Dr. Ranjan Kumar discussed carbon-based nanostructures and their applications, highlighting their importance in advanced

materials and modern technological developments.

- Nano-Science and Technology: An Overview with Future Outlook.
- Carbon-Based Nanostructures and Applications.

The first day focused on the fundamentals of nanoscience and nanotechnology, their future scope and the importance of carbon-based nanostructures in advanced technological applications.

Day 2 – 06 October 2026 (Tuesday) -Synthesis and Characterization of Nanomaterials
Dr. GR Chaudhary delivered a session on Techniques for Synthesis of Nanomaterials, explaining various approaches used for preparing nanomaterials. Dr. Sanjeev Kumar discussed different characterization techniques used to investigate the structural, morphological, and physical properties of nanomaterials.

Dr. Rajinder S. Chandel conducted a lecture-cum-demonstration on X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), and Transmission Electron Microscopy (TEM). The session provided practical insights into the identification of crystal structures, surface morphology, and particle characteristics of nanomaterials.

- Techniques for Synthesis of Nanomaterials.
- Techniques for Characterization of Nanomaterials.
- Lecture-cum-Demonstration on XRD, SEM and TEM.

The sessions provided an understanding of different synthesis approaches and characterization methods used to study the structural, morphological and physical properties of nanomaterials. Special emphasis was given to X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM).

Day 3 – 07 October 2026 (Wednesday) Nanoelectronics and Advanced Characterization

Dr. Balwinder Raj delivered a lecture on Nano-Electronic Devices: Status & Issues, explaining recent developments and challenges in nanoelectronics. Dr. Pankaj Sharma discussed Nano-Magnetism & Memory Devices, highlighting the importance of nanotechnology in magnetic materials and data storage applications.

Dr. BC Choudhary conducted a lecture-cum-demonstration on Scanning Probe Microscopes (SPMs), including Scanning Tunnelling Microscopy (STM) and Atomic Force Microscopy (AFM). The session provided an understanding of nanoscale surface analysis and advanced imaging techniques.

- Nano-Electronic Devices: Status and Issues.
- Nano-Magnetism and Memory Devices.
- Lecture-cum-Demonstration on Scanning Probe Microscopes (SPMs): STM and AFM.

The sessions highlighted the applications of nanotechnology in electronic devices, magnetic materials and memory storage systems. The demonstration of Scanning Tunnelling Microscopy (STM) and Atomic Force Microscopy (AFM) helped participants understand advanced nanoscale surface characterization techniques.

Day 4 – 08 October 2026 (Thursday) Biomedical and Environmental Applications

Dr. Bikash Medhi delivered an informative session on Nanotech in Medicines, focusing on the applications of nanotechnology in healthcare, drug delivery, diagnostics, and therapeutic development.
Dr. Kamal Kailasam discussed Nanotech for Clean Energy & Green Environment, emphasizing the role of nanomaterials in sustainable energy technologies and environmental protection.

Dr. Ashok Kumar delivered a session on NEP-2020 Aligned Indian Knowledge Systems (IKS), highlighting the integration of traditional knowledge with modern scientific education and research.
The session on Nano-scale Modeling & Simulations introduced participants to computational approaches for understanding and predicting the behaviour and properties of nanomaterials at the nanoscale.

- Nanotechnology in Medicines.
- Nanotechnology for Clean Energy and Green Environment.
- NEP-2020 Aligned Indian Knowledge Systems (IKS).
- Nanoscale Modelling and Simulations.

The fourth day focused on biomedical applications of nanotechnology, particularly in medicine and healthcare. Discussions also covered the role of nanotechnology in renewable energy, environmental protection, sustainability and computational modelling.

Day 5 – 09 October 2026 (Friday) Emerging Technologies and Research Applications

Dr. Ashok Kumar delivered a session on Energy Harvesting & Storage Devices, explaining the importance of nanotechnology in developing advanced energy storage and harvesting systems.
Dr. Pankaj Sharma discussed AI Tools for Nanotechnology, highlighting the potential of artificial intelligence in material discovery, data analysis, simulation, and optimization of nanotechnology research.

- Energy Harvesting and Storage Devices.
- AI Tools for Nanotechnology.
- Quiz and Valediction.

The programme concluded with a quiz session to assess the knowledge gained by participants, followed by the valedictory function conducted by Dr. BC Choudhary, Dr. Pankaj Sharma, and Dr. Ashok Kumar.The final day highlighted emerging applications of nanotechnology in energy harvesting, energy storage and artificial intelligence. The programme concluded with a quiz session and valedictory function.

