



Report on the NATIONAL SEMINAR(HYBRID MODE) “INTEGRATING NUMERICAL ANALYSIS WITH MACHINE LEARNING” Organized by Department of Mathematics

Day & Date: Thursday 20.08.2026

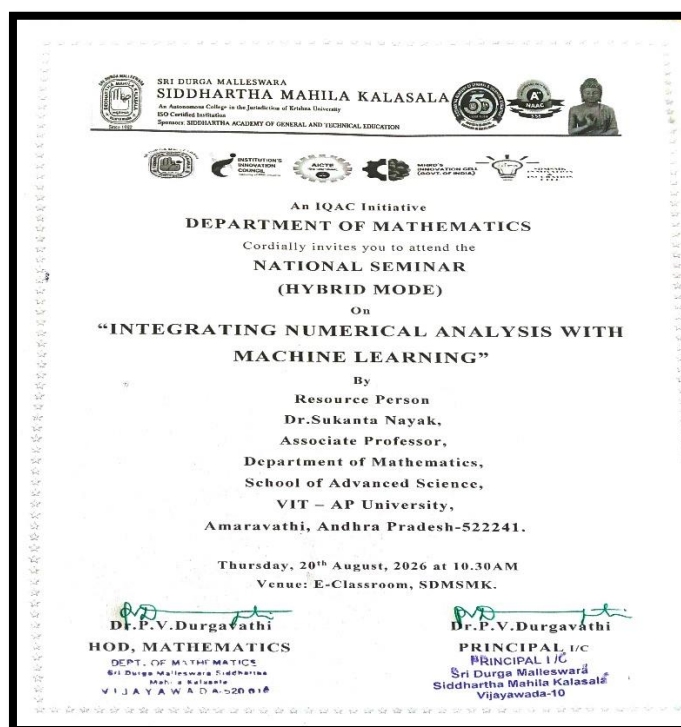
Venue: Webinar Hall

Time: 10:30AM - 12.30PM

PARTICIPANTS: Students of II & III B.Sc Honours Mathematics(offline) and Faculty, Students, Research scholars from different colleges(online).

RESOURCE PERSON: Dr.Sukanta Nayak,
Associate Professor, Dept. of Mathematics,
School of Advanced Science, VIT-AP University
Amaravathi, Andhra Pradesh-522241.

INVITATION:



PROGRAMME SCHEDULE FOR THE NATIONAL SEMINAR		
S.NO	PROGRAMME PARTICULARS	TIME
1	Welcoming Note & Inviting the guest to the dais	10.30AM-10.35AM
2	Lighting the Lamp, Prayer Song	10.35AM-10.40AM
3	Address by Principal I/C	10.40AM-10.45AM
4	Introducing the Resource Person	10.45AM-10.50AM
5	Session by Resource Person	10.50AM-12.25PM
6	Vote of Thanks	12.25PM-12.30PM

OBJECTIVE:

- To introduce participants to the role of numerical analysis in modern machine learning algorithms.
- To demonstrate practical applications of computational mathematics in data science, engineering, and AI.
- To encourage undergraduate students and faculty to explore interdisciplinary research and skill development in mathematical computing.

PROGRAMME HIGHLIGHTS

The Department of Mathematics, SDMSMK organized a National Seminar on “Integrating Numerical Analysis with Machine Learning” on 20th August 2026, from 10:30 AM to 12:30 PM, in hybrid mode. The seminar aimed to provide participants with an understanding of how numerical methods and machine learning techniques can complement each other in solving complex mathematical and real-world computational problems. The programme was attended by UG students and Mathematics lecturers/professors from the college as well as participants from other colleges , both offline and online. The session featured Dr. Sukanta Nayak, Associate Professor, Department of Mathematics, School of Advanced Science, VIT-AP University, a distinguished academician and researcher, as the Resource Person.



