Summary Report

Faculty Development Program on High Performance Computing & AI

Date: 18–23 August 2025

Organized by: Department of Artificial Intelligence and Data Science, MET's Institute of Engineering, Nashik

In Association With: C-DAC Pune & NSM Nodal Center, Walchand College of Engineering, Sangli

Sponsored by: National Supercomputing Mission (Govt. of India)

Introduction:

The **Faculty Development Program (FDP) on High Performance Computing (HPC) and Artificial Intelligence (AI)** was jointly organized by **MET's Institute of Engineering, Nashik** and **Walchand College of Engineering, Sangli**, under the sponsorship of the **National Supercomputing Mission (NSM)**, in collaboration with **C-DAC Pune**.

The program was conducted from **18th to 23rd August 2025 (Hybrid mode)** with a **CUDA Certification session on 13th September 2025 (Online)**. The aim of this FDP was to provide faculty members with comprehensive exposure to High Performance Computing (HPC) and Artificial Intelligence (AI), through expert lectures, hands-on sessions, and interdisciplinary discussions.

Objectives

- Conceptual and practical understanding of HPC architectures, OpenMP, MPI, CUDA, and Deep Learning.
- Exposure to Gen AI, LLMs, RAG, Transformers, and convergence of AI with HPC.
- Hands-on learning sessions with real-world coding platforms and cluster environments.

Patrons:

Hon. Pankaj Bhujbal (Trustee, MET's BKC, Nashik)

Hon. Sameer Bhujbal (Trustee, MET's BKC, Nashik)

Hon. Dr. Shefali Bhujbal (Chief Administrator, MET's BKC, Nashik)

Advisors:

Prof. (Dr.) V. P. Wani, Principal, MET's IOE, Nashik

Dr. U. A. Dabade, Director WCE, Sangli

Mr. Ashish Kuvelkar, Senior Director, CDAC Pune

Convenors:

Prof. (Dr.) S. V. Gumaste, MET's IOE, Nashik

(Head, Department of Artificial Intelligence and Data Science)

Prof. (Dr.) D. B. Kulkarni, WCE Sangli

(Head, NSM Nodal Centre WCE Sangli)

Coordinators:

Mrs. N. S. Ambekar, Assistant Professor, MET's IOE, Nashik.

Ms. A. S. Pawar, Assistant Professor, WCE, Sangli

Organizing committee:

- Dr. Nisha Patil
- Mr. Prashant Rewagad
- Mrs. Deepali Suryawanshi
- Mr. Ganesh Gaikwad
- Mrs. Shital Bedse
- Mrs. Jayshri Kandekar
- Mrs. Sonali Jadhav
- Mr. Nitin Dhamale
- Mrs. Radha Sali
- Mr. Nilesh Ahire

Event Highlights

Inaugural Session (18th August 2025, 2:15 PM – 3:00 PM, Online)

The FDP was inaugurated in the presence of dignitaries from C-DAC Pune, WCE Sangli, and MET's IOE Nashik. The session highlighted the vision of NSM in strengthening India's supercomputing ecosystem.

Highlights of the session:

- Screening of *MET League of Colleges* film.
- Welcome by Mrs. Neelima S. Ambekar, FDP Coordinator.
- Addresses by Dr. S. V. Gumaste (Convenor), Mr. Ashish Kuvelkar (CDAC), Dr. D. B. Kulkarni (WCE), Dr. U. A. Dabade (WCE), and Dr. V. P. Wani (Principal, MET's IOE).
- **Dr. S. V. Gumaste (Convenor** addressed the audience by sharing the schedule and key objectives of the program
- **Mr. Ashish Kuvelkar,** Scientist G at C-DAC Pune, opened the technical sessions by sharing his expertise on India's supercomputing journey and the goals of the National Supercomputing Mission.
- **Dr. Dinesh B. Kulkarni,** Professor at Walchand College of Engineering, spoke about his work in Parallel Processing and High-Performance Computing, while also touching upon international collaborations and academic contributions.
- **Dr. Uday A. Dabade,** Director of WCE Sangli, highlighted the institute's commitment to advancing research and building capacity in cutting-edge computing technologies.
- **Dr. V. Wani**, Principal of MET's IOE Nashik, emphasized the role of academic leadership in strengthening national capabilities in HPC and AI.

This session set the tone by emphasizing **India's progress in HPC and AI under NSM**.

Program Highlights with Speaker Details and Session-wise Summary

Day 1 – August 18, 2025 (Online 3:00 PM– 5:00 PM and 7:00 PM – 9:00 PM)

- **Session 1: Introduction to HPC & Architectures** – *Mr. Ashish Kuvelkar, CDAC Pune*

  Mr. Kuvelkar introduced the fundamentals of High-Performance Computing, explaining the differences between shared memory and distributed memory systems. He discussed how each architecture is applied in real-world scenarios and highlighted the importance of choosing the right approach based on computational needs.

- **Session 2: HPC Clusters (System Side)** – *Mr. Shubham Mehta, CDAC Pune*

  Mr. Mehta gave an in-depth view of how HPC clusters are built and managed from a system perspective. He explained the hardware and software components that make up a cluster and described how they are interconnected to deliver high computational performance.

- **Session 3: Cluster Access, OpenMP & MPI Basics** – *Ms. Harsha Ugave, CDAC Pune*

  Ms. Ugave focused on the practical aspects of accessing an HPC cluster and introduced programming models like OpenMP and MPI. She explained how these tools help in parallelizing code, improving efficiency, and scaling applications across multiple processors.

- **Session 4: Slurm Scheduler & Job Submission** – *Mr. Himanshu Sharma, CDAC Pune*

  Mr. Sharma demonstrated how resource management and job scheduling work in an HPC environment. He explained the role of the Slurm scheduler, walked through the steps of job submission, and shared best practices for efficiently utilizing computational resources.

Outcome: Participants gained familiarity with HPC environments and batch scheduling.

Day 2 – August 19, 2025 (Online 3:00 PM– 5:00 PM and 7:00 PM – 9:00 PM)

Dr. Sharon Christa (MIT WPU) conducted both theoretical and practical sessions on OpenMP, demonstrating parallel programming techniques.

- **Session 1: OpenMP Concepts** – *Dr. Sharon Christa, MIT WPU*

  Dr. Christa introduced the core ideas of OpenMP, explaining its role in parallel programming and how it supports shared memory architectures. She discussed key directives, syntax, and programming constructs that allow developers to parallelize tasks effectively. The session highlighted how OpenMP simplifies writing parallel code while still giving programmers flexibility and control.

- **Session 2: Demo & Hands-on with OpenMP** – *Dr. Sharon Christa*

  In this practical session, Dr. Christa guided participants through real coding examples to demonstrate how OpenMP directives are applied in practice. Attendees worked on exercises that showed how to parallelize loops, manage threads, and optimize performance, giving them direct experience in applying OpenMP to solve computational problems.

Outcome: These sessions provided practical coding exposure for parallelization using OpenMP.

Day 3 – Wednesday, 20th August 2025 (Online 3:00 PM– 5:00 PM and 7:00 PM – 9:00 PM)

- **Session 1: Introduction to LLM & Gen AI with Demo** – *Dr. Pramod Bhide, SPIT Mumbai*

Dr. Bhide provided an overview of Large Language Models and Generative AI, explaining their underlying concepts and real-world applications. He discussed how these models are trained, their ability to process and generate human-like text, and their growing role in fields such as education, research, and industry. The session also included a live demo that showed practical use cases of LLMs and how they can be integrated into problem-solving and innovation.

- **Session 2: MPI Basics** – *Mr. Sudip Bhattacharya, BIT Durg, IIT Kharagpur (Research Scholar)*

  Mr. Bhattacharya introduced the fundamentals of MPI (Message Passing Interface), a key programming model for distributed computing. He explained how MPI enables communication between processes running on different nodes of a cluster, making it essential for scaling applications. The session covered basic MPI functions, communication mechanisms, and examples that demonstrated how parallel programs can be structured for efficiency and performance.

Outcome: The sessions maintained a balance between traditional parallel programming approaches like MPI and modern tools in Generative AI..

