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COLLEGE OF SCIENCE FOR WOMEN, KARUR-5.



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

Empty Space Is Not Empty

In everyday thinking, empty space means “nothing.” However, in physics, especially in Quantum Mechanics, empty space—also called a vacuum—is far from truly empty. According to modern physics, a vacuum is filled with tiny, invisible energy fluctuations. These fluctuations constantly create and destroy particles known as virtual particles. They appear for a very short time and then disappear, following the rules of quantum physics. This means that even in complete emptiness, activity is always happening at a microscopic level. This phenomenon is explained by the idea of quantum fields, which exist everywhere in the universe. Even when no real particles are present, these fields still have energy. As a result, space itself has a kind of “background energy,” often called vacuum energy. One interesting effect of this is the **Casimir effect**, where two metal plates placed very close together in a vacuum experience a tiny force pushing them toward each other. This happens because of the energy present in empty space. In conclusion, what we call “empty space” is actually a dynamic and active environment. It is never truly empty but filled with energy and constant quantum activity, revealing the surprising nature of the universe.

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

INFINITY: THE ENIGMATIC BOUNDLESSNESS OF MATHEMATICS

Infinity has captivated thinkers for millennia, representing the ultimate frontier where finite minds grapple with the boundless. From ancient philosophers to modern mathematicians, infinity challenges our intuition, fuelling paradoxes and breakthroughs across science and philosophy. The journey begins with the Greeks. Zeno's paradoxes, around 450 BCE, mocked motion: Achilles never catches the tortoise because he must traverse infinitely many halfway points in finite time. These thought experiments exposed infinity's counterintuitive nature dividing a finite distance into infinite segments yields zero per step, yet summing them reconstructs the whole. Calculus later resolved this through limits that handle infinite processes.

Galileo noted in 1638 that natural numbers contain infinitely many squares (1, 4, 9...), yet squares seem fewer than non-squares. Surprisingly, both sets are equally infinite when paired one-to-one, defying everyday arithmetic. Georg Cantor revolutionized infinity in the 19th century with set theory. He distinguished countable infinity, like the integers that can be listed sequentially, from uncountable infinity, like the real numbers between 0 and 1. His diagonal argument proves the reals cannot be listed exhaustively: construct a new number differing in the n th digit from the n th entry in any supposed complete list—it's always missing. This hierarchy of infinities, from aleph-null upward, introduced transfinite numbers, where adding or multiplying by finite amounts leaves the size unchanged.

Potential versus actual infinity divides views: Aristotle saw infinity as an endless process, never complete. Cantor embraced actual infinities as fully realized sets. In analysis, infinity enables calculus. Improper integrals

over infinite domains can converge to finite values, and infinite series approximate functions with pinpoint accuracy, like expansions for the exponential function. Physics invokes infinity provocatively. Black holes harbour singularities of infinite density the universe may stretch infinitely. Yet infinities often signal issues quantum field theory renormalizes them, subtracting excesses for finite, testable predictions.

Philosophy ponders infinity's implications. Hilbert's hotel paradox shows a fully occupied infinite hotel can always accommodate new guests by shifting occupants cleverly: move those in room n to room $2n$, freeing infinite odds. This highlights infinity's quirky arithmetic. Modern math tames infinity via ordinals for order and cardinals for size. Gödel's incompleteness theorems suggest infinite layers of mathematical truth. In computer science, infinite sets model theoretical computability. Turing machines process endless tapes in principle.

Infinity inspires art and culture Bach's endless canons, Escher's impossible staircases. Yet it cautions against overreach: the continuum hypothesis, claiming no infinity between countable sets and the continuum, remains undecidable under standard axioms.

Infinity isn't a number but a profound concept transcending finitude, revealing math's boundless beauty. It reminds us: the universe of ideas expands forever, inviting endless exploration.

M. Vijayalakshmi
Assistant Professor,
Department of Mathematics

Prime Number Distribution: Patterns in the Building Blocks of Numbers

Prime numbers are the fundamental building blocks of arithmetic numbers greater than 1 that are divisible only by 1 and themselves. Examples include 2, 3, 5, 7, 11, and so on. Although primes appear irregular at first glance, mathematicians have discovered deep patterns in how they are distributed among natural numbers. The study of this behavior is known as prime number distribution, a central topic in Number Theory.

