MANGALORE INSTITUTE OF TECHNOLOGY & ENGINEERING
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(A Unit of Rajalaxmi Education Trust®, Mangalore - 575001)
Affiliated to V.T.U., Belagavi, Approved by AICTE, New Delhi.

THREE DAYS FACULTY DEVELOPMENT PROGRAM ON

COMPUTATIONAL MATHEMATICS WITH MATLAB

Organised by

Internal Quality Assurance Cell (IQAC)

MITE

In Association with

MathWorks®

CoreEL Technologies
Enabling Excellence

8/12/2022 to 10/12/2022

Three Days Faculty Development Program

on

Computational Mathematics with MATLAB

Title: Three Days FDP on Computational Mathematics with MATLAB

Date: 8/12/2022 to 10/12/2022

About the Workshop:

The three-day faculty development program on **Computational Mathematics with MATLAB** was organised by **Internal Quality Assurance Cell (IQAC), MITE** in association with Mathworks and CoreEL Technologies Pvt. Ltd. to foster the growth of engineering and scientific skills of the faculty members.

MathWorks is the developer of mathematical computing software for Engineers and Scientists. MathWorks is leading worldwide supplier of technical computing software. The business activities are characterized by quality, innovation, and timeliness; competitive awareness; ethical business practices; and outstanding service to the customers. MathWorks actively support local and professional communities through initiatives that advance STEM education, foster staff volunteerism, build environmental sustainability, and aid global relief efforts.

CoreEL Technologies is driven by innovation and a multi-disciplinary approach towards technology. CoreEL offer innovative solutions ranging from Intellectual Property (IP) cores, Design and Development, System Design and Prototype Development, Next-Gen Digital products, Integrated solutions, Low Volume Manufacturing, System Upgrades, Obsolescence management, EDA tools, COTS products, to Semiconductor solutions, and Technology Training.

FDP Outcome:

Participants will be familiar with the theory and practical aspects of Computational Mathematics with MATLAB.

The resource person for Three Days FDP on Computational Mathematics with MATLAB:

	**Mr. Rakshith B S** **Senior Application Engineer** **MathWorks products at CoreEL Technologies, Pvt. Ltd., Bengaluru**
	**Ms. Niveditha Mohankumar** **Education Customer Success Team at MathWorks, Bengaluru**

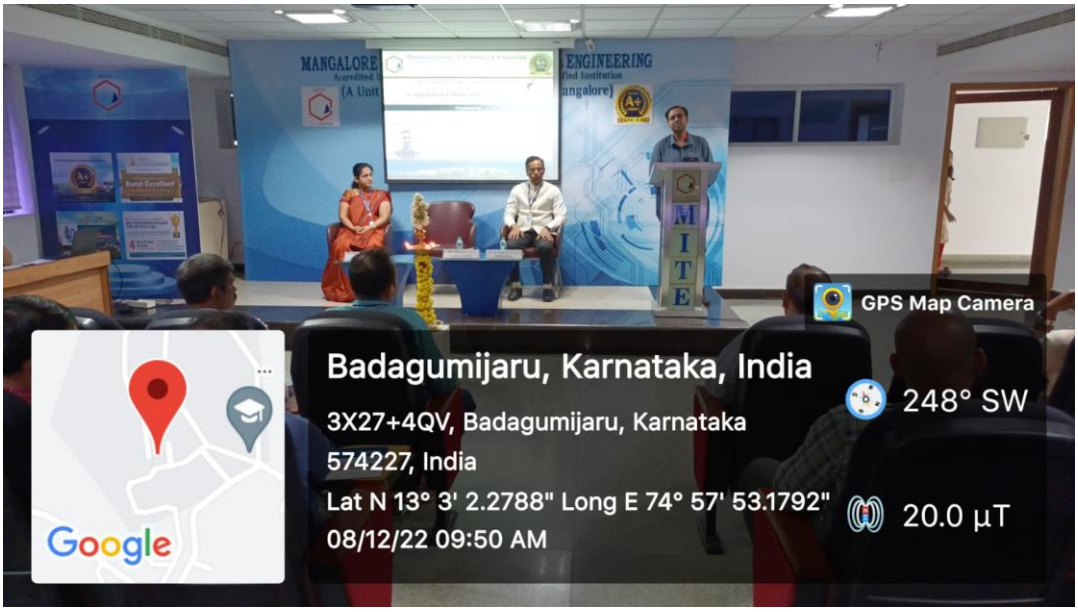
Day 1: 8th December 2022

INAUGURAL FUNCTION

The inaugural session of the three-day Faculty Development Program (FDP) on Computational Mathematics with MATLAB was held on 8th December 2022 at 9:00 am in Auditorium - 2. The FDP was organised by Internal Quality Assurance Cell, MITE, in association with Mathworks and CoreEL Technologies Pvt. Ltd. Mr. Rakshith B S, Senior Application Engineer for MathWorks products at CoreEL Technologies, Pvt. Ltd., Bengaluru, was the guest of honour and inaugurated the FDP. The inaugural session was presided over by the Principal Dr. M S Ganesha Prasad and Dr Vinayambika S Bhat, Convener IQAC and Program Coordinator of the FDP were present on the dais.