Day 4 – Thursday, 21st August 2025 (Online 3:00 PM– 5:00 PM and 7:00 PM – 9:00 PM)

- **Session 1: MPI Collective Communication & Demo** – *Mr. Sudip Bhattacharya*
  Mr. Bhattacharya expanded on the basics of MPI by focusing on collective communication operations such as broadcast, scatter, gather, and reduce. He explained how these functions enable efficient data sharing among multiple processes in distributed computing environments. The session included a live demo where participants observed how collective communication improves performance and simplifies coordination in parallel programs.

- **Session 2: Introduction to RAG (Retrieval-Augmented Generation)** – *Dr. U.B. Chavan, WCE Sangli*

  Dr. Chavan introduced Retrieval-Augmented Generation (RAG), explaining how it combines large language models with external knowledge sources to produce more accurate and context-aware outputs. He discussed the architecture of RAG, its applications in research and industry, and its advantages over traditional generative models. The session highlighted how RAG bridges the gap between stored knowledge and generative capabilities, making AI systems more reliable and useful in real-world scenarios.

Outcome: These sessions demonstrated **RAG workflows for GenAI applications**.

Day 5 – Friday, 22nd August 2025 (Offline 10:00 AM to 5:30 PM)

- **Session 1: Deep Learning Server Setup** – Mr. Devesh Talegaonkar, *NSM Intern*

  Mr. Devesh demonstrated the step-by-step process of setting up a deep learning server, covering both hardware and software requirements. They explained installation procedures, environment configuration, and resource management to ensure smooth execution of deep learning workloads. The session provided participants with a clear understanding of how to prepare infrastructure for AI research and applications.

- **Session 2a: CPU vs GPU & CUDA Basics** – *Dr. D. B. Kulkarni, Nodal Centre Head, WCE, Sangli*

  Dr. Kulkarni compared CPU and GPU architectures, highlighting their differences in design, processing capabilities, and suitability for parallel computing. He introduced CUDA as a framework that leverages the power of GPUs for high-performance applications. The session explained how CUDA accelerates tasks like deep learning and scientific simulations by efficiently handling large-scale parallel computations.

- **Session 2b: Hands-on CUDA Programming** – *Dr. D. B. Kulkarni, Nodal Centre Head, WCE, Sangli*

  In this practical session, Dr. Kulkarni guided participants through writing and executing CUDA programs. Attendees learned how to structure code for GPU execution, manage threads and memory, and optimize performance. The hands-on approach gave participants direct experience in applying CUDA for real computational problems.

- **Session 3: Hands-on OpenMP** – *Ms. A. S. Pawar, WCE*

  Ms. Pawar conducted a practical lab session on OpenMP, where participants implemented parallel programming constructs introduced earlier. She guided them through exercises such as parallelizing loops, managing synchronization, and optimizing program execution, reinforcing the conceptual knowledge with real coding practice.

- **Session 4: Convergence of HPC and AI** – *Dr. Sharad Sinha, IIT Goa (Online Session)*

  Dr. Sinha delivered an online session that focused on how High-Performance Computing and Artificial Intelligence are increasingly interconnected. He explained how HPC provides the large-scale computational power required to train and deploy advanced AI models, while AI techniques can also optimize HPC workflows and applications. The session highlighted real-world examples where the two domains complement each other, such as in scientific research, healthcare, and large data analysis. Dr. Sinha also discussed future trends, emphasizing the critical role this convergence will play in solving complex global challenges.

Outcome: Through these sessions participants learned **GPU acceleration & CUDA coding**, plus **synergy of AI and HPC**.

Day 6 – Saturday, 23rd August 2025 (Offline)

- **Session 1: Transformers & Hands-on** – *Ms. Aditi Pawde, WCE*

  Ms. Pawde introduced participants to the concept of Transformers, explaining their architecture and significance in modern AI applications such as natural language processing. She covered how attention mechanisms work and why Transformers have become the backbone of state-of-the-art models. The session also included a hands-on component where participants explored practical implementations of Transformer models.

- **Session 2: Hands-on MPI Cluster Demo** – *Ms. A. S. Pawar, WCE*

  Ms. Pawar guided participants through a live demonstration of MPI on a cluster environment. She showed how processes communicate across nodes, explained the workflow of submitting MPI programs, and provided practical examples to reinforce concepts like message passing and process coordination.

Outcome: These sessions Focused on **deep learning architectures (Transformers)** and **final reflections**.

- **Quiz** – Testing retention across all sessions.

  A quiz was conducted to review key concepts covered throughout the program. It served as an interactive way to assess participants' understanding and ensure that they retained the essential knowledge from the lectures and hands-on sessions.

- **Valedictory Function** – Addresses, Felicitation, Feedback Sharing.

  The program began with a short film on MET League of Colleges, followed by a welcome address and introduction of guests. Experts were felicitated for their contributions, after which Dr. S. V. Gumaste gave an overview of the FDP. Dr. D. B. Kulkarni and Dr. V. P. Wani shared their insights through expert and principal addresses. Selected participants provided feedback on their learning experience. The event concluded with a vote of thanks by FDP coordinator, Mrs. Neelima S. Ambekar, final remarks from the organizing team, and a group photo session followed by networking tea.

Day 7 – Saturday, 13th September 2025 (Online 10:00 AM – 12:00 Noon and 2:00 PM – 4:00 PM)

- **CUDA Certification Session** – *Dr. Nileshchandra Pikle, IIT Nagpur*

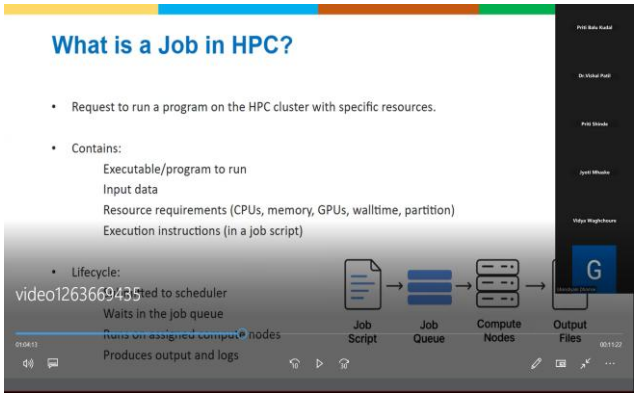
  Dr. Pikle delivered an online session on the role of CUDA in parallel programming and its applications in high-performance computing and AI. He explained the value of CUDA certification as a way to formally validate GPU programming skills and strengthen professional credibility. The session guided participants on the certification process, exam preparation, and the kind of computational challenges addressed with CUDA, while also highlighting how certified expertise can open up advanced research and career opportunities.

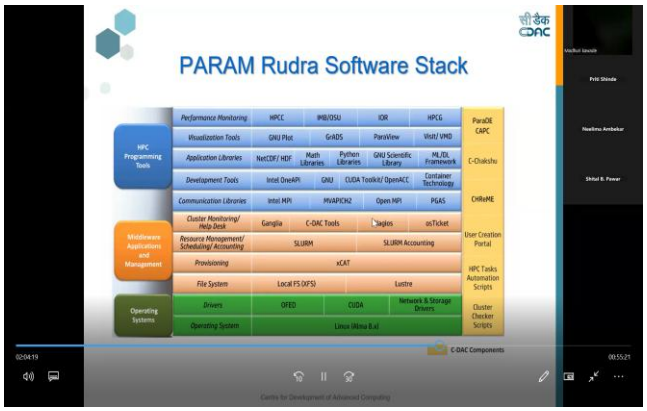
Outcome: Participants earned **NVIDIA CUDA Certification**.