One of the earliest results in this area is the Prime Number Theorem, which describes how primes become less frequent as numbers grow larger. It states that the number of primes less than a large number n is approximately $\frac{n}{\log n}$. This means that while primes never stop appearing, they become increasingly sparse as we move toward infinity. This result was independently proven by mathematicians such as Jacques Hadamard and Charles Jean de la Vallée-Poussin in 1896.

Despite this general trend, the distribution of primes is not perfectly regular. There are unexpected patterns and gaps where primes cluster or become rare. Understanding these irregularities is one of the most challenging problems in mathematics. To study these patterns more deeply, mathematicians use tools from complex analysis, leading to important connections with the Riemann zeta function and related concepts.

A major unsolved problem in this field is the **Riemann Hypothesis**, proposed by Bernhard Riemann. It suggests a deep structure behind the distribution of primes and is considered one of the most important open problems in mathematics. If proven true, it would provide an even more precise understanding of how primes are spaced.

Prime number distribution also has practical applications. In modern cryptography, especially in securing digital communication, large prime numbers are essential for encryption algorithms. This makes the study of primes not only theoretically important but also crucial for cybersecurity and information technology.

In conclusion, prime number distribution reveals both order and randomness in the sequence of natural numbers. While primes follow a general trend described by mathematical laws, their finer structure remains mysterious and continues to inspire research in mathematics today.

P.Anitha
Librarian

The Modern Library

In today's fast-changing digital world, the concept of a library has transformed dramatically. Once known as quiet places filled with shelves of books, libraries have now evolved into dynamic centers of knowledge, technology, and community engagement.

Modern libraries are no longer limited to printed materials. They provide access to e-books, online journals, databases, and multimedia resources. With the rise of digital technology, libraries help users access information anytime and anywhere. According to studies on contemporary

libraries, digital tools and electronic resources have become a major part of library services.

Another important role of today's library is supporting education and research. Students, teachers, and researchers rely on libraries for reliable and organized information. Many libraries now offer free internet access, online learning platforms, and digital archives, making learning more inclusive and accessible.

Libraries are also becoming community hubs. They host workshops, reading programs, cultural events, and discussions. These activities encourage creativity, collaboration, and lifelong learning. In many places, libraries are being redesigned as spaces for interaction rather than silence, promoting the exchange of ideas and innovation.

Technology has also changed the role of librarians. Today's librarians are not just caretakers of books but information experts who guide users in finding accurate and useful data. They help people navigate digital resources, use research tools, and develop critical thinking skills.

Magazines like *Computers in Libraries* highlight how technology is shaping modern libraries and improving services for users. Similarly, professional publications such as *Public Libraries* provide ideas and strategies to meet the changing needs of communities.

However, despite all these advancements, the core purpose of a library remains unchanged—to provide free and equal access to knowledge. Libraries continue to play a vital role in education, culture, and society.

Conclusion:

The modern library is not just a place to read books; it is a gateway to knowledge, innovation, and community development. As technology continues to evolve, libraries will remain essential in guiding people toward information, learning, and growth.

D.KRITHIGA, M.sc.,M.Phil ,B.Ed ,DMLT.
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Soil Superstar , Nature's Hidden microbe Beneath Our Feet

The familiar, earthy fragrance that arises when rain falls on dry soil is a sensory experience cherished across cultures. This distinctive smell, often referred to as *petrichor*, has a fascinating scientific origin rooted in the activity of microscopic life within the soil. The term *Petrichor* was coined in 1964 by Australian scientists to describe the pleasant aroma produced when rain interacts with dry ground. One of the primary contributors to this scent is a compound called *Geosmin*, which is released by soil-dwelling microorganisms known as *Actinomyces*. These bacteria thrive in moist conditions but produce spores during dry periods. When raindrops strike the ground, they disturb these spores, releasing geosmin into the air, which we perceive as that characteristic earthy smell.