Mr. Rakshith B S in his guest speech gave an insight into the importance of the MATLAB tool and its applications. Dr Vinayambika S Bhat, the Program Coordinator briefed the participants about the workshop. Principal Dr. M. S. Ganesha Prasad in his Presidential address gave a glimpse of how important it is for the faculty members to take part in such FDPs for enhancing their knowledge & develop their skills.. Ms Deepthi Shetty, Senior Assistant Professor from the Department of Electronics & Communication Engineering rendered a vote of thanks.

Inauguration of the FDP by Mr. Rakshith B S



Inaugural Session – Address by chief guest Mr. Rakshith B S

SESSION-1

Resource Person: Ms. Niveditha Mohankumar & Mr Rakshith B S

Day 1 of the FDP began with introductory talk on MATLAB by Ms Niveditha Mohankumar, Customer Success Specialist, Mathworks. She had an online interaction with participants wherein she gave an introduction about Mathworks and its products. She highlighted the importance of MATLAB in engineering applications. Then she also briefed about the MATLAB Portal and gave a demo on the same. She highlighted that there is 100+ features in MATLAB and Simulink. She gave more emphasis on self paced online courses which students and faculties can avail free of cost. She added that, there are Onramp courses for beginners and also focused courses for advanced learners. She also briefed about the MATLAB Grader feature which would help faculty in assessment of students.

The resource person Mr. Rakshith B S explained about the installation of MATLAB using a valid Institutional email ID. He also explained the usage of MATLAB as an offline tool without browser support. Later he emphasized the usage of MATLAB drive for file upload and file sharing. Then the resource person explained the fundamentals of MATLAB that included programming using variables and the creation of variables. Using examples, he explained various mathematical operations that can be performed using MATLAB simulation tool. He then talked about Command History features available in MATLAB and explained various layouts and scripting using a live editor. Parallel to the live editor he also talked about the availability of MATLAB script. He then explained about adding text using the text option and writing

code using the code after the text section in the code section. He then threw light on various formatting features available in the text section like Bold, Unbold, Text formatting options, and Numbering options which are available in the live editor but not in the MATLAB script editor. Later he brought out the usage of tab insertion, adding hyperlinks, adding Web pages, adding images, and adding equations using the equation engine. He briefed about the creation of an array using the matrix tab, inserting the equation using LATEX. Later he presented about saving the MATLAB file using the save option and added how to save the files with the .mlx extension. He later added code control, label options, text configuration and section break.

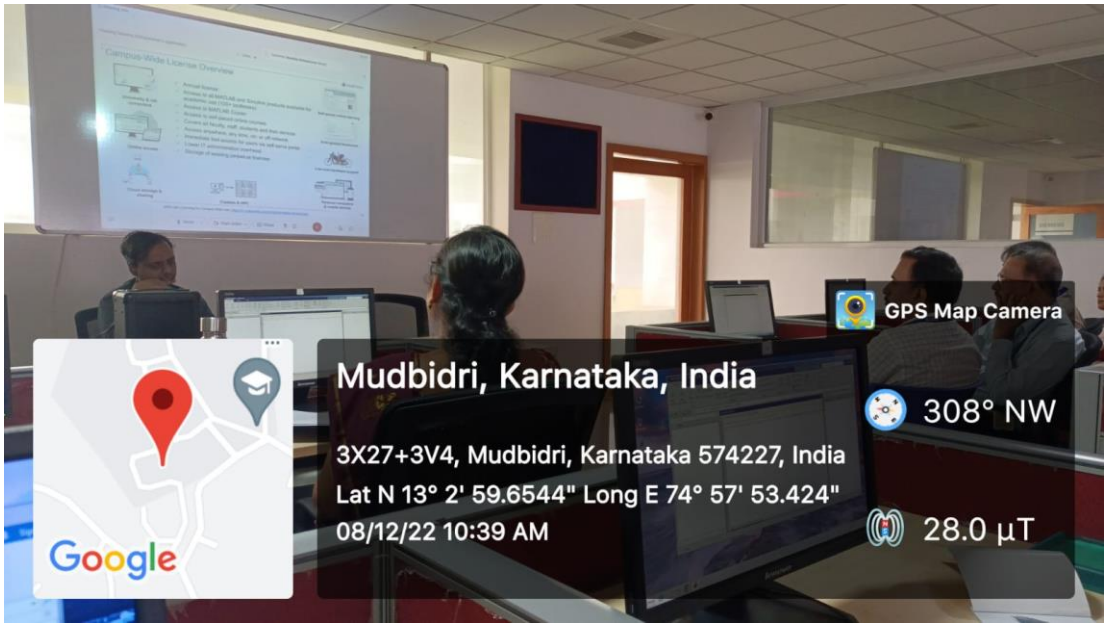
` **Resource Person Introducing the fundamentals of MATLAB to the participants**

