



SRI SARADA NIKETAN

COLLEGE OF SCIENCE FOR WOMEN, KARUR-5.



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Mobile No: 9489151733.

E- mail ID: admn-off@sssnc.ac.in.

Website: www.ssnac.ac.in

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S. Chinnamuthammal,
Head and Assistant Professor,
Department of Physics.

Absolute Zero

Absolute zero is the lowest temperature that can theoretically be reached in the universe. It is defined as -273.15°C (**0 Kelvin**). At this temperature, particles such as atoms and molecules have the least possible energy and almost completely stop moving. Temperature is a measure of how fast particles move. As a substance cools, its particles slow down. When the temperature reaches absolute zero, the motion of these particles becomes minimal. However, according to Quantum Mechanics, particles never come to a complete stop due to a concept called **zero-point energy**. This means there is always a tiny amount of motion, even at absolute zero. Scientists have not been able to reach absolute zero exactly, but they have come extremely close using advanced cooling techniques such as laser cooling and magnetic trapping. These experiments help researchers study unusual states of matter like Bose–Einstein condensates, where atoms behave as a single quantum system. In conclusion, absolute zero represents the ultimate limit of coldness. It is an important concept in physics that helps scientists understand the behavior of matter at extremely low temperatures.

S.Prabhadevi M.Sc.,
Assistant Professor
Department Of Mathematics

Mathematics: The Backbone of Artificial Intelligence

Artificial Intelligence (AI) powers everything from voice assistants to self-driving cars, but at its core lies mathematics—the language that makes machines "think." Without linear algebra,

calculus, probability, and optimization, AI would be impossible. These tools transform raw data into intelligent decisions, enabling algorithms to learn patterns, predict outcomes, and adapt.

Linear algebra forms the foundation. AI models like neural networks represent data as vectors and matrices. Consider a simple image: pixels become a matrix, and transformations (rotations, scalings) use matrix multiplications. In deep learning, layers of neurons compute $y=f(Wx + b)$ where W is a weight matrix, x input data, and f an activation function like ReLU. Techniques such as Singular Value Decomposition (SVD) compress high-dimensional data, powering recommendation systems on Netflix or Amazon by uncovering latent factors in user preferences. Calculus drives learning through optimization. Gradient descent minimizes loss functions, iteratively adjusting parameters: $\theta_{\text{new}} = \theta_{\text{old}} - \eta \nabla J(\theta)$, where η is the learning rate and ∇J the gradient. This calculus-based method trains models on massive datasets, converging toward optimal solutions. Backpropagation, a chain rule application, computes gradients efficiently across network layers, making deep learning scalable.

Probability and statistics handle uncertainty, the hallmark of real-world AI. Bayesian inference updates beliefs with evidence: $P(H/D) = \frac{P(D|H)P(H)}{P(D)}$. In generative models like Gaussian Mixture Models, probabilistic distributions model data clusters. Markov chains underpin hidden Markov models for speech recognition, while stochastic gradient descent introduces randomness to escape local minima. Machine learning metrics—precision, recall, F1-score—root in statistical hypothesis testing, ensuring models generalize beyond training data.

Optimization elevates AI from theory to practice. Convex optimization guarantees global minima for problems like Support Vector Machines, solving $\min_{\{w\}} \frac{1}{2} \|w\|^2 + C \sum \xi_i$ subject to constraints. Reinforcement learning uses dynamic programming and Bellman equations to maximize rewards: $V(s) = \max_a [R(s,a) + \gamma \sum_{s'} P(s'|s,a) V(s')]$. Graph theory models relationships in social networks or knowledge graphs, with algorithms like PageRank computing eigenvector centrality. Discrete math, including combinatorics, fuels search algorithms like A*. Yet challenges persist: the "curse of dimensionality" demands advanced linear algebra, and explainable AI requires new mathematical frameworks for interpretability. Emerging fields like topological data analysis use algebraic topology to capture data shapes. Mathematics doesn't just enable AI—it evolves with it. Quantum AI leverages linear algebra in Hilbert spaces, promising exponential speedups. As AI tackles climate modelling or drug discovery, math remains indispensable. In essence, AI is applied mathematics at scale. Mastering these concepts unlocks innovation, bridging theory and real-world impact.