Outcomes of the FDP

- The programme was highly informative and provided valuable exposure to recent advancements in nanotechnology. The major outcomes were:
- Enhanced understanding of nanomaterials, their synthesis and characterization.
- Knowledge of advanced analytical techniques such as XRD, SEM, TEM, STM and AFM.
- Better understanding of nanotechnology applications in medicine, electronics, energy and environmental science.
- Awareness of AI-based tools and computational techniques for nanotechnology research.
- Exposure to interdisciplinary research opportunities and emerging technological challenges.
- Motivation to incorporate nanotechnology-related concepts into academic teaching, student projects and research activities

DEPARTMENT OF ENGINEERING SCIENCES & MATHEMATICS

ORGANIZES

One Week Faculty Development Programme On

"INNOVATIONS IN NANOTECHNOLOGY: OPPORTUNITIES & CHALLENGES"

TAC No. HBAS-4 (Inter-Disciplinary)

(Through ICT in Online Interactive Mode)

In Association with National Institute of Technical Teachers Training & Research (NITTTR), Chandigarh

CONVENER
Dr. V. P. Wani
Principal - IOE

CO-CONVENER & LOCAL COORDINATOR
Dr. V. S. Khairnar

CO-CORDINATOR
Prof. Shilpa Shinde

COORDINATING STAFF
Dr. Pradnya Raut | Prof. Rajkumar Rajkuvar

DATE
5th to 9th October, 2026

TIME
10:00 AM

VENUE
Seminar Hall - IOE