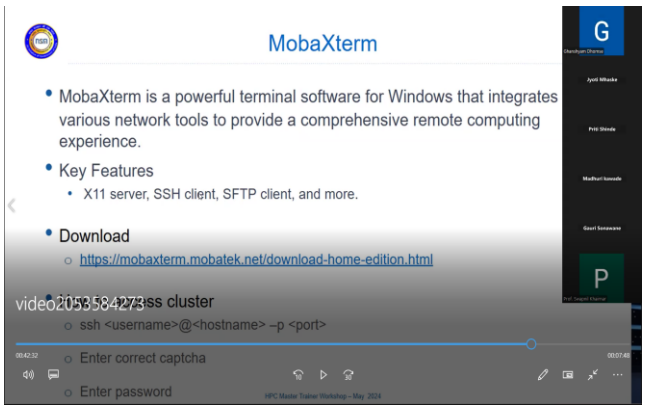
Day 01 Session Photo Gallery

(Session: Inauguration, Address by Dignitaries, Introduction* to HPC & Architectures, HPC Clusters (System Side), Cluster Access, OpenMP & MPI Basics, Slurm Scheduler & Job Submission *and Q&A)

Session 1: Introduction to HPC & Architectures

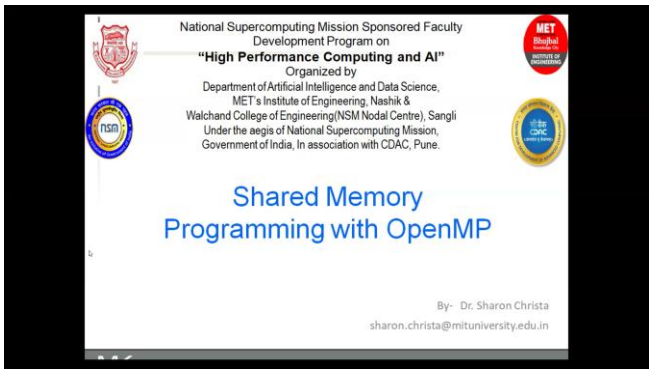


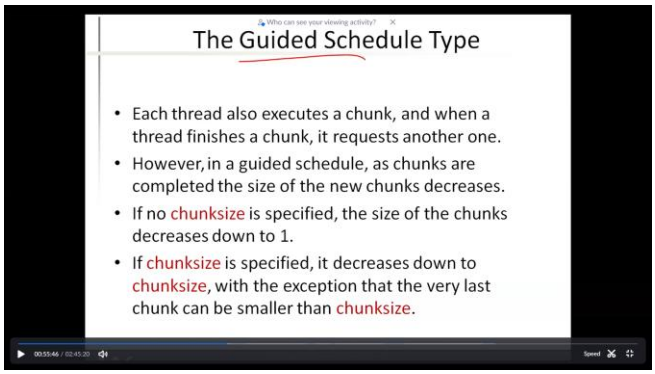


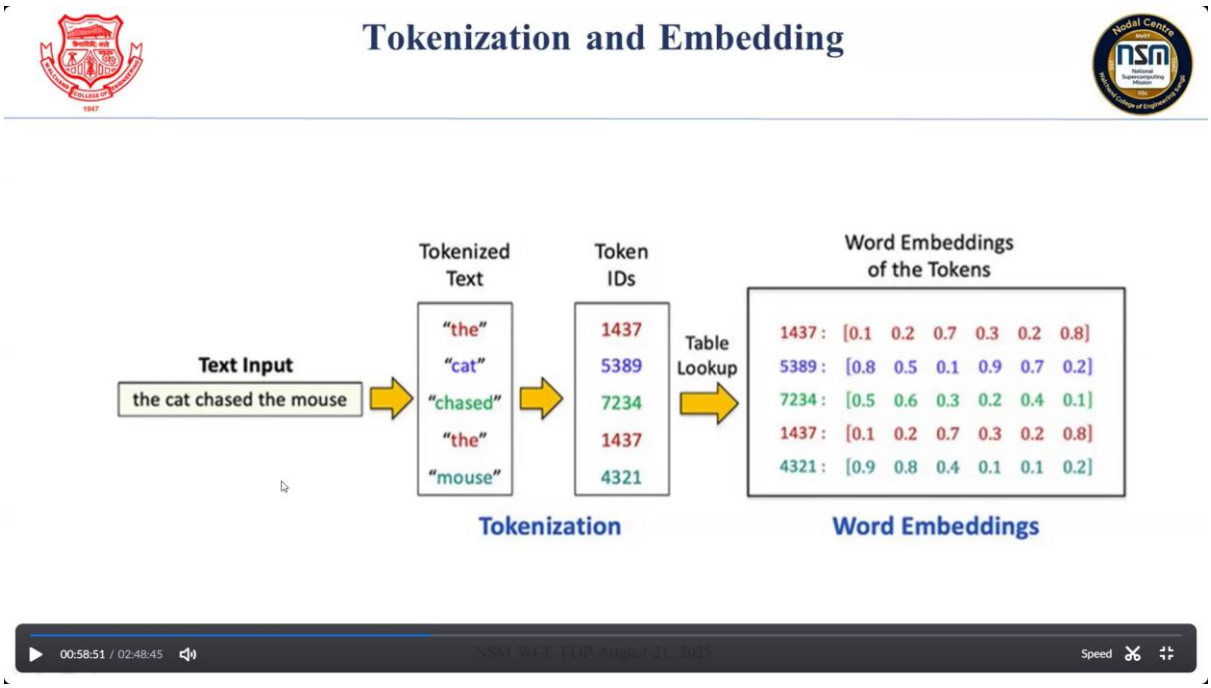


Day 02 Session Photo Gallery

(Session:* OpenMP Concepts and Demo & Hands-on with OpenMP *)

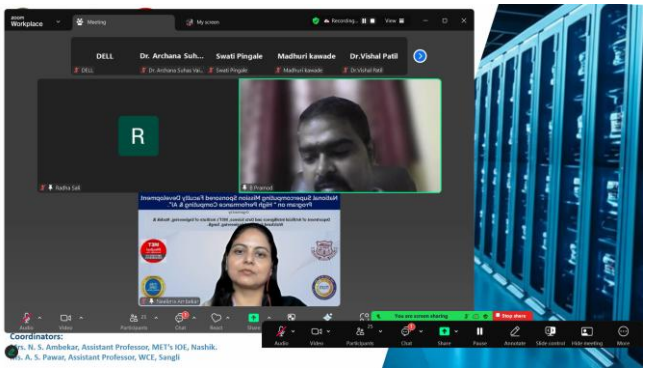


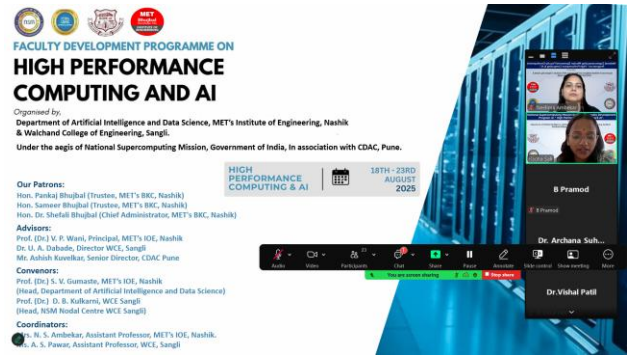


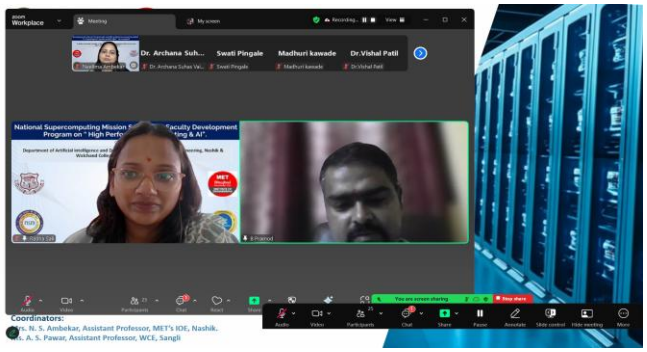


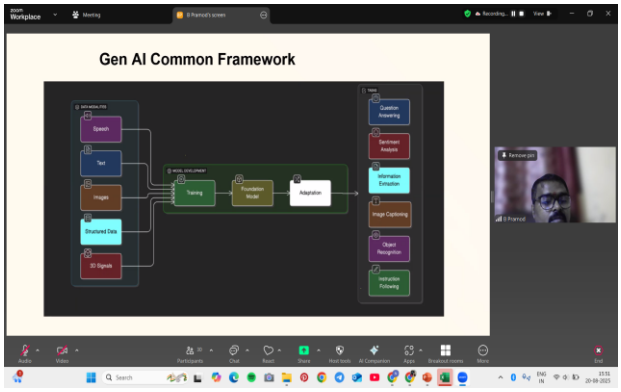
Day 03 Session Photo Gallery

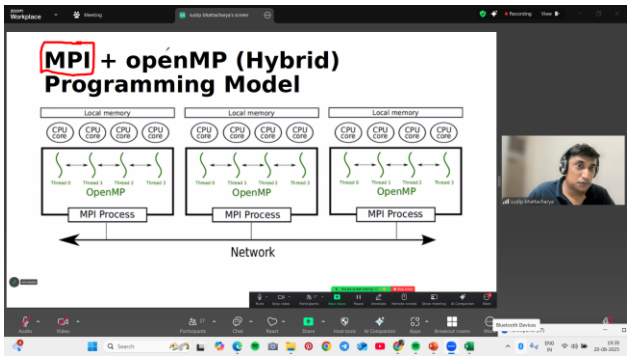
(Session:* Introduction to LLM & Gen AI with Demo and MPI Basics *)