M. Vijayalakshmi
Assistant Professor,
Department of Mathematics

Probability: Understanding Uncertainty in the Real World

Probability is a fascinating branch of mathematics that deals with measuring uncertainty and predicting the likelihood of events. In a world filled with unpredictable outcomes from weather changes to financial markets probability provides a structured way to analyse and make informed decisions. It not only helps in solving mathematical

problems but also plays a vital role in science, technology, and everyday life.

The origins of probability can be traced back to the 17th century, when mathematicians such as Blaise Pascal and Pierre de Fermat began studying games of chance. Their work laid the foundation for modern probability theory, transforming it into a powerful mathematical discipline. Today, probability is deeply connected with fields like Statistics and Artificial Intelligence.

At its core, probability assigns a numerical value between 0 and 1 to describe how likely an event is to occur. An event with probability 0 is impossible, while an event with probability 1 is certain. Between these extremes lie countless possibilities that reflect real-world uncertainty.

To understand probability, we begin with a random experiment any process that leads to uncertain outcomes, such as tossing a coin or rolling a die. The collection of all possible outcomes is called the sample space, while any specific outcome or group of outcomes is known as an event. When all outcomes are equally likely, probability can be calculated using a simple ratio of favourable outcomes to total outcomes.

As the study deepens, probability introduces important concepts such as conditional probability, which examines how one event affects the likelihood of another. This idea is especially useful in areas like medical diagnosis, where the probability of a disease may depend on test results. Similarly, the concept of random variables allows us to represent outcomes numerically, making it easier to analyse patterns and distributions.

The applications of probability are vast and impactful. It is used in weather

forecasting to predict rainfall, in finance to assess risks and returns, in insurance to calculate premiums, and in modern technologies such as machine learning to build intelligent systems. Without probability, many of the systems we rely on daily would not function effectively.

In conclusion, probability is more than just a mathematical concept, it is a practical tool for navigating uncertainty. By providing a logical framework to evaluate chances and risks, it empowers individuals and organizations to make better decisions in an unpredictable world.

P.Anitha
Librarian

Indian History: A Journey Through Time

Indian history is one of the oldest and richest in the world, stretching back thousands of years. It reflects a vibrant blend of cultures, traditions, and civilizations that have shaped the nation we see today.

The story of India begins with the ancient Indus Valley Civilization, one of the world's earliest urban cultures. Known for well-planned cities like Harappa and Mohenjo-Daro, this civilization showed remarkable advancements in architecture, drainage systems, and trade.

Following this period, the Vedic age laid the foundation of Indian culture, philosophy, and religion. Important texts like the Vedas were composed, shaping spiritual and social life.

India saw the rise of powerful empires such as the Maurya Empire and the Gupta Empire. Under rulers like Ashoka the Great, India experienced political unity and the spread of peace

and Buddhism. The Gupta period is often called the "Golden Age" of India because of its achievements in science, mathematics, literature, and art.

During the medieval period, India witnessed the establishment of the Delhi Sultanate and later the Mughal Empire. The Mughals, especially rulers like Akbar, promoted cultural integration and administrative reforms. This era also gave India magnificent architectural wonders such as the Taj Mahal.

The modern period began with the arrival of European traders, leading to British colonial rule. The struggle for independence became a defining chapter in Indian history. Leaders like Mahatma Gandhi, Jawaharlal Nehru, and Subhas Chandra Bose inspired millions to fight for freedom.

Finally, India achieved independence in 1947, marking the end of colonial rule and the beginning of a new democratic nation. Since then, India has grown into one of the world's largest and most diverse countries.

Conclusion

Indian history is not just a record of the past but a source of pride and inspiration. It teaches us about resilience, unity in diversity, and the importance of cultural heritage. Understanding India's history helps us appreciate its present and shape a better future.

D.KRITHIGA, M.sc.,M.Phil ,B.Ed ,DMLT.
Asst. Professor In Microbiology
Dept Of Microbiology.