Additionally, plants contribute to petrichor by secreting oils during dry weather. These oils accumulate on surfaces like rocks and soil. When rain begins, the impact of droplets aerosolizes these oils along with geosmin, intensifying the scent. The process is further enhanced by tiny air bubbles formed when raindrops hit porous surfaces, which then burst and disperse these aromatic compounds into the atmosphere. Interestingly, humans

are highly sensitive to geosmin; even minute concentrations can be detected by our olfactory system. This sensitivity may have evolutionary significance, as the scent could have signaled the presence of water, an essential resource for survival.

In essence, the pleasant smell of rain is not merely a poetic experience but a remarkable interplay between biology, chemistry, and the environment. It reflects the hidden life within the soil and the intricate natural processes that connect the earth, the atmosphere, and human perception.

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

Organic Farming and Sustainable Agriculture

Organic farming and sustainable agriculture are essential approaches to ensure healthy food production and environmental protection. In recent years, the increasing use of chemical fertilizers and pesticides has led to soil degradation, water pollution and health problems. As a result, organic and sustainable farming methods have gained importance worldwide.

Organic farming is a method of agriculture that avoids the use of synthetic chemicals such as fertilizers, pesticides and genetically modified organisms (GMOs). Instead, it relies on natural processes like composting, crop rotation, green manure and biological pest control. These methods help maintain soil fertility and ecological balance.

One of the major advantages of organic farming is that it produces chemical-free and nutritious food. Organic crops are considered healthier

because they do not contain harmful residues of pesticides and chemicals. This contributes to better human health and reduces the risk of diseases.

Sustainable agriculture, on the other hand, focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs. It involves practices that are environmentally friendly, economically viable and socially responsible. Sustainable farming includes water conservation, soil management, biodiversity protection and efficient use of natural resources.

Organic farming is an important part of sustainable agriculture. It helps in improving soil structure, increasing microbial activity and reducing pollution. Practices such as crop rotation and intercropping prevent soil erosion and enhance productivity. The use of organic fertilizers like compost and manure enriches the soil naturally.

Another key benefit is the protection of biodiversity. Organic and sustainable farming methods encourage the growth of different plant and animal species. This creates a balanced ecosystem and reduces the risk of pest outbreaks.

However, organic farming also faces some challenges. It may require more labor, time, and knowledge compared to conventional farming. The yield may sometimes be lower, especially during the initial transition period. Despite these challenges, the long-term benefits outweigh the disadvantages.

In conclusion, organic farming and sustainable agriculture are crucial for ensuring food security, protecting the environment and promoting human

health. By adopting these practices, we can create a balanced and sustainable future for agriculture.

M. Parkavi
Assistant Professor,
Department of Computer Science.

Autonomous Systems and Robotics

Autonomous Systems and Robotics: Shaping the Future of Technology

Autonomous systems and robotics are among the most exciting and rapidly advancing fields in Computer Science. These technologies are transforming industries by enabling machines to perform tasks with minimal or no human intervention. From self-driving cars to intelligent drones, autonomous systems are redefining how humans interact with machines.

What Are Autonomous Systems?

Autonomous systems are machines or software that can perform tasks independently by making decisions based on data from their environment. They rely on sensors, algorithms, and computational models to operate without constant human control.

Robotics, on the other hand, involves the design, construction, and operation of physical machines (robots) that can carry out tasks automatically or semi-automatically.

Key Components of Autonomous Systems

Autonomous systems typically consist of several core components:

- **Sensors:** These collect data from the environment (e.g., cameras, GPS, LiDAR).

- **Processing Units:** Analyze data and make decisions using algorithms.
- **Actuators:** Execute actions such as movement or manipulation.
- **Control Systems:** Ensure smooth and accurate functioning.

These components work together to allow machines to perceive, decide, and act.

Applications of Autonomous Systems and Robotics

The use of autonomous systems is expanding across many industries:

- **Transportation:** Self-driving cars and smart traffic systems reduce accidents and improve efficiency.
- **Healthcare:** Robots assist in surgeries, rehabilitation, and patient care.
- **Agriculture:** Autonomous tractors and drones help monitor crops and increase productivity.
- **Defense:** Unmanned aerial vehicles (UAVs) are used for surveillance and missions.
- **Manufacturing:** Industrial robots improve precision and speed in production lines.

Benefits of Autonomous Systems

These technologies offer several advantages:

- **Increased Efficiency:** Machines can operate continuously without fatigue.
- **Improved Safety:** Dangerous tasks can be handled by robots.
- **High Precision:** Robots perform tasks with great accuracy.
- **Cost Reduction:** Automation reduces long-term labor costs.