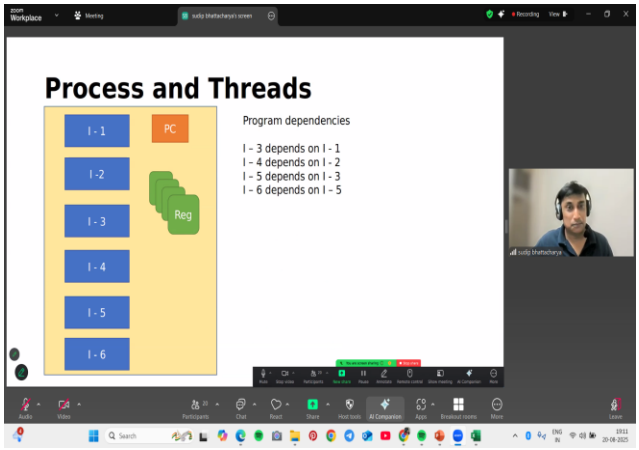


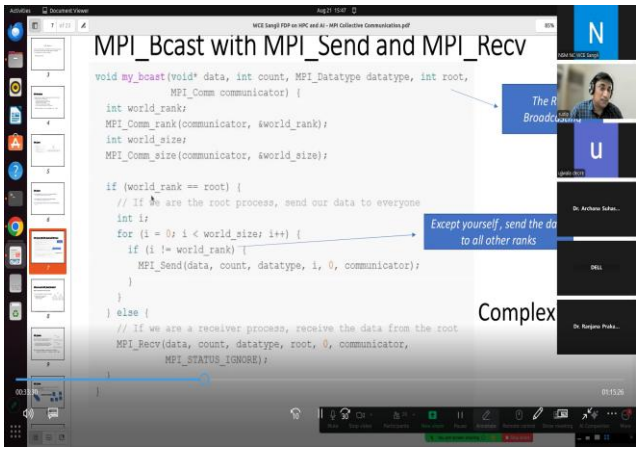


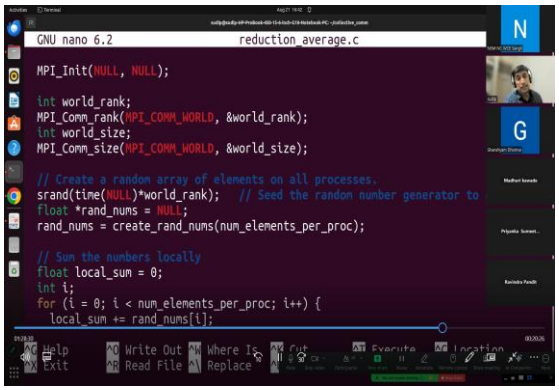


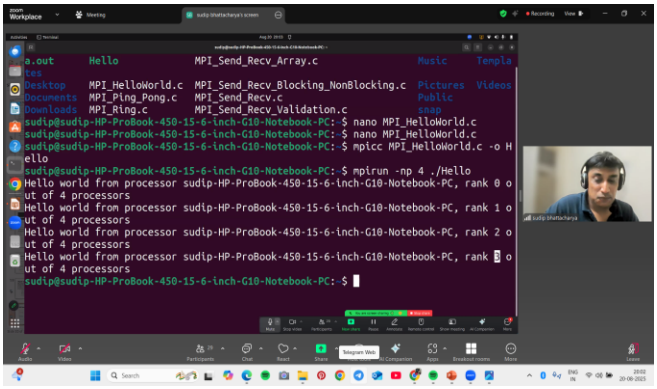
Day 04 Session Photo Gallery

(Session: MPI Collective Communication & Demo and Introduction to RAG (Retrieval-Augmented Generation))