Tiny Allies for Better Health

Probiotic microorganisms are live beneficial microbes that provide health benefits when consumed in

adequate amounts. Commonly referred to as “good bacteria,” they primarily belong to groups such as *Lactobacillus*, *Bifidobacterium*, and certain yeasts like *Saccharomyces boulardii*. These microorganisms naturally inhabit the human gut and play a crucial role in maintaining overall health. One of the main functions of probiotics is to support digestive health. They help balance the gut microbiota by suppressing harmful bacteria and promoting the growth of beneficial ones. This balance is essential for proper digestion, nutrient absorption, and prevention of gastrointestinal disorders such as diarrhea, constipation, and irritable bowel syndrome. Probiotics also contribute to strengthening the immune system. A large portion of the body’s immune cells are located in the gut, and probiotics help stimulate immune responses and protect against infections. Additionally, they produce substances like lactic acid and bacteriocins that inhibit the growth of pathogens.

These helpful microbes can be found in fermented foods such as yogurt, kefir, sauerkraut, kimchi, and traditional fermented products. They are also available as dietary supplements in capsules, powders, and liquids. Regular consumption of probiotic-rich foods is considered a natural and effective way to maintain gut health. Recent research suggests that probiotics may also have benefits beyond digestion, including improving mental health through the gut-brain axis, reducing allergies, and even supporting skin health. However, the effectiveness of probiotics depends on the strain, dosage, and individual health condition.

In conclusion, probiotic microorganisms are essential for maintaining a healthy balance in the body. Incorporating them into daily diets

can promote better digestion, stronger immunity, and overall well-being.

*Ms.R.Jeeva M.Sc., M.Phil.,
Head & Assistant Professor,
Department of Microbiology.*

Crop Improvement Techniques in Modern Botany

Crop improvement is an essential aspect of modern botany aimed at increasing agricultural productivity and ensuring food security with the rapid growth of the global population, there is a greater demand for high-yielding, disease-resistant and climate-resilient crops. Modern botany provides various techniques to improve crop quality and quantity efficiently.

One of the most important techniques is plant breeding. It involves the selection and crossing of plants with desirable traits such as high yield, pest resistance and drought tolerance. Traditional methods like hybridization have been used for many years to develop improved crop varieties.

Another advanced technique is genetic engineering. This involves modifying the genetic material of plants to introduce specific beneficial traits. For example, crops can be engineered to resist pests, tolerate herbicides or survive harsh environmental conditions. Genetically modified (GM) crops have contributed significantly to increased agricultural productivity.

Tissue culture is another important method used in crop improvement. It involves growing plant cells or tissues in a controlled laboratory environment to produce new plants. This technique helps in rapid multiplication of plants, production of disease-free crops and conservation of rare plant species. Modern botany also uses

molecular marker-assisted selection (MAS).

This technique helps scientists identify desirable traits at the DNA level and select plants more accurately and quickly compared to traditional methods. It improves the efficiency of breeding programs.

Another important approach is mutation breeding, where plants are exposed to chemicals or radiation to create genetic variations. Some of these variations may result in beneficial traits such as improved yield or resistance to diseases.

Crop improvement techniques also include biotechnology tools like CRISPR, which allow precise editing of plant genes. These technologies help develop crops that can adapt to climate change, resist pests and require fewer chemical inputs.

The importance of crop improvement lies in its ability to ensure food security, enhance nutritional quality and support sustainable agriculture. Improved crops can grow in poor soil conditions, withstand drought and produce higher yields thus benefiting farmers and society.

However, there are concerns regarding the safety, ethical issues, and environmental impact of some modern techniques, especially genetic engineering. Proper regulations and research are necessary to address these challenges.

In conclusion, crop improvement techniques in modern botany play a vital role in agriculture. By combining traditional methods with advanced technologies, scientists can develop better crop varieties to meet the needs of

the growing population and ensure a sustainable future.

M. Parkavi
Assistant Professor,
Department of Computer Science.

Cryptography

Cryptography: Securing Information in the Digital Age

In today's interconnected world, protecting data has become more important than ever. Cryptography plays a vital role in ensuring secure communication, safeguarding sensitive information, and maintaining privacy in digital systems. From online banking to messaging apps, cryptography is the backbone of modern cybersecurity.

What is Cryptography?

Cryptography is the science of securing information by transforming it into an unreadable format, known as ciphertext, so that only authorized parties can access it. The original readable data is called plaintext. Cryptographic techniques ensure confidentiality, integrity, authentication, and non-repudiation of data.