Challenges and Limitations

Despite their potential, autonomous systems face challenges:

- **Technical Complexity:** Designing reliable systems is difficult.
- **High Development Costs:** Advanced hardware and software are expensive.
- **Ethical Issues:** Decisions made by machines can raise moral concerns.
- **Security Risks:** Systems may be vulnerable to hacking.

Future of Autonomous Systems and Robotics

The future of this field is promising, with advancements in Artificial Intelligence, Machine Learning, and sensor technologies. Robots are expected to become more intelligent, adaptable, and capable of working alongside humans in everyday environments.

Emerging trends include:

- Collaborative robots (cobots)
- Swarm robotics
- AI-powered decision-making systems
- Smart cities with autonomous infrastructure

Conclusion

Autonomous systems and robotics are revolutionizing the modern world by enhancing productivity, safety, and innovation. As technology continues to evolve, these systems will play an increasingly important role in shaping the future of industries and society. However, addressing ethical and technical challenges will be crucial for their sustainable development.

S.SURYA, M.Sc., DCA.

*Assistant Professor in Microbiology,
Department of Microbiology.*

PLANT GROWTH PROMOTING RHIZOBACTERIA

Plant Growth-Promoting Rhizobacteria (PGPR) represent a transformative frontier in 2026 medical biology and sustainable agriculture, serving as a sophisticated biological bridge between soil health and human nutrition. These beneficial microbes, which naturally inhabit the rhizosphere, have moved beyond simple soil additives to become high-precision tools for "bio-priming" crops. The primary mechanism of PGPR involves the secretion of essential phytohormones like auxins and gibberellins, which fundamentally re-engineer root architecture to maximize nutrient capture. Beyond physical growth, PGPR are masters of biochemical synthesis; they solubilize atmospheric nitrogen and insoluble phosphorus while producing siderophores that deprive soil-borne pathogens of iron. A landmark shift in 2026 research focuses on the "metabolic shift" these bacteria induce in their hosts. By activating specific genetic pathways, PGPR increase the concentration of secondary metabolites in plants, such as polyphenols and antioxidants. This is particularly revolutionary for the pharmaceutical industry, as it allows for the cultivation of "pharma-crops" with standardized, high-potency medicinal compounds that were previously inconsistent in wild-harvested samples. Furthermore, PGPR play a critical role in climate mitigation through the production of the enzyme ACC deaminase, which lowers stress-induced ethylene levels. This allows crops to remain productive during the extreme heat waves and droughts that have

become more frequent in the mid-2020s. By triggering Induced Systemic Resistance, PGPR essentially vaccinate the plant against disease, drastically reducing the need for chemical pesticides. As the world moves toward carbon-neutral farming, the use of these bacteria has become essential for restoring soil carbon sequestration capabilities. This microbial technology represents a paradigm shift where we no longer view the plant as an isolated organism, but as a complex holobiont whose health and medicinal value are inextricably linked to its microscopic partners, ensuring a resilient and nutrient-dense future for global food systems.

*S.JAYALAKSHMI M.Sc.,
Assistant Professor,
Department of hospital Administration.*

WARD ADMINISTRATION

Ward administration refers to the organization, coordination, and management of all activities within a hospital ward to ensure efficient patient care. It involves planning, staffing, supervising, and maintaining resources while ensuring quality healthcare delivery. The ward is the central unit of a hospital, where patients receive continuous care, making effective administration essential for patient safety and recovery. To provide high-quality patient care. To ensure efficient use of resources. To maintain cleanliness and safety. A hospital ward represents the hospital and all the activities and functions of the hospital take place there. Professional, nonprofessional or auxiliary personnel are working together. A nurse who has to guide and coordinate her activities should clearly understand the process and techniques involved in management. These are necessary for the smooth running of the hospital ward or unit and