Participants being trained using MATLAB Script and MATLAB Live

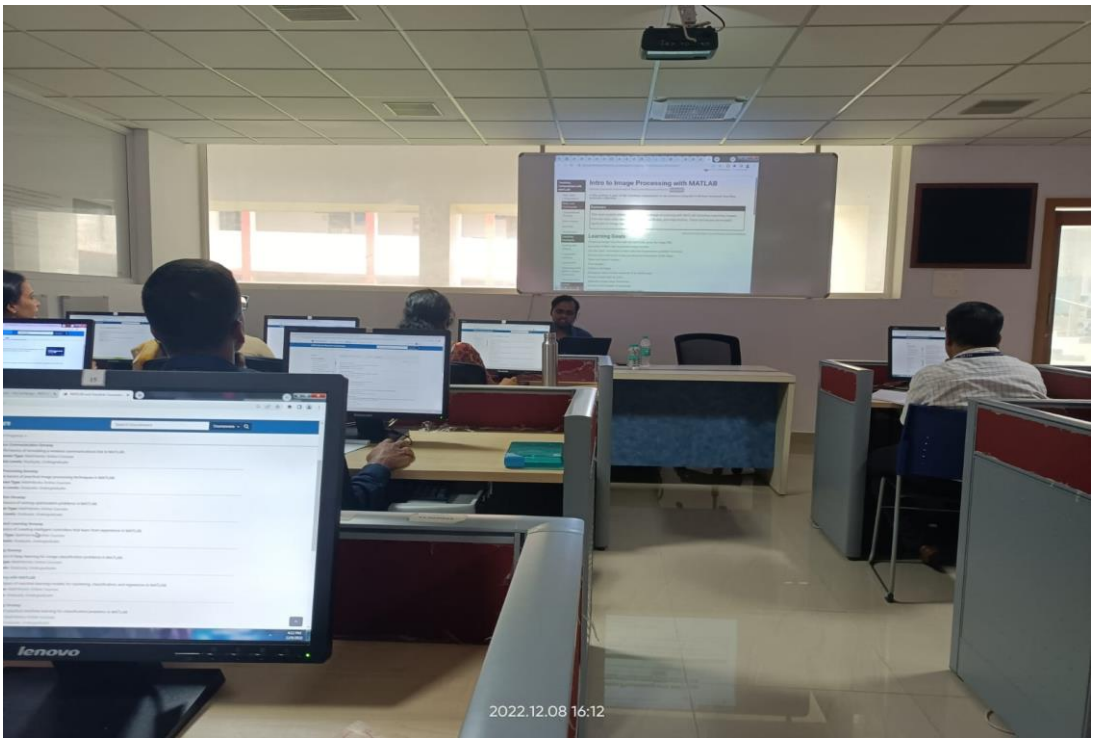
SESSION-2

Resource Person: Mr. Rakshith B S

In the afternoon session Mr Rakshith B S briefed about various datatypes available in MATLAB including numeric datatypes and integer datatypes with multiple options. He also talked about typecasting- converting the datatype of a variable from one type to another. He gave examples and explained about the unsigned integer data type. He then discussed about working with arrays and matrices. The discussion was on array creation, indexing arrays, array creation functions and array concatenation. He explained about row arrays, creation of matrices and vectors. Later he talked about array indexing by giving different examples. He added about special indexing operations performed on arrays. Next topic of discussion was on array concatenation techniques, horizontal and vertical concatenation with examples.