WELCOMING THE GUEST





LIGHTING THE LAMP, PRAYER SONG

The programme commenced with the **lighting of the ceremonial lamp and prayer song.**





BIO-DATA OF RESOURCE PERSON

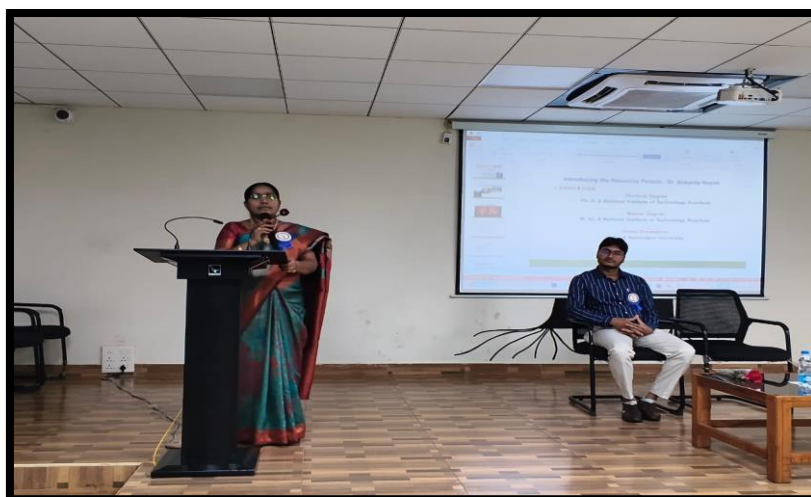
- Dr. Sukanata Nayak, who is currently working as Associate Professor – Grade I in the Department of Mathematics, School of Advanced Sciences, VIT-AP University, Amaravati, Andhra Pradesh.
- He completed his Bachelor's degree in B.Sc. from Sambalpur University, followed by his Master's degree in M.Sc. from the National Institute of Technology, Rourkela. He pursued his Doctoral degree, Ph.D., from the National Institute of Technology, Rourkela.
- Coming to his research profile, his areas of specialization include Numerical Analysis, Optimization Techniques, Differential Equations, Fuzzy Sets and Uncertainties, Artificial Intelligence, and Machine Learning.
- Dr. Sukanta Nayak recognized among 2% Scientist by Stanford University. He has more than 16 years of research and teaching experiences.
- Author of 3 books viz. "Fundamentals of Optimization Techniques with Algorithms" by Academic Publisher (Elsevier), "Interval Finite Element Method with MATLAB" by Academic Publisher (Elsevier), and "Neutron Diffusion: Concepts and Uncertainty Analysis for Engineers and Scientists" by CRC Press (Taylor and Francis) and editor of one edited

book “How Machine Learning is Innovating Today's World: A Concise Technical Guide” by John Wiley & Sons.

- Dr. Nayak received research awards on the occasion of the University Day of VIT-AP University for the years 2023, 2024, 2025, and 2026. He got Chancellor’s Publication Award, Amrita Innovation and Research Award (AIRA-2021) in 2021. He is a GES Postdoctoral Research Fellow, University of Johannesburg, South Africa, the year 2016, and MHRD GATE Fellow, the year 2012. He was awarded as PG Scholarship by Institute of Mathematics and Applications (IMA), Government of Odisha, year 2008.
- He has guided 15 master students and 2 PhD students awarded and 3 ongoing. Also he has served as admin guide for one PhD student.
- He is a life member of Indian Mathematical Society (IMS) and Andhra Pradesh & Telangana Society for Mathematical Sciences (APTSMS).
- Dr. Nayak has several book chapters and numerous peer-reviewed research articles in the well-known academic journals as well as he is a reviewer for many peer-review journals.

PRINCIPAL OPENING MARKS

The Principal In-charge, Dr. P.V.Durgavathi Madam, addressed the gathering and highlighted the importance of organizing such interdisciplinary academic programmes. She encouraged the students to develop computational and analytical skills and make use of emerging technologies such as artificial intelligence and machine learning in their academic and research pursuits.