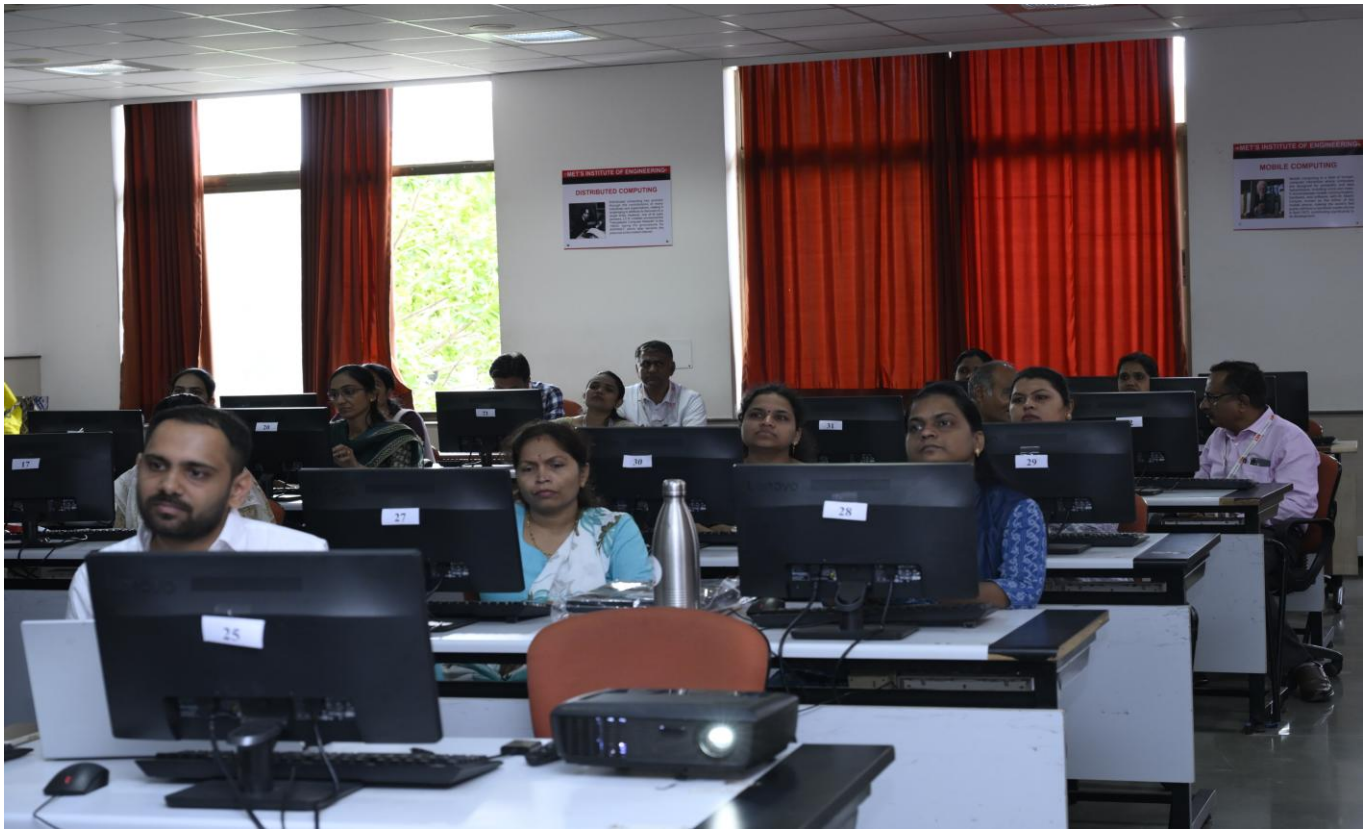






Day 05 Session Photo Gallery

(Deep Learning Server Setup, CPU vs GPU & CUDA Basics, Hands-on CUDA Programming, Hands-on OpenMP, Convergence of HPC and AI)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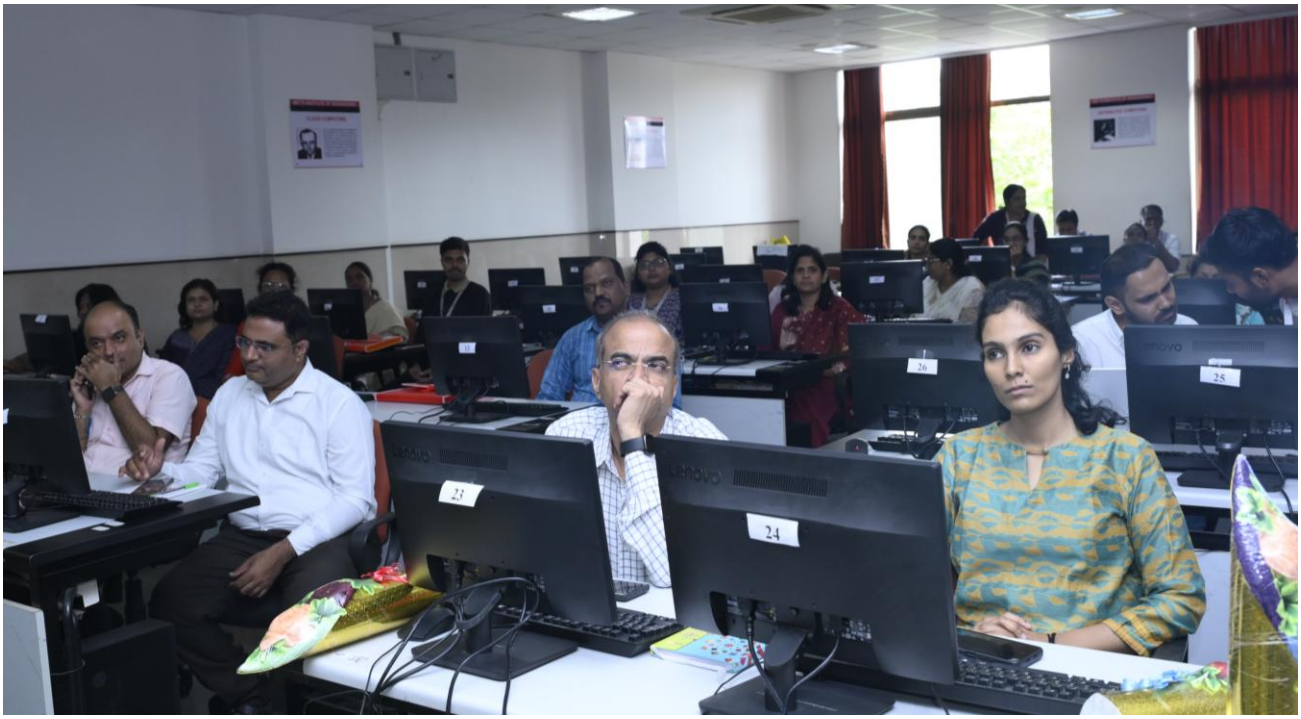
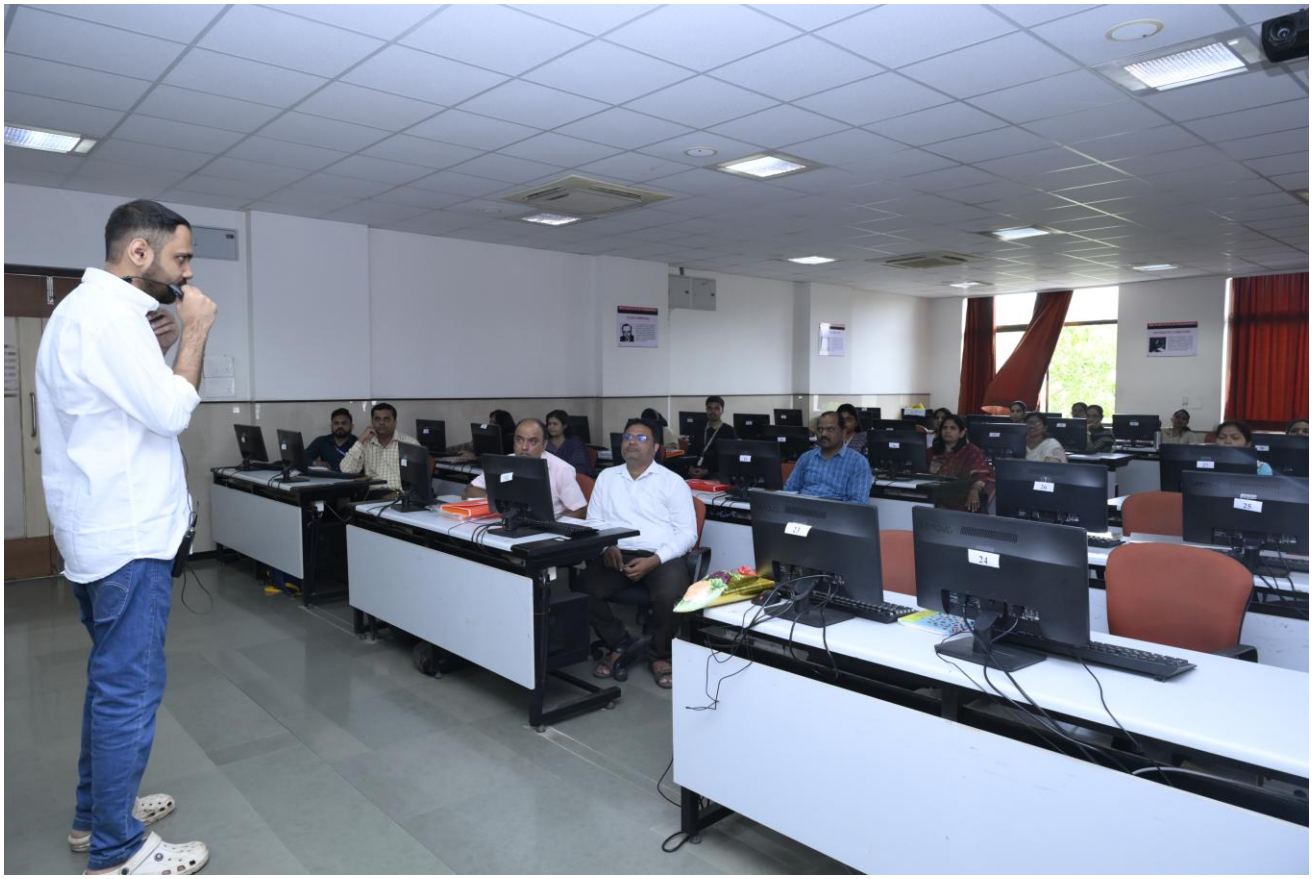
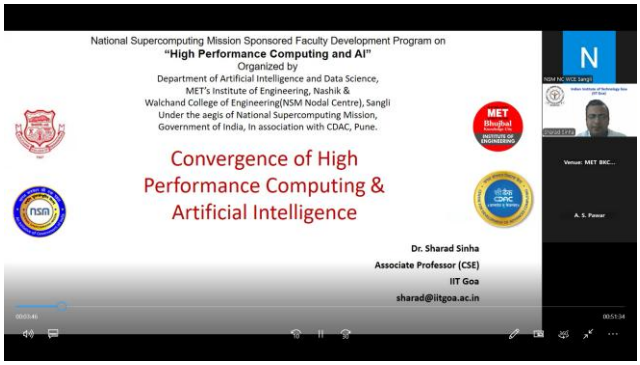
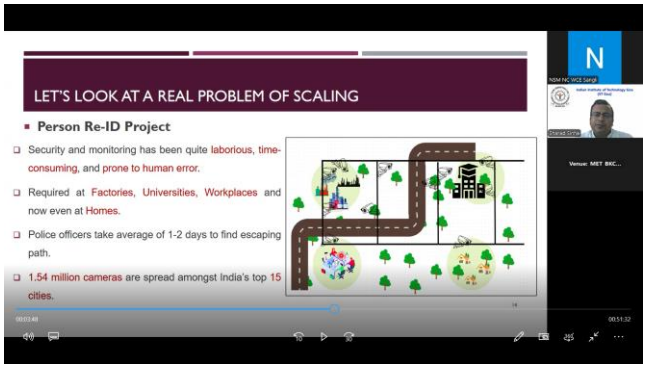
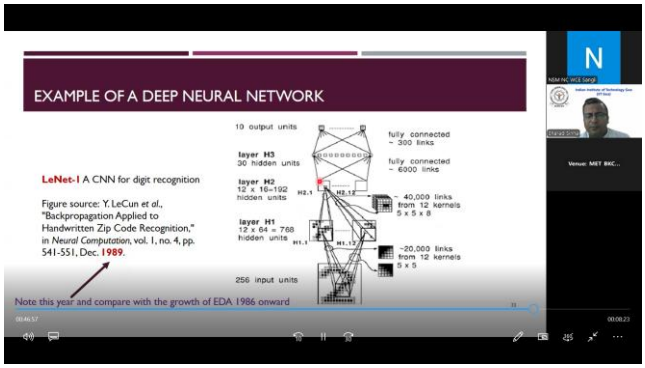