Hands-on session on arrays, matrices and vectors using MATLAB software



Hands-on session on matrix concatenation using MATLAB software

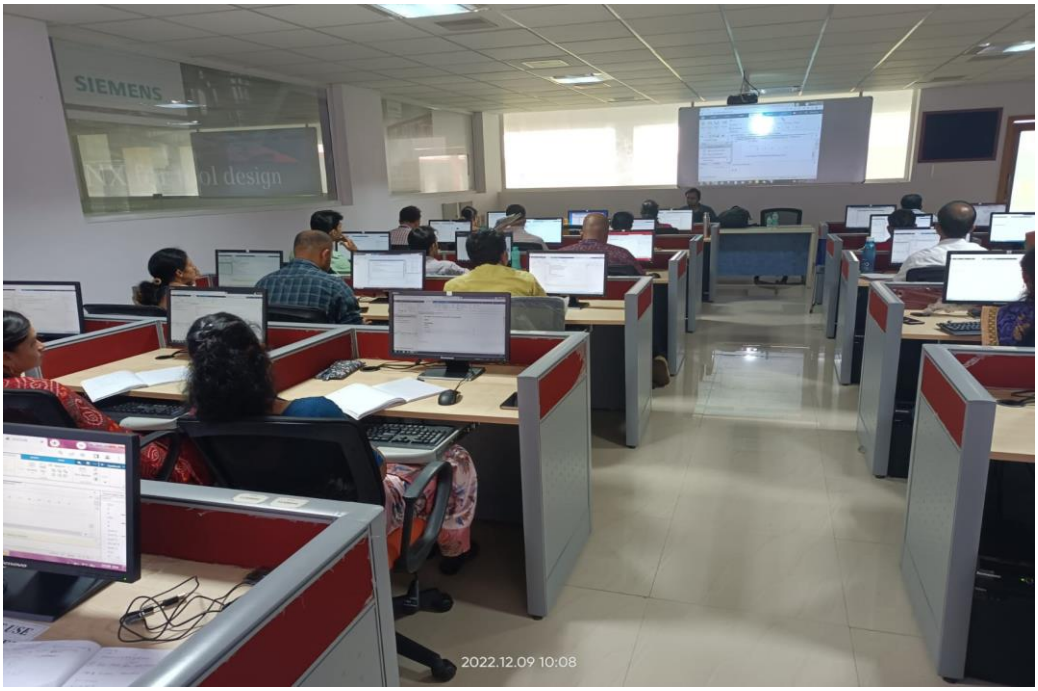
Day 2: 9th December 2022

SESSION-1

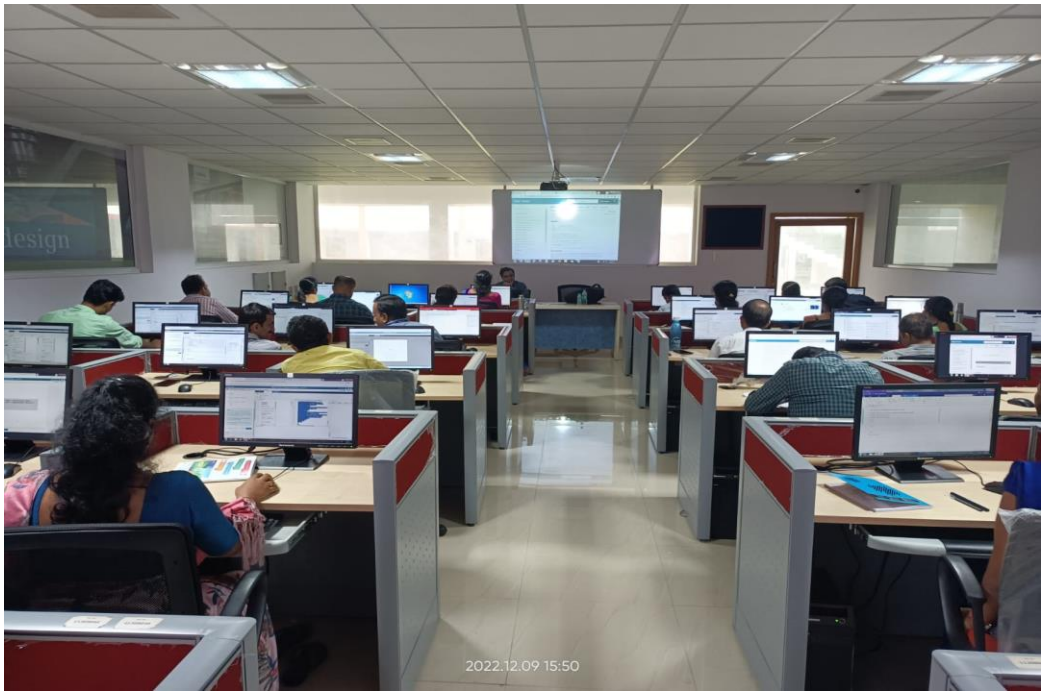
Resource Person: Mr Rakshith B S

On Day 2 the resource person began the talk on 2D plots for cartesian and polar curves. He showed by simulation examples on how to create 2D plots for cartesian and polar curves. He briefed on variable initialisation and step size by citing examples. He mentioned about **linspace** script for vector initialisation. He gave exquisite examples on plotting of curves. He then added about polar plotting.