Key Concepts in Cryptography

- **Encryption:** The process of converting plaintext into ciphertext using an algorithm and a key.
- **Decryption:** The reverse process of converting ciphertext back into plaintext.
- **Key:** A piece of information used by algorithms to encrypt and decrypt data.
- **Algorithm:** A mathematical procedure used for encryption and decryption.

Types of Cryptography

1. Symmetric Key Cryptography

In this method, the same key is used for both encryption and decryption. It is fast and efficient but requires secure key sharing.

Example: AES (Advanced Encryption Standard)

2. Asymmetric Key Cryptography

This uses two keys:

- Public key (for encryption)
- Private key (for decryption)

It enhances security but is slower than symmetric encryption.

Example: RSA algorithm

3. Hash Functions

Hashing converts data into a fixed-length string that cannot be reversed. It is mainly used for data integrity and password storage.

Example: SHA (Secure Hash Algorithm)

Applications of Cryptography

- **Online Banking and Payments:** Protects financial transactions.
- **Secure Communication:** Messaging apps use encryption to ensure privacy.
- **Passwords:** Stored using hashing techniques.
- **Digital Signatures:** Verify authenticity of digital documents.
- **Blockchain Technology:** Uses cryptographic principles for secure transactions.

Advantages of Cryptography

- Ensures data privacy and confidentiality
- Protects against unauthorized access
- Builds trust in digital systems
- Prevents data tampering

Challenges and Limitations

- **Key Management:** Safely storing and sharing keys is difficult.
- **Performance Overhead:** Encryption can slow down systems.
- **Human Errors:** Weak passwords or poor implementation reduce security.
- **Quantum Threats:** Future quantum computers may break current encryption methods.

Future of Cryptography

With the rise of quantum computing, researchers are developing **post-quantum cryptography** to build algorithms resistant to quantum attacks. Cryptography will continue evolving to meet new security challenges in areas like IoT, cloud computing, and artificial intelligence.

Conclusion

Cryptography is essential for maintaining security and privacy in the digital world. As cyber threats grow, the importance of strong cryptographic systems becomes even more critical. Understanding its principles helps build safer and more reliable technologies for the future.

S.SURYA, M.Sc., DCA.

***Assistant Professor in Microbiology,
Department of Microbiology.***

Navigating the 2026 Crossroads of Ozone Recovery

As of April 2026, the global effort to repair the stratospheric ozone layer is at a critical crossroads, balancing historical success with newly discovered industrial challenges. For decades, the Montreal Protocol has been hailed as the most successful environmental treaty in history, having successfully phased out 98% of ozone-depleting substances like chlorofluorocarbons once common in aerosols and refrigerants. Recent data from NASA and NOAA in late 2025 confirmed that the Antarctic ozone hole was one of the smallest on record since 1992, suggesting that the protective shield remains on track to return to 1980 levels by approximately 2066. However, a significant scientific update published in April 2026 warns that this recovery could be delayed by up to seven years, pushing the timeline to 2073. The primary cause is a regulatory loophole regarding "feedstock" chemicals—substances used as raw materials to produce other products like plastics and lithium-ion batteries. While these chemicals were originally thought to have negligible leakage rates, new global measurements indicate that industrial emissions are three to four times higher than previously estimated. This is particularly concerning because these substances do not just erode the ozone layer; they are also potent greenhouse gases. In the realm of medical biology, the stakes of this delay are profound. The ozone layer acts as Earth's primary sunscreen, filtering harmful ultraviolet-B radiation that causes DNA damage. Scientists estimate

that for every year the ozone's recovery is delayed, thousands of additional cases of skin cancer and cataracts occur globally. Beyond human health, increased UV exposure threatens the reproductive capacity of marine phytoplankton, the foundation of the aquatic food chain. Consequently, 2026 has become a pivotal year for international policy, with urgent calls to tighten the Montreal Protocol to include these forgotten industrial emissions and safeguard both the atmosphere and biological life.