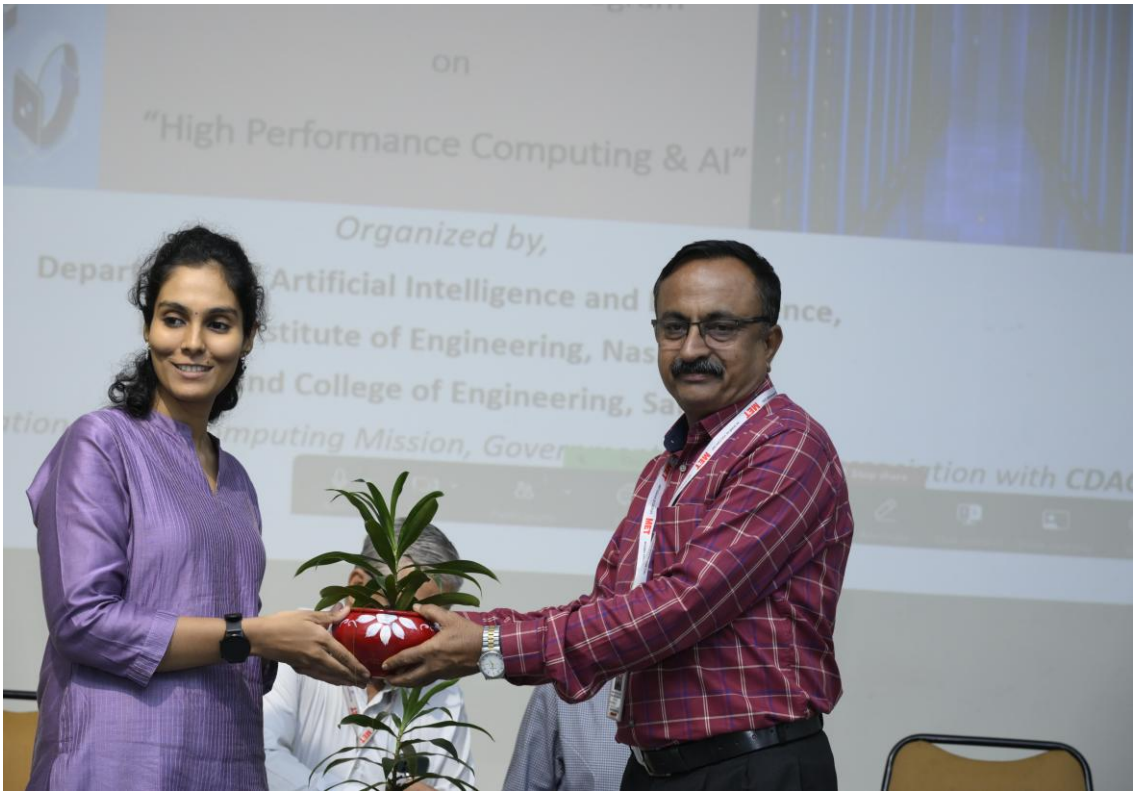


Day 06 Session Photo Gallery

(Transformers & Hands-on, Hands-on MPI Cluster Demo, Quiz, Valedictory Function)

Valedictory Session:

Felicitation: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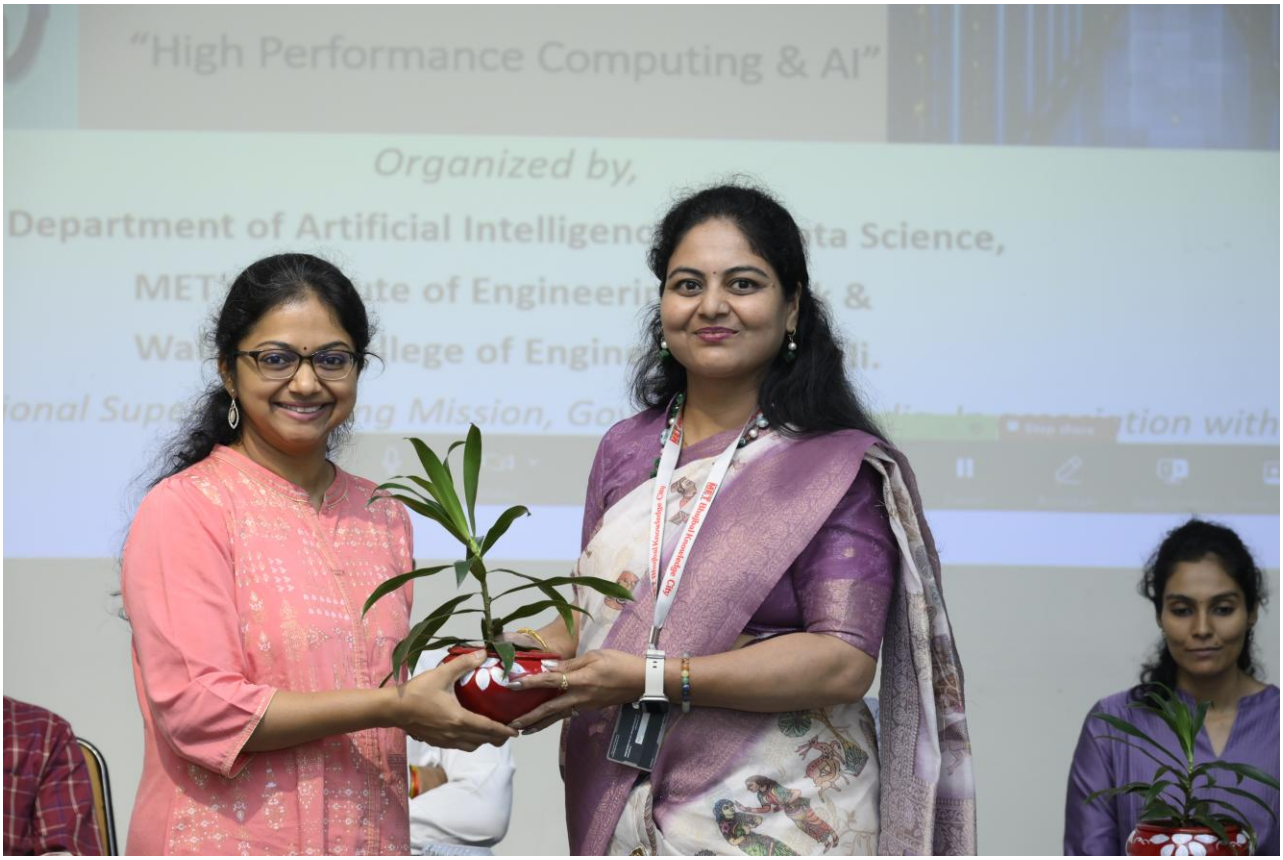
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Ms. A. S. Pawar