The next topic of discussion was about symbolic mathematics. He used terminologies like symbolic numbers, symbolic variables, symbolic equation and symbolic functions to explain symbolic mathematics. Then he gave numerous examples to explain the conversion from cartesian to polar form. He discussed about on symbolic arrays with examples. He gave examples to explain circulant matrix and its usage. Then he moved on to the topic of differentiation. In this he gave his remarks on univariable and multivariable expressions with few examples. Next, he shifted his focus on partial differential equations. He took examples and explained on various ways of implementing partial differential equations.



Introduction to concepts of differentiation using MATLAB software

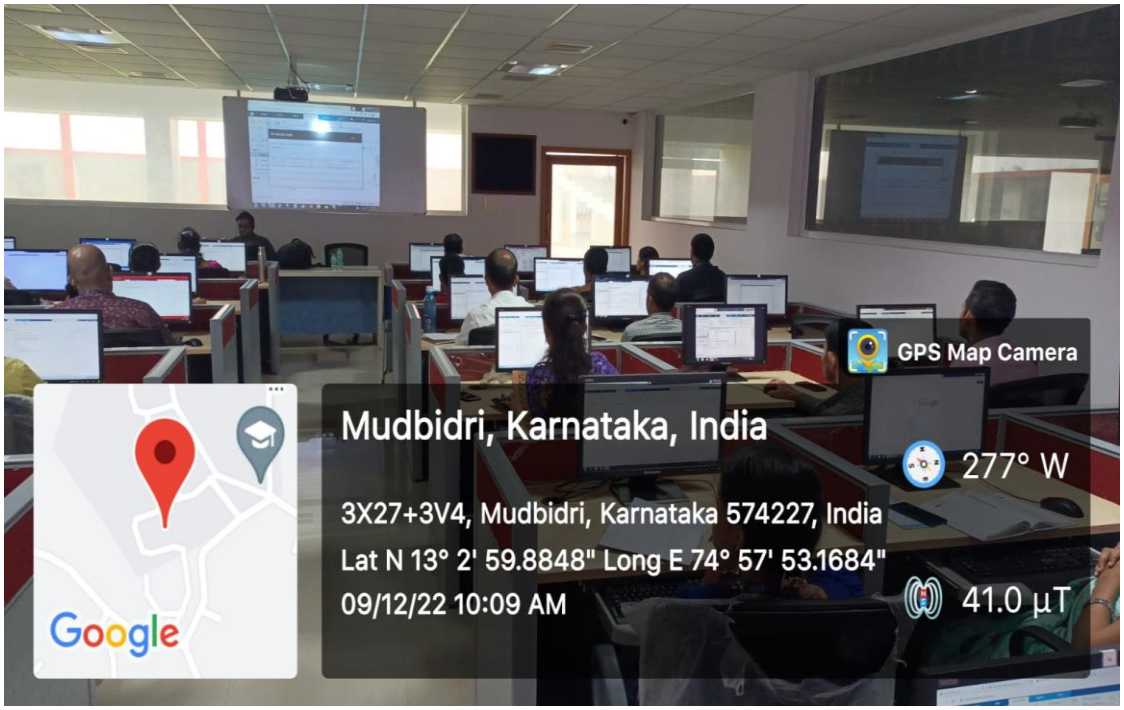


Mr Rakshith B S explaining the concept of Cartesian and Polar forms to Participants

