Report on "Mathematical Logic and Cyber Security"

SAMEEKARAN–2026
An Annual Seminar on "Mathematical Logic and Cyber Security"
(In view of World Logic Day – 5 January 2026

Organized by:
Departments of **Mathematics, Statistics, and Computer Science**

- **Date:** 5th January 2026
- **Time:** 10:00 A.M.
- **Venue:** M.V. Hall

Objective of the Seminar

The seminar was organized to commemorate **World Logic Day** and to highlight the importance of **Mathematical Logic** in modern computing along with emerging challenges in **Cyber Security**. The event aimed to create awareness among students about logical reasoning, artificial intelligence, cyber threats, and data protection in the digital era.

Speakers

1. **Mr. B. Paparaju**
   Retired Executive Director – CISO
   (Chief Information Security Officer)
2. **Prof. C. Govardhan**
   Retired Professor
   Department of Mathematics, Osmania University

Introduction

Mathematical Logic, Artificial Intelligence (AI), and Cyber Security are three closely related domains that form the foundation of modern computer science. Mathematical logic provides the theoretical basis for reasoning and problem-solving. Artificial Intelligence builds on logic and data to simulate human intelligence, while Cyber Security focuses on protecting data, systems, and networks from digital threats. This report summarizes important concepts, examples, real-world incidents, and current trends discussed in the class.

Mathematical Logic

Mathematical logic is essential for structured thinking and rational decision-making. Without logic, there is no satisfactory or valid acceptance of arguments or conclusions.

Importance of Logic

- Logic helps in clear reasoning and problem analysis.
- It is the backbone of mathematics and computer science.
- Mathematical answers resolve paradoxes that appear illogical at first glance.

Famous Paradoxes

- **Achilles and the Tortoise (Zeno's Paradox):** Shows the concept of infinite steps and limits.
- **Arrow Paradox:** An arrow in motion is at rest at any single instant.
- **Zeno's Paradox:** Demonstrates infinite divisibility.
- **Protagoras Paradox:** Legal and logical contradiction involving payment for education.
- **Euthyphro Argument:** Both sides argue for personal benefit.
- **Russell's Paradox:** Concerns sets that contain themselves.
- **Barber's Paradox:** A barber who shaves everyone who does not shave himself— logical contradiction.
- **Cantor's Paradox:** States that there is no universal set containing all sets.

Set Theory

- Introduction to **Transfinite Sets**
- Cantor proved different sizes of infinity.
- Set theory forms the base of modern mathematics and computing.

Artificial Intelligence (AI)

Artificial Intelligence refers to machines that simulate human intelligence, learning, and decision-making.

Large Language Models (LLMs)

- Examples: ChatGPT, Grok, Microsoft AI models
- Trained using large datasets with user permissions.
- Used in text generation, speech, translation, and decision support.

Agentic AI

- AI systems that can act independently to achieve goals.
- Used in automation, cybersecurity monitoring, and decision systems.

AI Applications

- Voice recording and duplication
- Video and audio manipulation
- Filmora and similar apps allow AI-based editing and alterations
- AI can create duplicates of voice and images, raising ethical concerns

Cyber Security

Cyber Security is the practice of protecting systems, networks, and data from digital attacks.

Cyber Threats

- **Malware:** Malicious software
- **Ransomware:** Locks data and demands payment
- **Phishing:** Fraudulent messages to steal data
- **Fake APK Files:** Malware installed through unknown links
- **Pirated Applications:** Risk of data theft

Real-World Incidents

- December 2023: GPS disruptions affected airports in Delhi, Mumbai, Kolkata, Bengaluru, and Ahmedabad.
- India ranks among the top countries affected by cyber attacks.

Data Security

- Data protection in mobile applications
- Risks of sideloaded apps
- Importance of permissions and official app stores

Cyber Laws and Governance

- Need to update cyber laws for modern investigations
- VPN usage raises legal and security challenges
- Government initiatives encourage cyber security skills among students

Reporting Cyber Crime

- Official Portal: **cybercrime.gov.in**
- Helpline Number: **1930**
- IMEI blocking via TRAI to prevent misuse of stolen phones

Emerging Technologies and Skills

- Blockchain technology
- AI + IoT integration
- Speech recognition and AI moderation
- GitHub as a collaborative development platform
- Future demand for cyber security professionals

Coordinating Faculty Members

- **Dr. P. Sarada** – HOD, Department of Mathematics
- **Ms. B. Ramani** – HOD, Department of Computer Science
- **Ms. P. Priyanka** – HOD, Department of Statistics

Participants

- **Number of Students Attended:** 200
- Participants included students from Mathematics, Statistics, and Computer Science departments.

Highlights of the Seminar

- Prof. C. Govardhan explained the role of **mathematical logic**, paradoxes, and logical reasoning in problem-solving and computer science.
- Mr. B. Paparaju discussed **cyber security challenges**, cyber crimes, ransomware, phishing attacks, and the role of AI in cyber defense.
- The speakers emphasized the increasing relevance of **Artificial Intelligence**, **logical models**, and **data security** in today's digital world.
- Awareness was created on safe digital practices, cyber laws, and reporting cyber crimes.
- The seminar encouraged students to pursue careers in **cyber security**, **data science**, and **AI-related fields**.

Outcome of the Seminar

- Enhanced understanding of mathematical logic and its real-world applications.
- Improved awareness of cyber threats and preventive measures.
- Motivated students to develop analytical thinking and cyber security skills.
- Strengthened interdisciplinary learning among Mathematics, Statistics, and Computer Science students.

Conclusion

The seminar **SAMEEKARAN–2026** was a great success with active participation from students and faculty members. The expert talks provided valuable insights into the integration of **Mathematical Logic and Cyber Security**, aligning well with the objectives of **World Logic Day**. The event significantly contributed to academic enrichment and skill development among students.

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