to render good service to the patient. In management or administration of any institution or establishment definite goals should be set up and all the efforts of the personnel should be directed towards it. A leader is one who motivates each person to put up his best performance and guides them to achieve their goal. The nursing service organization created by Florence Nightingale in mid-19th and her establishment of basic nursing education courses did much to enhance the professionalism of nursing and improvement is management of nursing care. In the early 19th nursing was considered a manual job for uneducated during night time, nursing was accepted as a suitable career for women, a trend professional nurse should understand well the patients conditions and intelligently assistant doctors. During her time sisters were selected from lady people rather from the professionals. After one year of training of nursing is carried out in the ward under the direction of the sister. The ward sister was the by figure or lynch pin in the organization of the ward. It was an authorization type of management. It was affirmed that clinical practice is the care of nursing. Educational and clinical practice is best thought by practicing nurses in well situation. Independence of thought, freedom to question and speak out, were discouraged subordinates felt sisters uncommunicative and unapproachable, adhering to the routine can prevent the nursing team from managing care on a way which takes amount of the individual needs of the patient.

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

AI in Smart Cities

Artificial Intelligence (AI) is playing a vital role in transforming traditional cities into **smart cities**. A smart city uses advanced technologies like AI the Internet of Things (IOT) and big data to improve the quality of life for citizens, enhance infrastructure and ensure sustainable development. AI enables cities to operate efficiently by analysing large amounts of data and making intelligent decisions in real time.

Intelligent Traffic Management

One of the most important applications of AI in smart cities is **traffic management**. AI systems analyze traffic patterns using cameras and sensors to reduce congestion and optimize traffic signals. This helps in minimizing travel time, reducing fuel consumption, and lowering pollution levels. AI can also support autonomous vehicles and smart parking systems.

Smart Energy Management

AI helps cities manage energy consumption efficiently. Smart grids powered by AI can monitor electricity usage, predict demand and reduce wastage. AI systems can automatically adjust lighting, heating and cooling in buildings, leading to energy savings and reduced carbon emissions.

Waste Management Optimization

AI improves waste collection by predicting when bins will be full and optimizing collection routes. Smart sensors placed in garbage bins send data to AI systems, ensuring timely waste disposal and cleaner urban environments.

Healthcare and Public Safety

AI enhances healthcare services in smart cities by enabling early disease detection, remote monitoring and

efficient hospital management. In terms of public safety, AI-powered surveillance systems can detect unusual activities, recognize faces and alert authorities in real time, helping to prevent crimes.

Environmental Monitoring

Smart cities use AI to monitor air quality, water levels and weather conditions. AI systems can predict natural disasters like floods or storms and provide early warnings, helping authorities take preventive measures and protect citizens.

Urban Planning and Infrastructure

AI assists in better urban planning by analyzing population growth, land use and infrastructure needs. It helps governments design efficient transportation systems, housing projects and public facilities. This leads to well-organized and sustainable city development.

Smart Water Management

AI plays a key role in managing water resources by detecting leaks, monitoring usage, and predicting demand. Smart water systems ensure efficient distribution and reduce wastage, which is crucial for growing urban populations.

Citizen Services and E-Governance

AI-powered chatbots and virtual assistants help citizens access government services quickly and easily. From paying bills to lodging complaints, AI simplifies communication between citizens and authorities, improving overall governance.

Challenges in AI-Based Smart Cities

Despite its benefits, implementing AI in smart cities faces several challenges:

- High cost of infrastructure and technology
- Data privacy and security concerns
- Need for skilled professionals
- Risk of system failures or cyber attacks

Conclusion

AI is a key driver in building smart cities that are efficient, sustainable and citizen-friendly. By improving transportation, energy use, healthcare and governance, AI enhances urban living standards. However, to fully realize its potential, cities must address challenges related to security, privacy and cost. With proper planning and responsible implementation, AI can create smarter, safer and more sustainable cities for the future.

S.DURGA DEVI
Assitant Professor
Department of Chemistry.

Catalysts Make Reactions Faster

Chemical reactions are happening everywhere around us, but not all reactions occur at the same speed. Some reactions are very fast, while others are very slow. For example, burning of fuel is fast, but rusting of iron is slow. To increase the speed of slow reactions, substances called catalysts are used. Catalysts play an important role in chemistry and are widely used in daily life and industries.

A catalyst is a substance that increases the rate of a chemical reaction without being used up in the reaction. This means that after the reaction is

complete, the catalyst remains unchanged and can be used again. Catalysts help reactions happen faster and more efficiently.