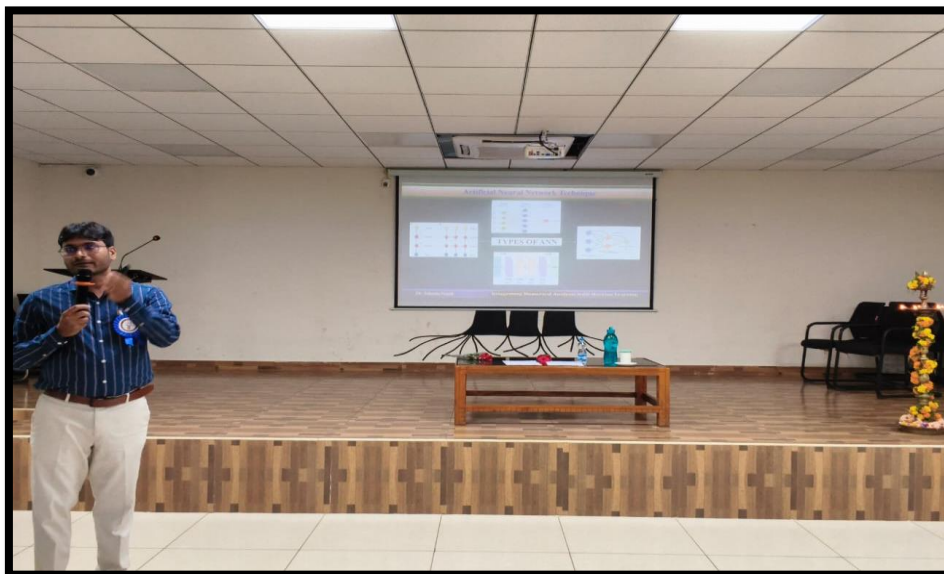
SESSION BY RESOURCE PERSON

Dr. Sukanta Nayak delivered an insightful and engaging session on the theme **“Integrating Numerical Analysis with Machine Learning.”** The session began with an interesting question:

“Can a computer learn a numerical method?”

This question provided an effective starting point for understanding the relationship between traditional numerical methods and modern machine learning techniques. The Resource Person introduced the participants to the major types of machine learning, namely **Supervised Learning, Unsupervised Learning, and Reinforcement Learning**, and explained their relevance to computational mathematics. He emphasized that numerical analysis is strongly connected with fundamental mathematical areas such as **linear algebra, calculus, differential equations, interpolation, and numerical methods for finding roots of nonlinear equations**. The session also discussed **interpolation and extrapolation**, along with the role of numerical techniques in generating computational data. A particularly interesting motivation presented during the session was: **“We normally use numerical methods to generate data. What if we use that data to train a machine that learns the numerical solution?”** This perspective helped the participants understand how numerical computation can serve as a source of training data for machine learning models.