S.JAYALAKSHMI M.Sc.,

***Assistant Professor,
Department of hospital Administration.***

HUMAN RESOURCE MANAGEMENT

Human resource management involves creating personnel policies and procedures that support business objectives and strategic plans. Central to this mission is fostering a culture that reflects core values and empowers employees to be as productive as possible. HR functions can vary depending on industry, businesses size and the types of workers employed. In most cases, the primary objectives are to acquire and cultivate talent and improve communication and cooperation among workforce members. Determining the skills and experience necessary to perform a job well may make it easier to hire the right people, determine appropriate compensation and create training programs. Creating health and safety policies, addressing employee grievances, and engaging with worker representatives can help support compliance with Indian labour regulations. Evaluating performance is important because it

not only fosters employee growth through constructive feedback, but also serves as a guide for raises, promotions and dismissals. Recognising achievements and rewarding high performers with bonuses and other perks is a proven way of motivating employees to take ownership of business objectives. From orientation to advanced educational programs, employee training serves to improve productivity, reduce turnover and minimise supervisory needs. HR professionals generally are tasked with creating and administering programs that improve workplace efficiency and employer-employee relationships. Within this broad assignment are several different but critical responsibilities. Staffing a business or an individual department requires a number of key steps. Hiring managers must first determine how many new employees the budget can support, then find and interview qualified candidates and finally, make selections and negotiate compensation. When new or updated policies are needed, HR professionals collaborate with management to document and share them with employees. These policies may include leave entitlements, workplace conduct, disciplinary actions and other protocols suited to the organisation's culture.

S.Prabhadevi,
Assistant Professor,
Department of Computer Science.

Strong AI vs Weak AI

Artificial Intelligence (AI) can be broadly classified into **Strong AI** and **Weak AI** based on their capabilities and level of intelligence. These two types represent different stages and goals in

the development of intelligent systems. Understanding their differences helps in grasping the current state and future direction of AI technology.

What is Weak AI?

Weak AI also known as **Narrow AI**, refers to AI systems that are designed to perform a **specific task**. These systems operate within a limited context and cannot go beyond their programmed functions. Weak AI does not possess consciousness, self-awareness or genuine understanding.

Examples of Weak AI include:

- Voice assistants like Siri and Alexa
- Recommendation systems used by online platforms
- Chatbots and virtual assistants
- Image recognition systems

Weak AI is widely used today and has become an integral part of everyday life. It is efficient, fast and capable of handling complex tasks within its domain.

What is Strong AI?

Strong AI, also known as **Artificial General Intelligence (AGI)** refers to machines that possess **human-like intelligence**. These systems can understand, learn and apply knowledge across different tasks, just like a human being.

Key characteristics of Strong AI:

- Ability to think, reason, and make decisions independently
- Self-awareness and consciousness (theoretical)
- Capability to perform any intellectual task that a human can do

- Adaptability to new situations without prior programming

Currently, Strong AI is still a **concept** and has not been fully developed. Researchers and scientists are actively working toward achieving this level of intelligence.

S.DURGA DEVI
Assitant Professor
Department of Chemistry.

Reversible Reactions

Chemical reactions are an important part of chemistry. Most reactions that we study go in one direction, where reactants change into products. These are called irreversible reactions. However, some reactions are different. They can occur in both directions. Such reactions are called reversible reactions. These reactions are very interesting and useful in chemistry.

A reversible reaction is a chemical reaction in which the reactants form products, and the products can change back into reactants. This means the reaction can move forward as well as backward. Reversible reactions are usually represented by a double arrow (\rightleftharpoons), showing that the reaction can occur in both directions.

In a reversible reaction, two processes happen at the same time. The forward reaction converts reactants into products, while the backward reaction converts products back into reactants. At the beginning, the forward reaction is faster because there are more reactants. As time passes, products are formed, and the backward reaction starts increasing.

After some time, both the forward and backward reactions occur at the same rate. At this stage, the amounts of reactants and products remain constant.

This condition is called equilibrium. It is an important concept in chemistry and is explained by the Chemical Equilibrium. Even though the reaction is still happening, there is no visible change because both reactions balance each other.

There are many examples of reversible reactions. One simple example is the reaction between hydrogen and iodine to form hydrogen iodide. In this reaction, hydrogen and iodine combine to form hydrogen iodide, and hydrogen iodide can also break down to form hydrogen and iodine again.

Another example is the formation of ammonia from nitrogen and hydrogen. This reaction is widely used in industries to produce ammonia, which is used in fertilizers. In this process, the reaction is reversible, and conditions like temperature and pressure are controlled to get more product.