In a chemical reaction, particles of reactants must collide with each other to form products. However, not all collisions are successful. For a reaction to occur, the particles must have enough energy. This minimum energy required is explained by the Activation Energy. Many reactions are slow because the reactants do not have enough energy to react quickly.

Catalysts help by lowering the activation energy of a reaction. This makes it easier for the reactant particles to react, and as a result, the reaction becomes faster. Catalysts do not change the final product of the reaction; they only change the speed at which the reaction occurs.

There are many examples of catalysts in everyday life. One important example is enzymes in our body. Enzymes are natural catalysts that help in digestion. They break down complex food into simpler substances quickly. Without enzymes, digestion would be very slow and difficult.

Another example is the use of catalysts in vehicles. In cars and bikes, a device called a catalytic converter is used. It contains catalysts that help convert harmful gases like carbon monoxide into less harmful gases like carbon dioxide. This helps in reducing air pollution.

Catalysts are also used in industrial processes. For example, in the manufacture of ammonia, iron is used as a catalyst to speed up the reaction between nitrogen and hydrogen. This process is very important for producing fertilizers.

In the laboratory, catalysts are used to carry out reactions more efficiently. For example, manganese dioxide is used as a catalyst in the decomposition of hydrogen peroxide. It helps the reaction produce oxygen gas quickly.

There are different types of catalysts. Positive catalysts increase the speed of a reaction, while negative catalysts slow down a reaction. Most commonly, we use positive catalysts to make reactions faster.

We can identify the effect of a catalyst by observing the reaction speed. When a catalyst is added, the reaction happens faster, and products are formed more quickly. However, the catalyst itself does not get used up, which makes it very useful and economical.

Catalysts have many applications in daily life. They are used in cooking, in industries, in vehicles, and in our body. They help save time and energy by speeding up reactions. They also make processes more efficient and reduce waste.

In conclusion, catalysts are very important in chemistry because they help reactions occur faster without being consumed. They work by lowering the Activation Energy required for a reaction. From digestion in our body to large industrial processes, catalysts play a key role in making reactions quick and efficient. Understanding catalysts helps us understand how chemical reactions can be controlled and improved in everyday life.

L. ELAVARASI
Assistant Professor,
Department of Chemistry.

Gas Formation in Chemical Reactions

Chemical reactions happen all around us in daily life. One interesting type of reaction is when a gas is formed. Gas formation is easy to notice because we can see bubbles, fizzing, or sometimes smell a gas. These signs tell us that a chemical reaction has taken place.

A gas-forming reaction is a chemical reaction in which one of the products is a gas. When the reaction happens, the gas escapes into the air. This creates bubbles or effervescence in the liquid. These reactions are common in laboratories, industries, and even in our homes.

In every chemical reaction, substances called reactants change into new substances called products. During this process, atoms rearrange to form new compounds. When one of these products is a gas, it leaves the reaction mixture. Even though the gas escapes, the reaction still follows the Law of Conservation of Mass, which means mass is not lost but only changes form.

There are many types of gas-forming reactions. One common example is the reaction between an acid and a metal. When a metal like zinc reacts with hydrochloric acid, hydrogen gas is produced. This gas appears as bubbles. Hydrogen gas is colorless and can burn with a small flame.

Another example is the reaction between an acid and a carbonate. When substances like baking soda react with an acid, carbon dioxide gas is produced. This reaction is easy to observe because it creates a lot of fizzing. For example, when vinegar is mixed with baking soda, bubbles of carbon dioxide gas are formed. This is a popular experiment done by students.

Gas formation also occurs in decomposition reactions. In these reactions, a compound breaks down into simpler substances, often with the help of heat. For example, when calcium carbonate is heated, it breaks down to form calcium oxide and carbon dioxide gas. This shows that heat can cause substances to decompose and release gases.

We can identify gas formation by observing certain changes. The most common sign is bubbling or fizzing in the solution. Sometimes, the gas may have a smell, such as sulfur dioxide, which has a strong, irritating odor. In some cases, gases can be tested using simple methods. For example, carbon dioxide gas can extinguish a flame, while hydrogen gas burns with a 'pop' sound.