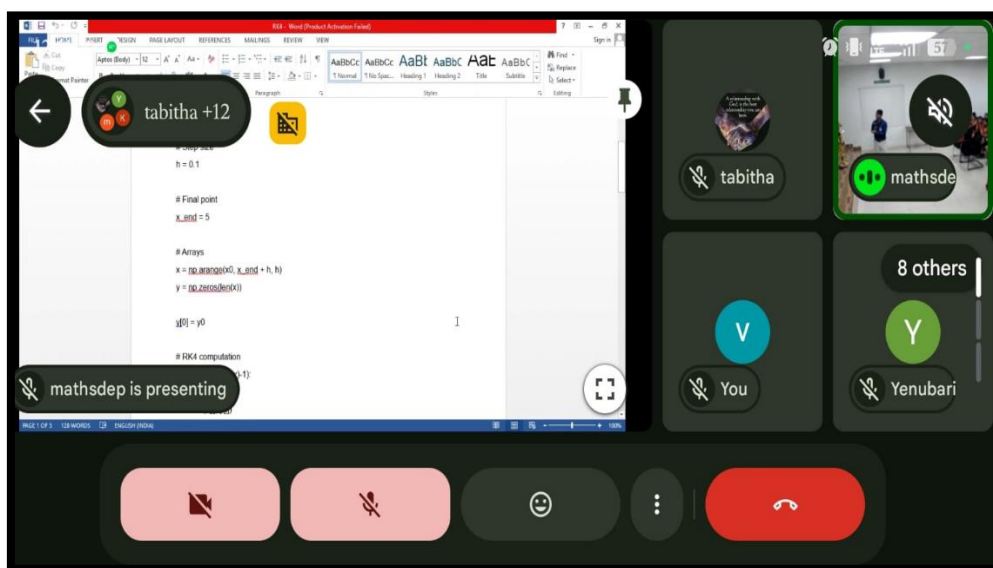






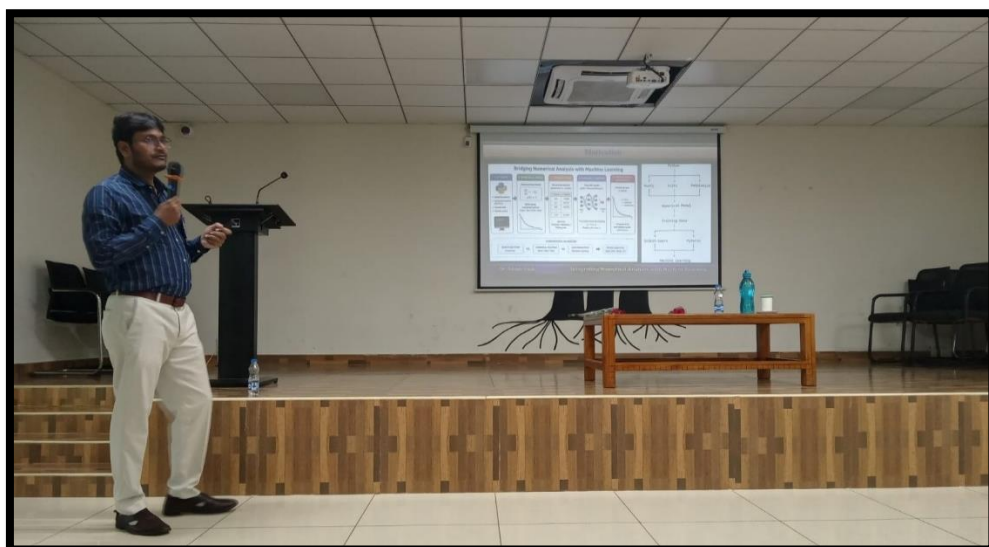
```
12:16 Python codes
Gaussian Elimination Method for system of an equations
import numpy as np
def gaussian_elimination(A, b):
    n = len(b)
    # Create augmented matrix
    Ab = np.column_stack((A, b)).astype(float)
    # Forward elimination
    for k in range(n - 1):
        # Partial pivoting
        max_row = np.argmax(abs(Ab[k:, k])) + k
        Ab[[k, max_row]] = Ab[[max_row, k]]
        for i in range(k + 1, n):
            factor = Ab[i, k] / Ab[k, k]
            Ab[i, k:] = Ab[i, k:] - factor * Ab[k, k:]
    # Back substitution
    x = np.zeros(n)
    for i in range(n - 1, -1, -1):
        x[i] = (Ab[i, -1] - np.dot(Ab[i, i + 1:n], x[i + 1:n])) / Ab[i, i]
    return x
A = np.array([
    [2, 1, 1],
    [1, 3, 2],
    [2, 1, 3]
], dtype=float)
b = np.array([10, 13, 15], dtype=float)
solution = gaussian_elimination(A, b)
print("Solution:")
for i, value in enumerate(solution):
    print(f"x{i+1} = {value:.4f}")
```

mathsdep is presenting Integrating Numerical Analysis with Machine Learning mathsdep



Key points covered

- ❖ Why Combine Numerical Analysis with Machine Learning?
- ❖ Numerical methods provide mathematical structure, accuracy, and computational principles, while machine learning provides data-driven approximation and adaptability.
- ❖ “How close can machine learning come to a numerical solution?”
- ❖ Artificial Neural Networks and Python
- ❖ The role of **Python** was also highlighted as an important computational tool. The Resource Person described Python as a **laboratory where numerical analysis and machine learning meet**.
- ❖ Bridging Numerical Analysis with Machine Learning