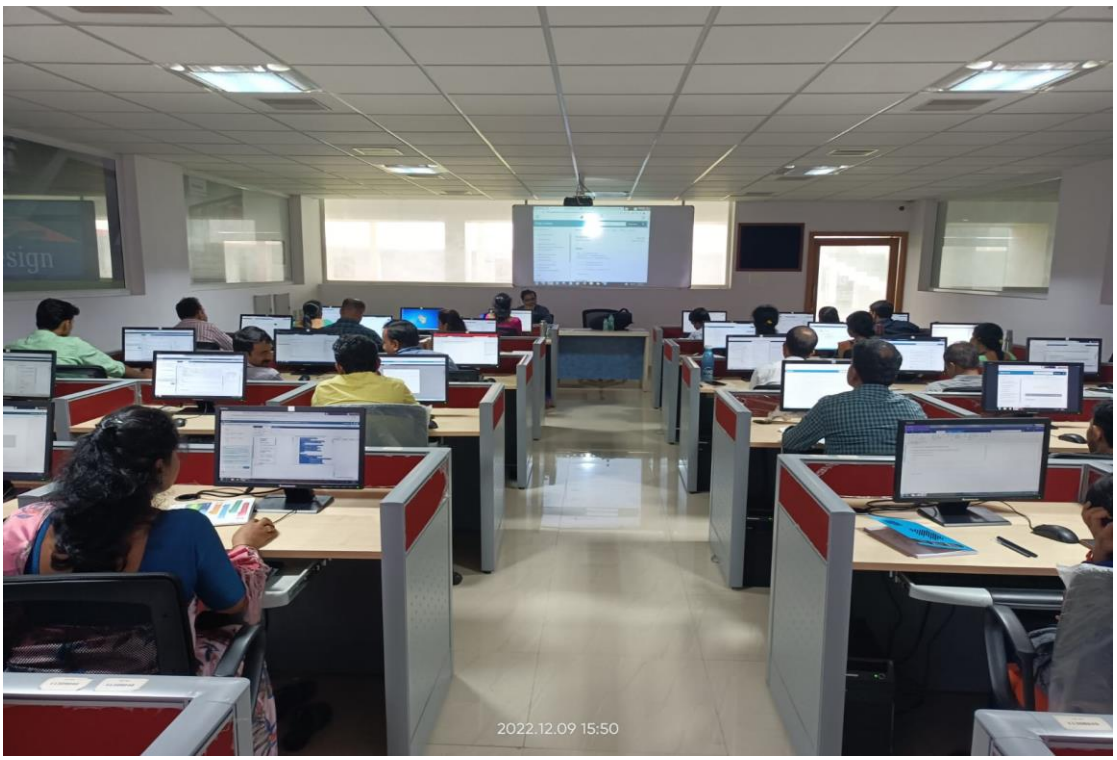
SESSION-2

Resource Person: Mr Rakshith B S

In the second session he gave impetus to a totally new topic of discussion on Integration. He elaborated by giving the two types widely used for Integration namel:, Indefinite Integral and Definite Integral. By taking a few examples he vividly explained on these with and without boundary conditions. Later he gave examples and described about finding angle between curves by using slope. He went on to explain about angle function and substituting function for calculation of angles between curves by substituting the values. Next, he shifted the topic of discussion to radius of curvature. He highlighted about **expand** function by taking a few examples. Next a small discussion was also done on Jacobian Matrix of Partial derivatives. He also gave examples and mentioned about plotting symbolic equation. He gave example of **fplot** function to explain this. The **fplot** function is used to create 2D plot of symbolic equations. He further continued his discussion with the talk on local maxima and minima. He talked about the **findpeak** function and explained its usage to compute local maxima and minima.



Hands-on Session training to participants on Introduction to Integration concepts using MATLAB



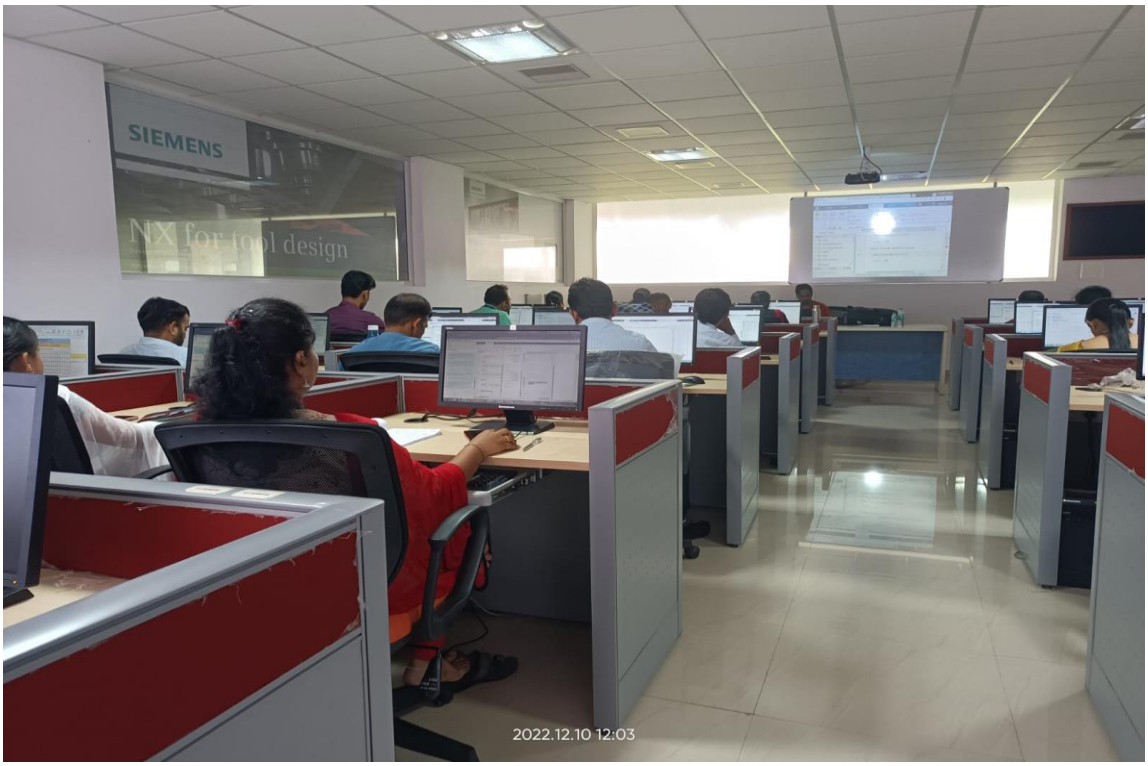
Rakshith B S giving Hands-on training to participants on Symbolic Equation using MATLAB