Address by Dr. D. B. Kulkarni:

Feedback from Participants:


National Supercomputing Mission (GOI)
Sponsored
Faculty Development Program
on
"High Performance Computing & AI"
Organized by,
Department of Artificial Intelligence and Data Science,
MET's Institute of Engineering, Nashik &
Walchand College of Engineering, Sangli.
Under the aegis of National Supercomputing Mission, Government of India, In association with CDAC, Pune.
MET's Institute of Engineering
MET
Bhujbal
Knowledge City


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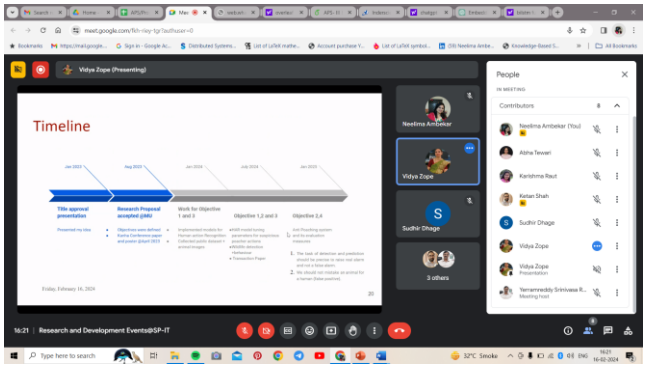
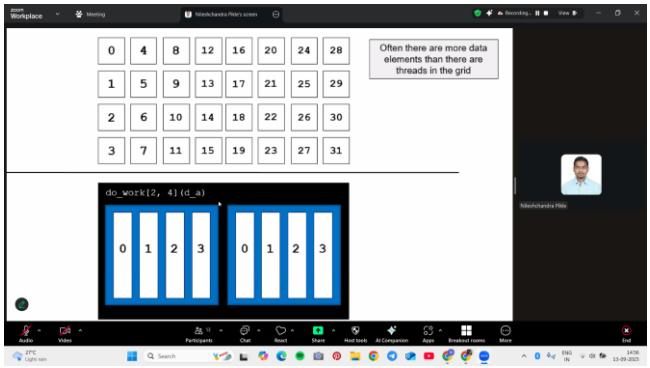
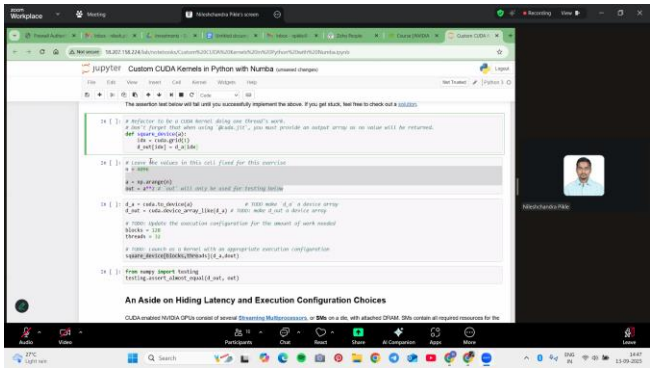
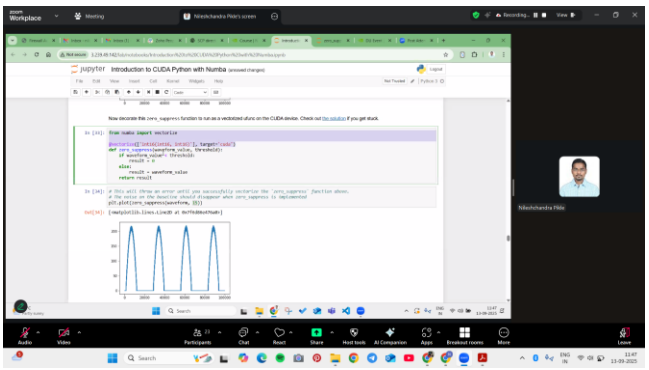
Day 07 Session Photo Gallery

(Session: Fundamentals of Accelerated Computing with CUDA)









NVIDIA Certification Achievement

On 13th September 2025, Dr. Nileshchandra Pikle conducted a hands-on session that combined practical exercises with in-depth conceptual clarity. His guidance enabled 30 participants to successfully earn the NVIDIA Certification in “Fundamentals of Accelerated Computing with CUDA.”

All participants were awarded digital certificates by NVIDIA in recognition of their achievement.


NVIDIA

Certificate of Competency

This certificate is awarded to

Ghanshyam Dhomse

for demonstrating competence in the completion of

Fundamentals of Accelerated Computing with CUDA Python

Greg Estes

Vice President, NVIDIA

Issue Date: : September 16, 2025

Certification ID: bxyprrc3TfCIQTkxCSO2yQ


NVIDIA

Certificate of Competency

This certificate is awarded to

Dr. Kirti A. Patil

for demonstrating competence in the completion of

Fundamentals of Accelerated Computing with CUDA Python

Greg Estes

Vice President, NVIDIA

Issue Date: : September 13, 2025

FDP Outcomes and Impact

• Gained stronger conceptual understanding and hands-on experience with HPC and AI tools such as OpenMP, MPI, and CUDA

• Learned about real-world applications and interdisciplinary research from top institutes

• Improved faculty skills for both teaching and research in new and growing areas of computing]

Quiz Analysis

The final quiz conducted during the FDP was attempted by 36 participants. The quiz tested conceptual understanding across 50 questions. The performance analysis highlights strong engagement and high success rates among participants.