12:07

Promising research topics

Numerical Methods + ANN

- ✓ ANN-enhanced Newton methods
- ✓ ANN-based iterative solvers
- ✓ FEM-ANN hybrid methods
- ✓ ANN-assisted nonlinear equation solving

Numerical Analysis + PINNs

- ✓ PINNs for ODE/PDE problems
- ✓ Adaptive PINNs
- ✓ Numerical-error-aware PINNs
- ✓ FEM-PINN hybrid methods

Numerical Analysis + Optimization

- ✓ Levenberg-Marquardt neural solvers
- ✓ ML-assisted optimization
- ✓ Metaheuristic optimization of numerical algorithms
- ✓ Adaptive parameter selection

Uncertainty and Fuzzy Numerical Methods

- ✓ Fuzzy numerical methods + ML
- ✓ Uncertainty-aware neural solvers
- ✓ Fuzzy differential equations + PINNs
- ✓ Type-2 fuzzy systems + machine learning

Surrogate Modelling

- ✓ Numerical simulation → training data → ML surrogate
- ✓ Reduced-order models
- ✓ ML prediction of numerical simulation outputs
- ✓ Error/correction prediction using ML

mathsdep is presenting

Integrating Numerical Analysis with Machine Learning

mathsdep

12:03

Physics Informed Neural Network (PINN)

mathsdep is presenting

Integrating Numerical Analysis with Machine Learning

mathsdep

11:30

Interpolation and extrapolation

mathsdep is presenting

Integrating Numerical Analysis with Machine Learning

mathsdep

INTERACTION WITH THE PARTICIPANTS

The session also included an **interactive discussion**, where students actively raised questions and shared their queries, which were thoughtfully addressed and clarified by the Resource Person.



CONCLUSION:

The National Seminar provided an effective platform for **UG students and Mathematics faculty members** to explore the emerging interdisciplinary area of numerical analysis and machine learning. The programme encouraged participants to look beyond traditional computational methods and appreciate the potential of combining mathematical structure with data-driven approaches.

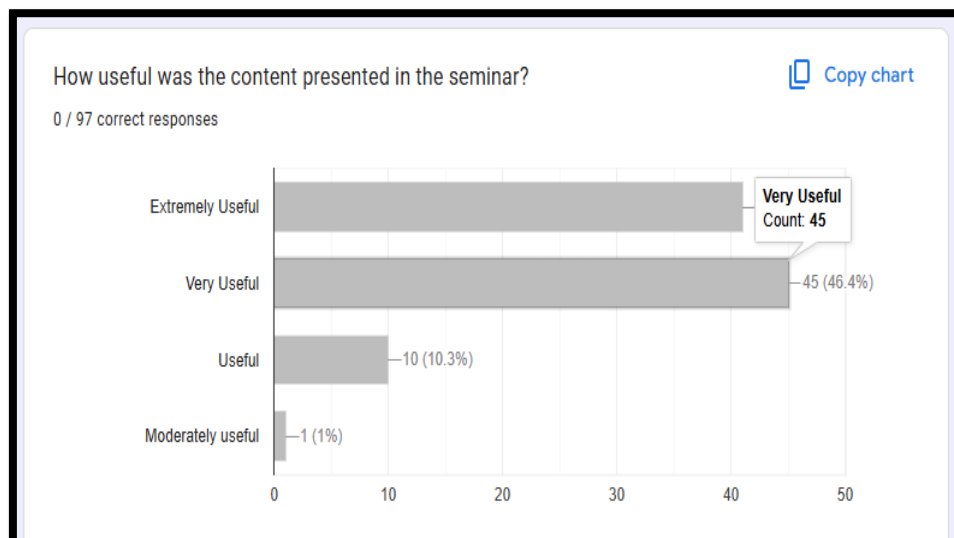
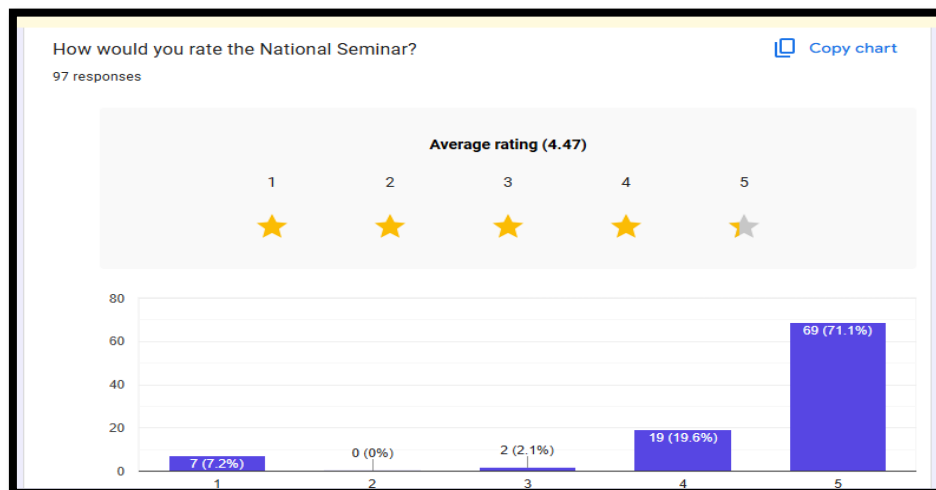