Day 3: 10th December 2022

SESSION-1

Resource Person: Mr Rakshith B S

On day 3 Mr Rakshith made wide discussion on working with differential equation. He introduced the **dsolve** function and explained its usage to arrive at symbolic solution of differential equation. He made use of initial conditions to solve differential equations. He further added a new function called **odetovector** field, which is a MATLAB function that uses variables for numerical evaluation. He used a few examples to explain this. Next, he shifted to first order and second order ordinary differential equation. He gave a few examples to this concept. He also explained on how to solve such equations by using and without using initial boundary conditions.



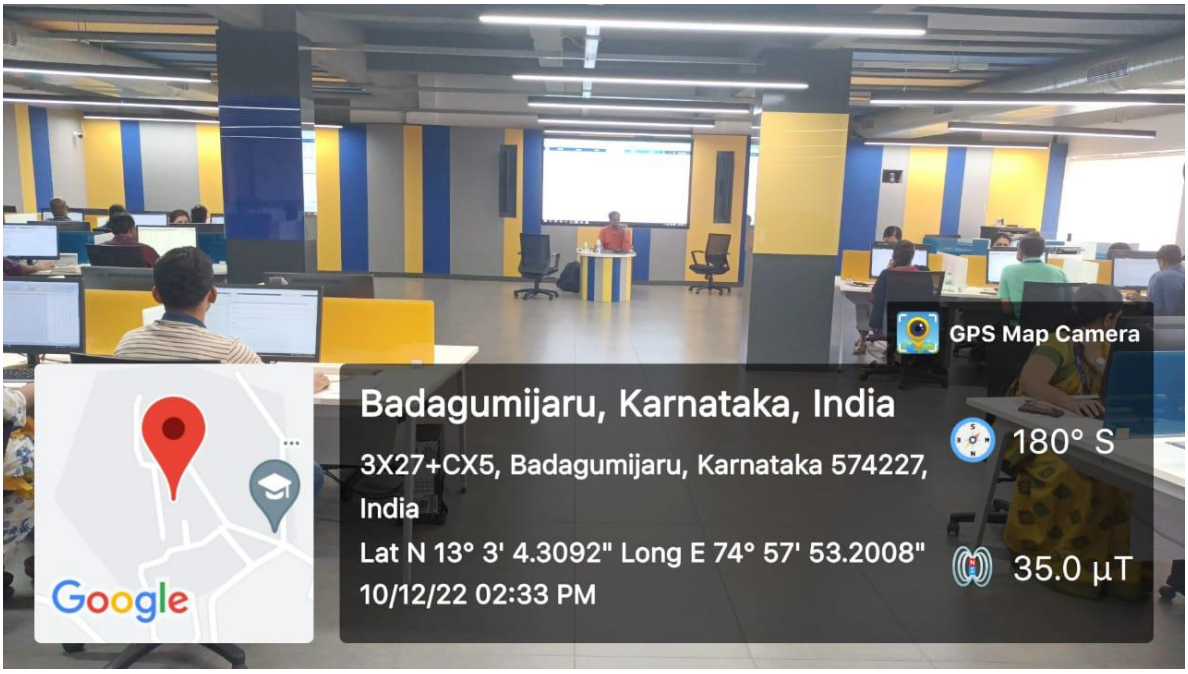
MATLAB software training on differential equations by Rakshith B S