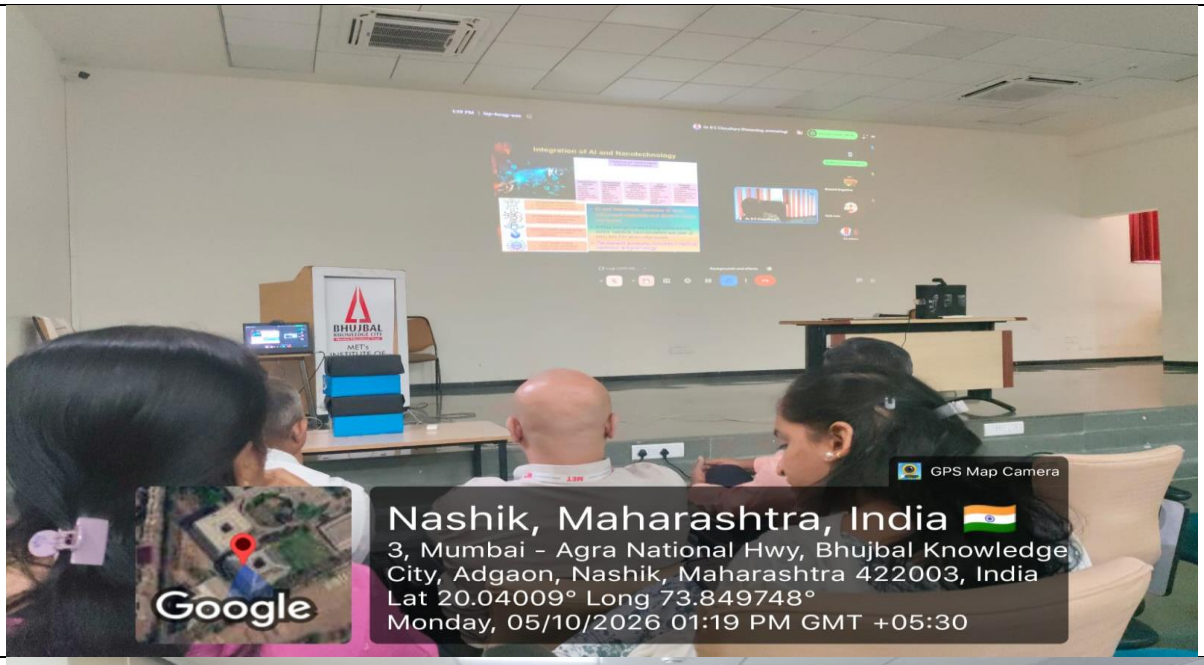
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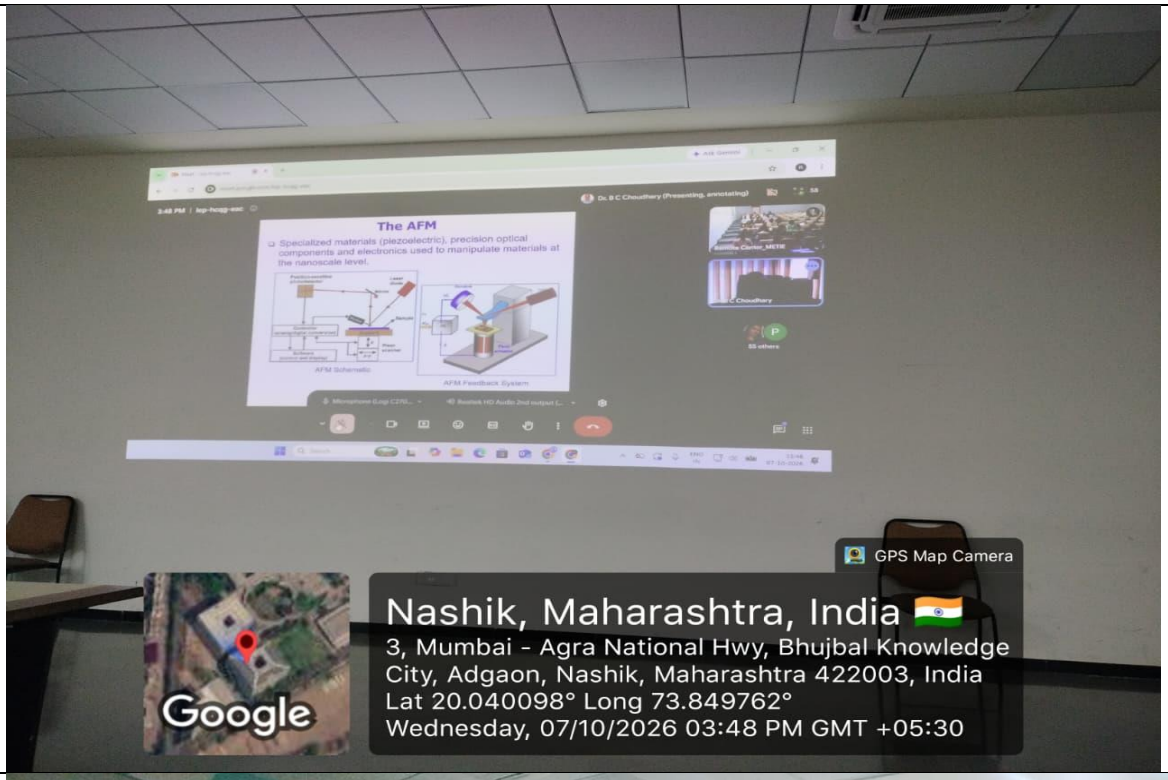
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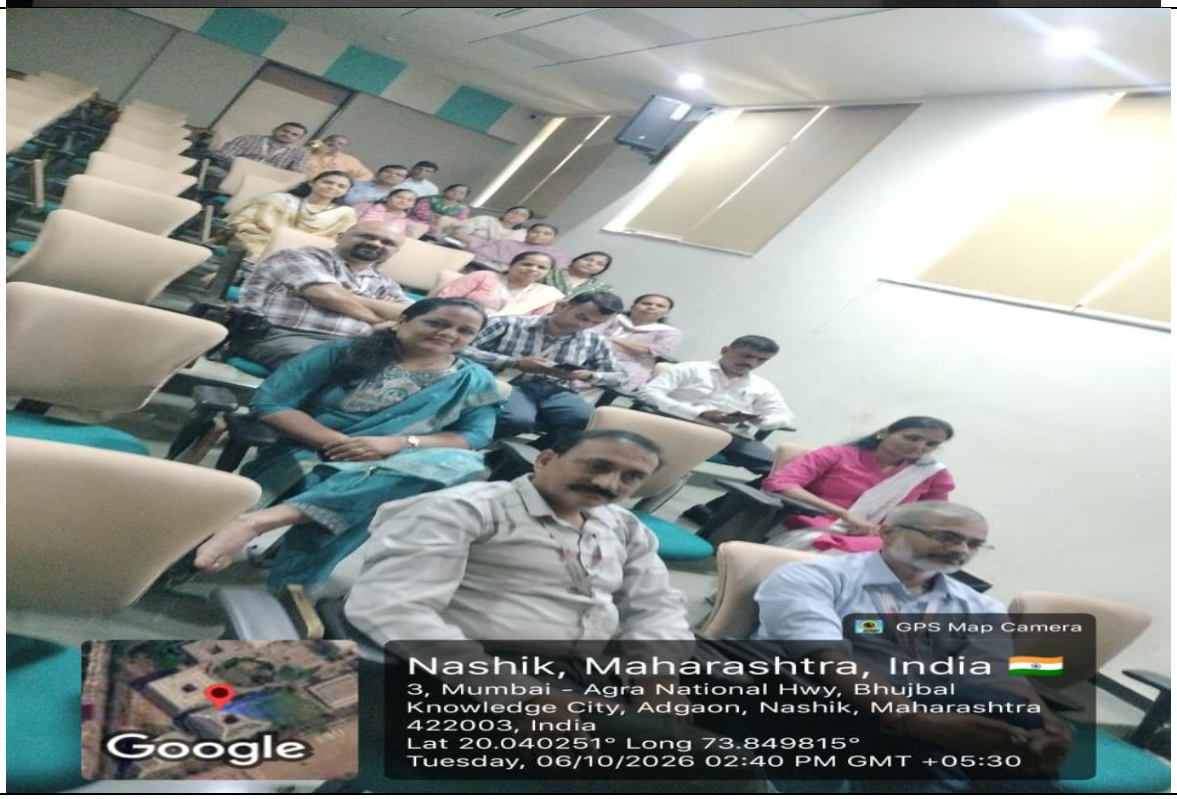
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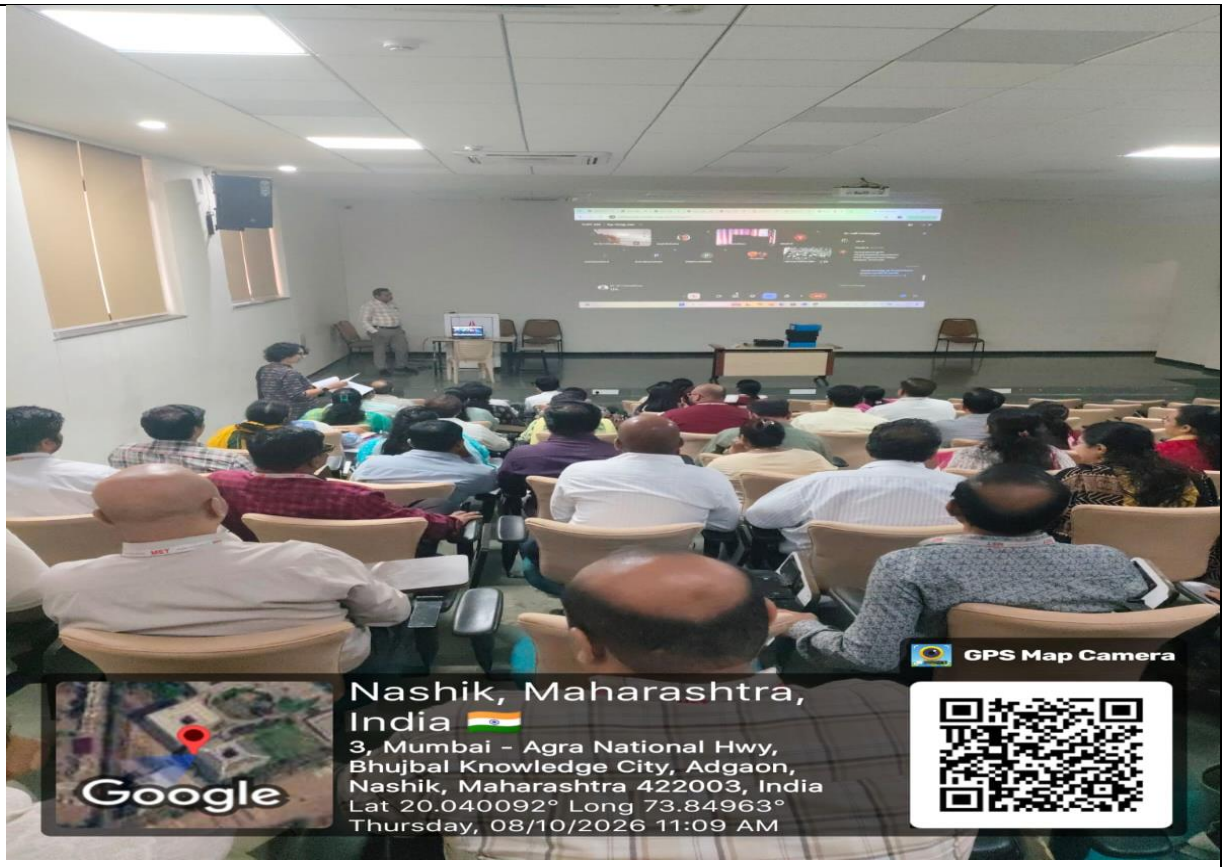

The AFM
Specialized materials (piezoelectric), precision optical components and electronics used to manipulate materials at the nanoscale level.
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Prof.R.D.Rajkuvar (Coordinator)	**Prof. S.S. Shinde (Coordinator)**	**Dr.P.S. Raut (Coordinator)**	**Dr. V. S. Khairnar (FE-Coordinator)**	**Dr. V. P. Wani (Principal-IOE)**