FELICITATION TO RESOURCE PERSON





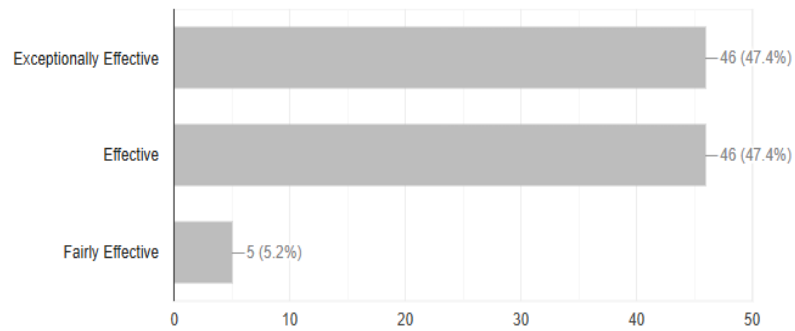
FEEDBACK FROM THE PARTICIPANTS



How effective was the speaker's delivery, clarity and engagement?

[Copy chart](#)

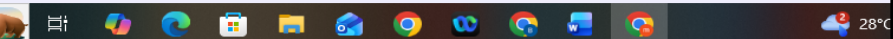
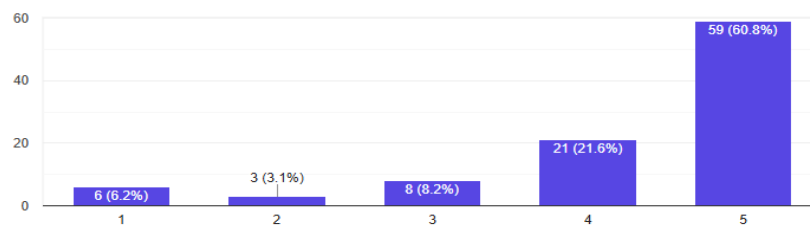
0 / 97 correct responses



How would you rate the level of interaction and engagement during the session?

[Copy chart](#)

97 responses



What was the most useful takeaway from the session?

97 responses

- Machine learning
- Career guidance
- Excellent
- Good
- Numerical analysis integrated with machine learning
- All
- Numerical analysis
- Knowledge
- How we use

What was the most useful takeaway from the session?

97 responses

Very nice and informative

Machine learning concepts

Informative Session

The most useful takeaway from the seminar was understanding how Numerical Analysis and Machine Learning can be integrated to solve complex mathematical and real-world problems more efficiently and accurately. It also helped us realise the importance of combining strong mathematical knowledge with modern technologies and encouraged students to explore practical applications of Mathematics in Machine Learning.