Reversible reactions can be affected by different factors. Temperature, pressure, and concentration can change the direction of the reaction. For example, increasing the temperature may favor either the forward or backward reaction depending on the nature of the reaction. Similarly, changing the concentration of reactants or products can shift the reaction in a particular direction.

This behavior is explained by the Le Chatelier's Principle. According to this principle, if a change is made to a system at equilibrium, the system adjusts itself to reduce the effect of that change. This helps in controlling reversible reactions in industries.

Reversible reactions are very important in daily life and industries. In our body, many biochemical reactions are reversible. They help in maintaining balance and proper functioning. In

industries, reversible reactions are used to produce important chemicals like ammonia, sulfuric acid, and many others.

We can identify reversible reactions by the presence of a double arrow in the chemical equation. Also, these reactions do not go to completion because both reactants and products are present even after a long time.

Reversible reactions are different from irreversible reactions. In irreversible reactions, the products cannot change back into reactants. For example, burning of paper is an irreversible reaction because the ash formed cannot turn back into paper.

In conclusion, reversible reactions are an important type of chemical reaction in which the reaction can occur in both forward and backward directions. They reach a state of Chemical Equilibrium where both reactions occur at the same rate. These reactions are useful in many natural processes and industrial applications. Understanding reversible reactions helps us learn how to control chemical processes and use them effectively in real life.

L. ELAVARASI
Assistant Professor,
Department of Chemistry.

Reactions in Daily Life

Chemical reactions are happening all around us every day. Even if we do not see them clearly, they play an important role in our life. From morning to night, many activities involve chemical reactions. These reactions help us live, grow, and perform our daily tasks.

A chemical reaction is a process in which one substance changes into

another substance. These new substances have different properties. Chemical reactions can be fast or slow, visible or invisible, but they are always important.

One of the most important reactions in daily life is respiration. In this process, we breathe in oxygen and it reacts with the food (glucose) in our body. This reaction produces energy, carbon dioxide, and water. The energy released helps us to walk, talk, study, and do all activities. Without respiration, life would not be possible.

Another important reaction is digestion. The food we eat is complex and cannot be used directly by the body. So, our digestive system breaks down the food into simpler substances with the help of enzymes. This is also a chemical reaction. It helps our body to absorb nutrients and stay healthy.

Cooking food is another common example of chemical reactions. When we cook rice, vegetables, or any food, heat causes chemical changes. The food changes in taste, color, and texture. For example, raw rice becomes soft and edible after cooking. These changes are permanent, which shows that a chemical reaction has taken place.

Burning of fuels is also a chemical reaction. When we burn LPG, wood, or petrol, they react with oxygen and produce heat and light. This type of reaction is very useful for cooking, running vehicles, and generating electricity. It is an example of an exothermic reaction, where energy is released.

Rusting of iron is a slow chemical reaction that we see in daily life. When iron is exposed to air and moisture, it reacts with oxygen to form rust. Rust is a reddish-brown substance

that weakens iron. This is why iron objects need to be painted or coated to prevent rusting.

Plants also perform important chemical reactions. In photosynthesis, plants use sunlight, water, and carbon dioxide to make their own food. This reaction also releases oxygen, which is essential for humans and animals. Photosynthesis is a natural process that supports life on Earth.

Cleaning is another activity that involves chemical reactions. Soaps and detergents react with dirt and oil to remove them from clothes and surfaces. This makes cleaning easier and more effective.

Many reactions in daily life follow the Law of Conservation of Mass, which means matter is not created or destroyed but only changes form during a reaction.

We can identify chemical reactions in daily life by observing certain changes. These include change in color, production of heat or light, formation of gas, and formation of new substances. For example, when baking soda reacts with an acid, it produces carbon dioxide gas, which causes bubbles.

Chemical reactions are also used in industries. They help in making medicines, plastics, perfumes, soaps, and many other useful products. Without chemical reactions, modern life would not be possible.

In conclusion, chemical reactions are an essential part of our daily life. They occur in our body, in our homes, and in nature. They help us in many ways, such as providing energy, preparing food, and keeping us clean. Understanding these reactions helps us

to learn more about the world around us and appreciate the importance of chemistry in our everyday life.