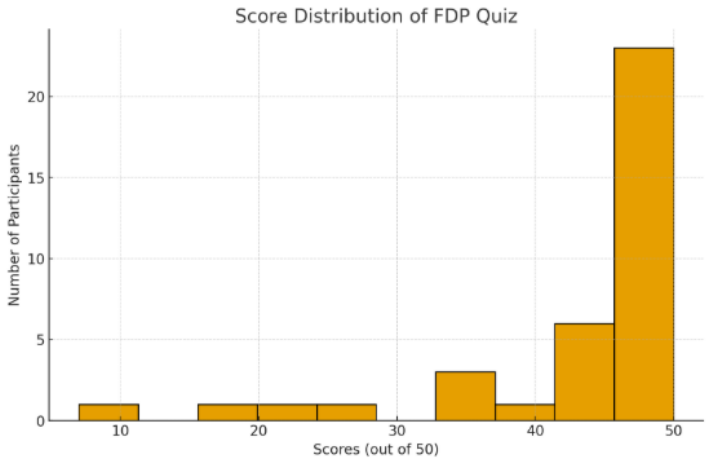


Figure 1: Score Distribution of FDP Quiz

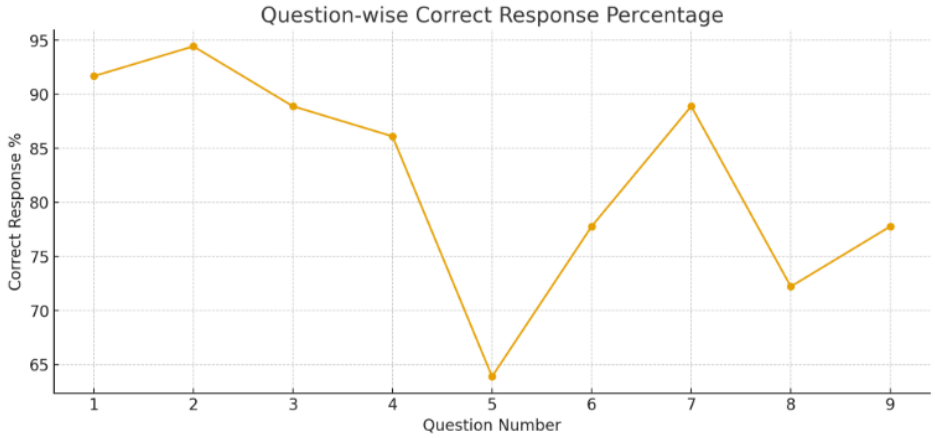


Figure 2: Question-wise response percentage

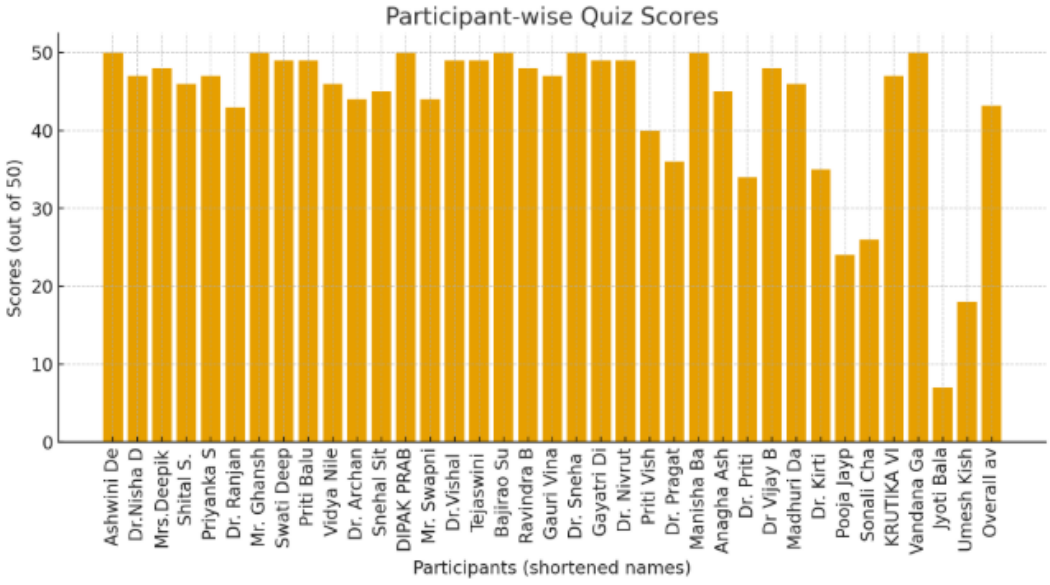


Figure 3: Participants with Quiz Score

Overall Performance

- **Total Participants:** 37
- **Highest Score:** 50/50
- **Lowest Score:** 18/50
- **Average Score:** 43.19/50
- **Median Score:** 47/50
- **Pass Percentage (≥25 marks):** 91.89%

Participant Performance

- A majority of participants scored above 40, indicating good conceptual clarity.
- A small fraction scored below the passing threshold, highlighting areas where additional support may be required.
- The top performers achieved a perfect score of 50.

Question-wise Insights

- Certain questions had a **100% correct response rate**, reflecting well-understood topics.
- A few questions showed comparatively lower correct response rates, identifying potential areas for future reinforcement.

Outcome

The high overall average (43.19/50) reflects the **effective delivery of FDP sessions** and participant engagement.

Feedback Analysis

The following charts represent participant feedback:

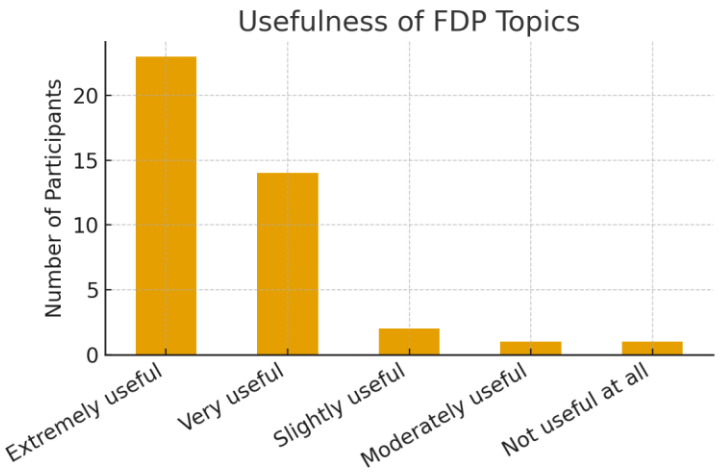


Figure 4: Usefulness of FDP Topics

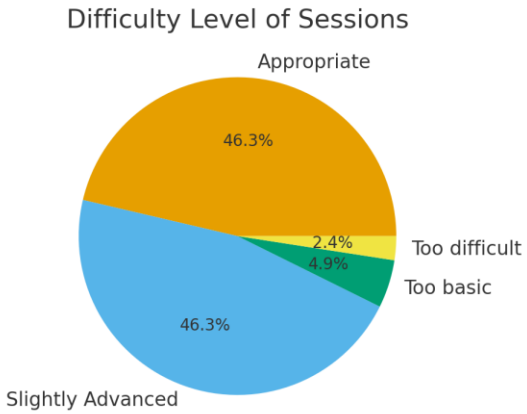


Figure 5: Difficulty Level of Sessions

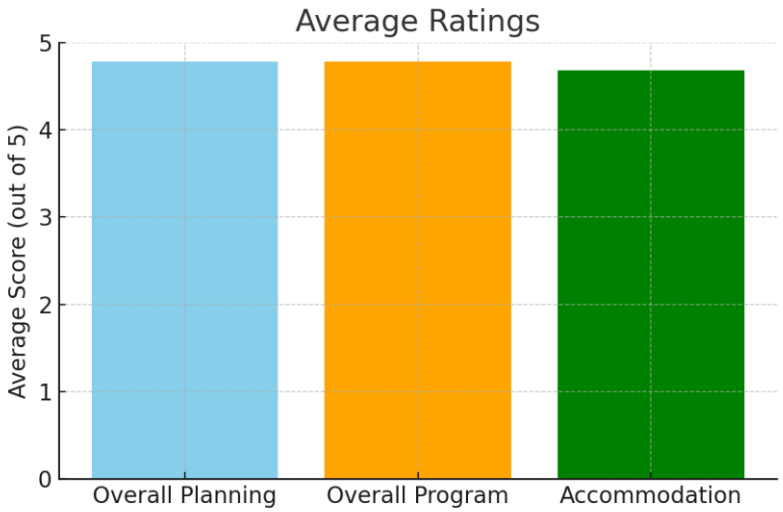


Figure 6: Average Ratings (Planning, Program, Accommodation)

Summary of Findings:

- Overall Planning Rating: 4.78/5
- Program Usefulness: 56% Extremely Useful, 34% Very Useful
- Difficulty Level: 46% Appropriate, 46% Slightly Advanced
- Accommodation Cleanliness: 4.68/5
- Food Satisfaction: 88% Agreed/Strongly Agreed
- Issues Reported: 41% minor issues (internet, power, water)
- Venue Cleanliness: 95% positive
- Overall Program Rating: 4.78/5

Conclusion

The Faculty Development Program on High Performance Computing and Artificial Intelligence, held from August 18–23, 2025, at MET's Institute of Engineering, brought together academic experts, researchers, and faculty members for a week of intensive learning and collaboration. With a strong mix of expert talks, hands-on lab sessions, and interactive discussions, the program successfully met its goal of deepening conceptual understanding while strengthening practical skills in HPC and AI.

Sessions covered a wide spectrum, from foundational programming tools like OpenMP and MPI to advanced CUDA programming, as well as emerging themes such as Generative AI, Retrieval-Augmented Generation, and the integration of HPC with AI. Each session offered participants a balance of theory and practical relevance, showing the real-world applications of these technologies.

Active involvement and valuable feedback from participants reflected the effectiveness of the program design, the importance of the topics discussed, and the expertise of the invited speakers. The seamless support from C-DAC Pune, the NSM Nodal Center at Walchand College of Engineering, and the dedicated organizing team at MET Institute of Engineering ensured smooth execution and high-quality delivery throughout the FDP.

This program not only enriched the knowledge base of faculty participants but also motivated them to bring advanced computing practices into their teaching, research, and institutional activities. Through this FDP, MET Institute of Engineering reinforces its commitment to driving innovation, advancing research excellence, and promoting academic growth in line with national priorities and global technological advancements.

We sincerely thank all speakers, contributors, and participants for making the program a meaningful and impactful experience.

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Convenor and H. O. D. [AI & DS]