All sessions is useful

Uncertainty of differential equations

The most useful takeaway was understanding how numerical analysis concepts can be integrated with machine learning to solve mathematical and real-world problems more efficiently.

MEDIA COVERAGE OF THE PROGRAMME

ఆధునిక శాస్త్ర, సాంకేతిక రంగాల్లో న్యూమెరికల్ ఎనాలసిస్, మెషిన్

- లెర్నింగ్ పరస్కర సమన్వయం ద్వారా సమన్వయ పరిష్కరించవచ్చు
- అసోసియేట్ ప్రొఫెసర్ సుకంట్ నాయక్



విజయవాడ, ఆగస్టు 20 నేటి శుభోదయ : ఆధునిక శాస్త్ర, సాంకేతిక రంగాల్లో న్యూమెరికల్ ఎనాలసిస్, మెషిన్ లెర్నింగ్ పరస్కర సమన్వయం ద్వారా క్లిష్టమైన గణిత సమస్యలను సమర్థవంతంగా పరిష్కరించవచ్చని విట్ -ఎ. పి. యూనివర్సిటీ, అమరావతి స్కూల్స్ ఆఫ్ అడ్వాన్స్డ్ సైన్స్, డిపార్ట్మెంట్ ఆఫ్ మేథమెటిక్స్ అసోసియేట్ ప్రొఫెసర్ డాక్టర్ సుకంట్ నాయక్ అన్నారు. గురువారం శ్రీ దుర్గామల్లేశ్వర సిద్ధార్థ మహిళా కళాశాలలో గణిత శాస్త్ర విభాగం ఆధ్వర్యంలో ఇంటిగ్రేటింగ్ న్యూమెరికల్ ఎనాలసిస్ మెషిన్ లెర్నింగ్ అంశం పై నిర్వహించిన జాతీయ సదస్సులో పాల్గొని మాట్లాడుతూ ముఖ్యంగా డేటా విశ్లేషణ, గణిత సమూహాల రూపకల్పన, అంచనా పద్ధతులు, శాస్త్రీయ మరియు ఇంజనీరింగ్ అనువర్తనాల్లో మెషిన్ లెర్నింగ్ ప్రాధాన్యతను వివరించారు. గణితశాస్త్ర విద్యార్థులు ఆధునిక సాంకేతిక పరిజ్ఞానాన్ని గణితశాస్త్రంలో అనుసంధానం చేసుకొని పరిశోధనా



దృక్పథాన్ని పెంపొందించుకోవాలని ఆయన సూచించారు. కార్యక్రమానికి అధ్యక్షత వహించిన కళాశాల ఇంచార్జ్ ప్రిన్సిపాల్, గణితశాస్త్ర విభాగాధిపతి డాక్టర్ పి.వి. దుర్గావతి మాట్లాడుతూ గణితశాస్త్రాన్ని ఆధునిక సాంకేతిక రంగాలలో అనుసంధానం చేస్తే ఇటువంటి కార్యక్రమాలు విద్యార్థుల్లో పరిశోధనా ఆసక్తిని, నూతన ఆలోచనా విధానాన్ని పెంపొందించడానికి ఎంతో దోహదపడతాయని అన్నారు. ఈ కార్యక్రమంలో బి. కీరణ్మయి, కే. భానుప్రియ, డాక్టర్ వై. సరూప, ఎన్. జాహ్నవి దేవి, కె. తబిత, వి. పుష్ప, గణిత విద్యార్థినులు పాల్గొన్నారు.