S. SHALINI
Assistant Professor,
Department of Computer Science.

Future of Cybersecurity in a Digital World

Introduction

In today's digital era, technology is deeply integrated into every aspect of life, from communication and banking to healthcare and education. As dependence on digital systems increases, so do the risks associated with cyber threats. Cybersecurity has become a critical field focused on protecting systems, networks and data from attacks. The future of cybersecurity will play a vital role in ensuring a safe and secure digital world.

Growing Need for Cybersecurity

With the rapid growth of the internet, cloud computing and connected devices, cyber threats are becoming more frequent and sophisticated. Organizations and individuals face risks such as:

- Data breaches
- Identity theft
- Ransomware attacks
- Phishing scams

As digital transformation continues, the demand for strong cybersecurity measures will only increase.

Emerging Trends in Cybersecurity

Artificial Intelligence in Security

❖ Artificial Intelligence is transforming cybersecurity by

enabling systems to detect threats in real time. AI can analyze large amounts of data, identify unusual patterns and respond to attacks faster than humans.

Role of Governments and Organizations.

Governments and organizations must work together to improve cybersecurity by:

- Creating strong policies and regulations
- Promoting cybersecurity awareness
- Investing in research and development
- Training skilled professionals

Cloud Security

- ❖ With the rise of cloud computing, securing data stored online has become essential. Advanced encryption and multi-factor authentication are being used to protect cloud environments.

Internet of Things (IoT) Security

- ❖ The increasing number of connected devices creates new vulnerabilities. Securing IoT devices is crucial to prevent unauthorized access and data leaks.

Blockchain Technology

- ❖ Blockchain provides secure and transparent data transactions. It is being explored as a solution to enhance cybersecurity.

Zero Trust Architecture

- ❖ This approach assumes that no user or system is automatically trusted. Every access request is verified, reducing the risk of internal and external threats.

Challenges in Future Cybersecurity

- Increasing complexity of cyber attacks
- Shortage of skilled cybersecurity professionals
- Balancing security with user convenience
- Protecting privacy in a data-driven world
- Securing emerging technologies like AI and IoT

Future Impact

The future of cybersecurity will influence all sectors:

- **Healthcare:** Protection of sensitive patient data
- **Finance:** Secure online transactions and banking
- **Education:** Safe digital learning environments
- **Business:** Protection of company assets and customer data

Cybersecurity will become a fundamental requirement for trust in the digital economy.

Conclusion.

As the world becomes increasingly digital, cybersecurity will play a crucial role in safeguarding information and systems. While new technologies bring opportunities, they also introduce risks. The future of cybersecurity depends on continuous innovation, awareness and collaboration to create a secure and resilient digital environment.

Data Visualization Techniques

Data Visualization is the process of representing data in graphical or visual formats such as charts, graphs, and maps. It helps users understand complex data easily and supports better decision-making.

Importance of Data Visualization

- Simplifies complex data
- Reveals patterns and trends
- Enhances communication of insights
- Supports quick decision-making
- **Common Data Visualization Techniques**
- **Bar Charts:** Compare quantities across categories
- **Line Graphs:** Show trends over time
- **Pie Charts:** Represent proportions
- **Scatter Plots:** Show relationships between variables
- **Histograms:** Display data distribution

Tools for Data Visualization

Popular tools include:

- Tableau
- Power BI
- Matplotlib and Seaborn (Python libraries)
- Excel charts

Best Practices

- Choose the right chart type
- Avoid clutter and unnecessary details
- Use clear labels and titles

Conclusion

Data visualization transforms raw data into meaningful insights, making it an essential part of data science and business intelligence.