Mr Rakshith B S explaining the usage of solve function

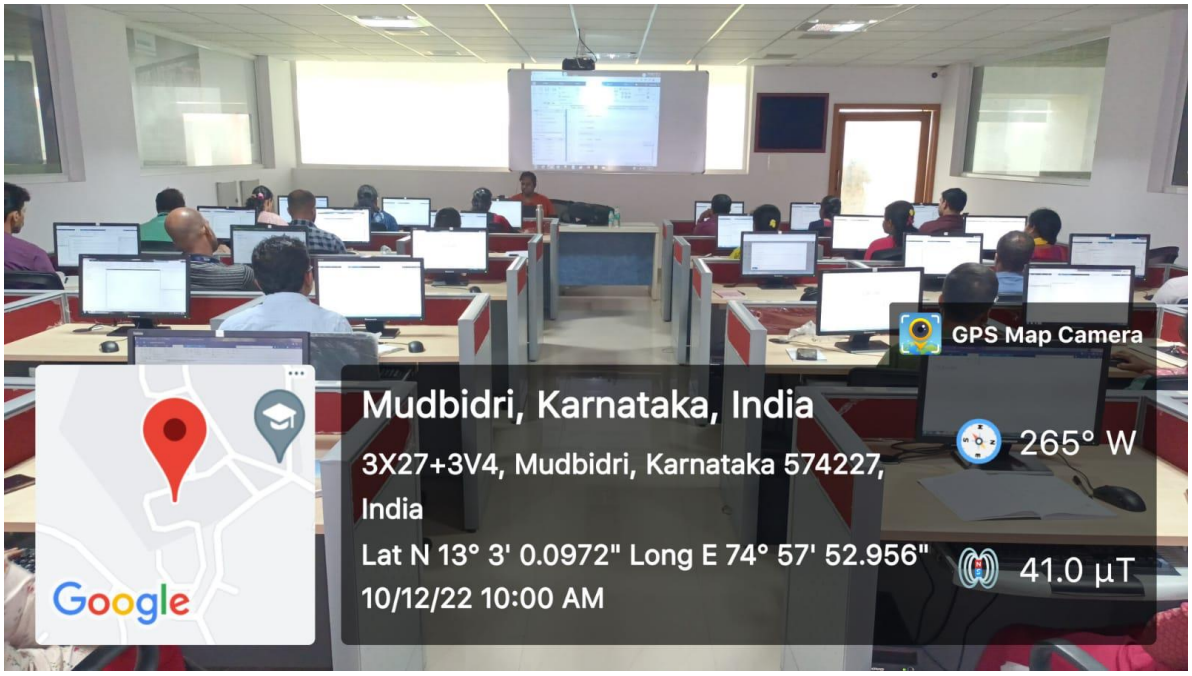
SESSION-2

Resource Person: Mr Rakshith B S

In the second session Mr Rakshith B S explained about applications of Integration such as Area and Volume. By using simulation, he showed how to calculate the area under the curve. He gave a few examples to explain this. He then talked on the calculation of the Volume of a solid. By taking examples he explained how one can calculate the volume of the solid by rotating the region which is bounded by limits. He used a variety of double and float inputs to show this. He then mentioned about Symbolic matrix and Augmented matrix that is obtained by concatenation. At the end of the discussion, he showed how to check for consistency for given system of linear equation. He then described about solve function and used it in the simulation to describe this. He gave an example to demonstrate this.



Rakshith explaining Hands-on applications of Integration-Area and Volume to participants



Mr Rakshith B S explaining the usage of MATLAB for solving the system of linear equations

VALEDICTORY PROGRAM

The valedictory program of the three-day FDP on Computational Mathematics with MATLAB was held on 10th December 2022 at 3.00pm in Innovation centre. Ms Zaheeda Vaseem, Manager Strategic Educational Institutional sales, Mathworks and Mr Bhanu Prakash Dixith, Manager University Solutions, CoreEL technologies were the invited guests for the valedictory ceremony. Dr Ganesha Prasad, Principal and Dr Vinayambika S Bhat, Program Coordinator of the FDP were present. Ms Zaheeda Vaseem briefed about the importance of a useful mathematical tool and its versatile usage in variety of applications related to different branches of Engineering. Mr Bhanu Prakash Dixith spoke about a variety of certificate programs offered by Mathworks that comes free together with campus wide license. Dr M S Ganesha Prasad, Principal appreciated the success of the FDP with very good and concerted faculty participation. He also highlighted the importance of MATLAB in faculty professional growth and transforming the knowledge to students by pedagogy. Participants from various departments shared their experiences about the FDP. Ms Deepthi Shetty concluded the program with a vote of thanks. A total of 36 faculty participants from various departments participated in the FDP.

Valedictory Program of the three Day FDP on Computational Mathematics with MATLAB

Group Photo