ATTENDANCE SHEET

ATTENDANCE SHEET				
DEPARTMENT OF MATHEMATICS				
NATIONAL SEMINAR				
(HYBRID MODE) 20/08/2026				
on				
"INTEGRATING NUMERICAL ANALYSIS WITH MACHINE LEARNING"				
Resource Person: Dr. Sukanta Nayak, Associate Professor,				
Department of Mathematics,				
School of Advanced Science, VIT - AP University,				
Amaravathi, Andhra Pradesh-522241.				
DATE: 20.08.2026 (THURSDAY) TIME: 10.30AM-12.30PM				
S.NO	ROLL NO	CLASS	STUDENT NAME	STUDENT SIGNATURE
1	2531385	II BSc (Maths)	A. Jithendra	A. Jithendra
2	2531045	II BSc (Maths)	V. Pratyaksha	V. Pratyaksha
3	2531506	II BSc (Maths)	M. Anurag	M. Anurag
4	2531033	II BSc (Maths)	K. Goparaju	K. Goparaju
5	2531515	II BSc (Maths)	S. Anurag	S. Anurag
6	2531485	II BSc (Maths)	M. Anurag	M. Anurag
7	2531485	II BSc (Maths)	M. Anurag	M. Anurag
8	2531505	II BSc (Maths)	P. Tejash	P. Tejash
9	2531505	II BSc (Maths)	P. Tejash	P. Tejash
10	2531485	II BSc (Maths)	P. Tejash	P. Tejash
11	2531505	II BSc (Maths)	P. Tejash	P. Tejash
12	2531505	II BSc (Maths)	P. Tejash	P. Tejash
13	2531505	II BSc (Maths)	P. Tejash	P. Tejash
14	2531505	II BSc (Maths)	P. Tejash	P. Tejash
15	2531505	II BSc (Maths)	P. Tejash	P. Tejash
16	2531505	II BSc (Maths)	P. Tejash	P. Tejash
17	2531505	II BSc (Maths)	P. Tejash	P. Tejash
18	2531505	II BSc (Maths)	P. Tejash	P. Tejash

19	2531505	II BSc (Maths)	P. Tejash	P. Tejash
20	2531505	II BSc (Maths)	P. Tejash	P. Tejash
21	2531505	II BSc (Maths)	P. Tejash	P. Tejash
22	2531505	II BSc (Maths)	P. Tejash	P. Tejash
23	2531505	II BSc (Maths)	P. Tejash	P. Tejash
24	2531505	II BSc (Maths)	P. Tejash	P. Tejash
25	2531505	II BSc (Maths)	P. Tejash	P. Tejash
26	2531505	II BSc (Maths)	P. Tejash	P. Tejash
27	2531505	II BSc (Maths)	P. Tejash	P. Tejash
28	2531505	II BSc (Maths)	P. Tejash	P. Tejash
29	2531505	II BSc (Maths)	P. Tejash	P. Tejash
30	2531505	II BSc (Maths)	P. Tejash	P. Tejash
31	2531505	II BSc (Maths)	P. Tejash	P. Tejash
32	2531505	II BSc (Maths)	P. Tejash	P. Tejash
33	2531505	II BSc (Maths)	P. Tejash	P. Tejash
34	2531505	II BSc (Maths)	P. Tejash	P. Tejash
35	2531505	II BSc (Maths)	P. Tejash	P. Tejash
36	2531505	II BSc (Maths)	P. Tejash	P. Tejash
37	2531505	II BSc (Maths)	P. Tejash	P. Tejash
38	2531505	II BSc (Maths)	P. Tejash	P. Tejash
39	2531505	II BSc (Maths)	P. Tejash	P. Tejash
40	2531505	II BSc (Maths)	P. Tejash	P. Tejash
41	2531505	II BSc (Maths)	P. Tejash	P. Tejash
42	2531505	II BSc (Maths)	P. Tejash	P. Tejash
43	2531505	II BSc (Maths)	P. Tejash	P. Tejash
44	2531505	II BSc (Maths)	P. Tejash	P. Tejash
45	2531505	II BSc (Maths)	P. Tejash	P. Tejash
46	2531505	II BSc (Maths)	P. Tejash	P. Tejash
47	2531505	II BSc (Maths)	P. Tejash	P. Tejash
48	2531505	II BSc (Maths)	P. Tejash	P. Tejash
49	2531505	II BSc (Maths)	P. Tejash	P. Tejash
50	2531505	II BSc (Maths)	P. Tejash	P. Tejash