S. Thamayanthi

Assistant Professor

*Department Of Commerce And
Management*

RIVER CLEANING

River cleaning is an essential activity to protect the environment and ensure the health of living beings. Rivers are one of the main sources of fresh water for drinking, agriculture, and daily use. Over time many rivers have become polluted due to human activities such as dumping waste, industrial discharge and plastic pollution. Cleaning rivers helps restore their natural beauty and ecological balance. It also improves water quality making it safer for people and animals. Many organizations and volunteers take part in river cleaning campaigns to remove garbage and harmful substances. Government initiatives also play a major role in maintaining river cleanliness. Proper waste management is necessary to prevent further pollution. People should avoid throwing trash into rivers and instead use designated disposal systems. Awareness programs can educate communities about the importance of clean rivers. Planting trees along riverbanks can reduce soil erosion and pollution. Industries must treat their waste before releasing it into water bodies. Farmers should use eco-friendly fertilizers to avoid chemical runoff. Regular monitoring of water quality can help identify pollution sources. Schools and colleges can organize cleanliness

drives to involve students. Technology can also help in tracking pollution levels and cleaning efforts. Recycling and reducing plastic use can significantly lower river pollution. Clean rivers support biodiversity including fish, birds, and aquatic plants. They also enhance tourism and local economies. Religious and cultural practices should be conducted in an eco-friendly manner. Volunteers often collect plastic bottles, bags, and other debris from riverbanks. Community participation is key to successful river cleaning projects. Clean water is essential for human survival and health. Polluted rivers can spread diseases and harm ecosystems. Governments should enforce strict laws against polluters. Public cooperation is necessary to maintain long-term cleanliness. Rivers are a natural heritage that must be protected. Sustainable practices can ensure rivers remain clean for future generations. Education and awareness can bring positive change in behavior. Local bodies should provide proper waste disposal facilities. River cleaning is not a one-time effort but a continuous process. Everyone has a responsibility to keep rivers clean. Even small actions can make a big difference. Using biodegradable products can reduce pollution. Clean rivers contribute to a healthier environment. Protecting rivers also helps in conserving water resources. Nos play a significant role in organizing cleaning campaigns. The media can spread awareness about river pollution issues. Citizens should report illegal dumping activities. Clean rivers improve the quality of life for nearby communities. Water conservation and river cleaning go hand in hand. Environmental protection starts with individual responsibility. Together people can restore and protect rivers effectively.

V.Ranganayagi,
Assistant Professor
Department Of Commerce And
Management

Cyber Security Threats in Mobile Phones

Cyber security threats in mobile phones have increased rapidly due to the widespread use of smartphones for communication, banking, and personal data storage. Common threats include malware, viruses, spyware, and ransomware which can enter devices through unsafe app downloads malicious links or untrusted websites. Phishing and smishing attacks trick users into revealing sensitive information like passwords and Ooops. Public Wi-Fi networks also pose a major risk as hackers can intercept data transmitted over unsecured connections. Additionally weak passwords, outdated software and excessive app permissions make mobile devices more vulnerable to attacks. Threats such as SIM-swapping fake apps and QR code scams can lead to identity theft and financial loss. Hackers may also gain access to a phone's camera, microphone, and location, compromising user privacy. Therefore it is essential to follow good security practices like installing apps from trusted sources updating software regularly and using strong passwords to protect mobile devices from cyber threats.

P.Sangeetha
Assistant Professor
Department Of Commerce And
Management

Cost Accounting

Cost accounting is a branch of accounting that focuses on recording,

analyzing, and controlling the costs associated with producing goods or services in a business. It plays a vital role in helping organizations understand how much they spend and how they can manage those expenses efficiently. Cost accounting is closely related to Accounting and supports managerial decision-making by providing detailed cost information. It involves the classification of costs into different types, such as fixed costs, variable costs, and semi-variable costs, which helps businesses plan their operations effectively. One of the main objectives of cost accounting is cost control, where managers monitor expenses and take corrective actions to avoid wastage. It also helps in cost reduction by identifying areas where efficiency can be improved without affecting product quality. Techniques like standard costing and budgetary control are commonly used to compare actual performance with planned performance. Cost accounting also assists in pricing decisions by determining the total cost of production and ensuring that prices cover costs while generating profit. Another important aspect is cost allocation, where indirect costs are distributed among different departments or products. It provides valuable insights into profitability by analyzing which products or services are more profitable. Cost accounting systems also help in inventory valuation, ensuring that stock is recorded accurately. It supports planning and forecasting by providing historical cost data for future estimates. Decision-making becomes more effective as managers rely on cost data to choose the best alternatives. It is especially useful in manufacturing industries where cost control is essential for survival. Overall, cost accounting is an important tool for improving efficiency, reducing costs, and increasing profitability in any organization.