Gas-forming reactions have many uses in daily life. One important use is in baking. Baking powder or baking soda releases carbon dioxide gas when heated or mixed with an acid. This gas makes cakes and bread soft and fluffy. Without this reaction, baked items would be hard and flat.

Another important use is in fire extinguishers. Carbon dioxide gas is used to put out fires because it does not support burning. It forms a layer over the fire and cuts off the oxygen supply, stopping the fire.

Gas formation is also seen in soft drinks. Aerated drinks contain dissolved carbon dioxide gas, which produces bubbles when the bottle is opened. This gives the drink its fizzy nature.

In living organisms, gas formation plays an important role. During respiration, our body releases carbon dioxide gas as a waste product. This gas is exhaled through the lungs.

Plants also exchange gases during photosynthesis and respiration.

Industries also depend on gas-forming reactions. Many gases like oxygen, hydrogen, and carbon dioxide are produced using chemical reactions and are used for different purposes such as welding, medical use, and manufacturing.

In conclusion, gas formation in chemical reactions is an important and interesting concept in chemistry. It helps us easily identify when a reaction is taking place. These reactions are not only useful in science experiments but also play a major role in our daily life and industries. Understanding gas formation makes learning chemistry more practical and enjoyable.

S. SHALINI
Assistant Professor,
Department of Computer Science.

Importance of Computers in Daily Life

Introduction

In today's modern world, computers have become an essential part of human life. From education and business to communication and entertainment, computers are used in almost every field. The development of computer technology has made tasks faster, easier and more efficient, significantly improving the quality of life.

Role of Computers in Daily Life

Education

Computers play a vital role in education by providing access to online learning platforms, digital libraries and virtual classrooms. Students can research topics,

attend online classes and complete assignments efficiently.

Business and Work

In the business world, computers are used for data management, communication, accounting and decision-making. Software tools help organizations increase productivity and reduce manual work.

Communication

Computers have revolutionized communication through emails, video calls and social media platforms like WhatsApp and Zoom. People can connect instantly across the globe.

Healthcare

In healthcare, computers are used for maintaining patient records, medical research, diagnosis and advanced treatments. Technologies like telemedicine allow doctors to treat patients remotely.

Banking and Finance

Computers make online banking, digital payments and financial transactions fast and secure. People can transfer money, pay bills and manage accounts from anywhere.

Shopping and E-commerce

Online shopping platforms allow users to buy products from home, saving time and effort. Computers make browsing, comparing, and purchasing easy.

Entertainment

Computers provide various forms of entertainment such as movies, music, gaming and social media. Streaming

services and online games are widely popular today.

Home and Personal Use

From managing daily schedules to controlling smart home devices, computers help simplify everyday tasks. They are also used for personal productivity like writing documents and creating presentations.

Advantages of Computers

- High speed and accuracy
- Storage of large amounts of data
- Automation of repetitive tasks
- Easy access to information
- Improved communication

Disadvantages of Computers

- Risk of cybercrime and data theft
- Addiction to technology
- Health issues like eye strain
- Dependence on machines
- Privacy concerns

Conclusion

Computers have become an integral part of daily life, influencing how we learn, work and communicate. While they offer numerous benefits, it is important to use them responsibly to avoid potential drawbacks. Overall, computers continue to play a crucial role in shaping a smarter and more connected world.

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Iran–USA War: Causes, Events and Global Impact

The conflict between Iran and the United States is one of the most

serious international issues in recent times. This war did not start suddenly; it is the result of long-standing political tension, mistrust, and disagreements over nuclear weapons and global power.

Background of the Conflict

The relationship between Iran and the United States has been tense since 1979. The main issue between them is Iran's nuclear program. The United States fears that Iran may develop nuclear weapons, which could threaten global security. On the other hand, Iran claims that its nuclear activities are only for peaceful purposes. Due to this disagreement, both countries have had conflicts for many years.

Beginning of the War in 2026

The situation became more serious on **February 28, 2026**, when the United States, along with its allies, launched airstrikes on Iran's military and nuclear facilities. These attacks were aimed at stopping Iran's military power and nuclear development.

In response, Iran retaliated by launching missiles and drones at U.S. military bases and allied countries in the Middle East. This led to a dangerous escalation of the conflict, affecting many regions.

Major Events During the War

- Airstrikes destroyed several military and government buildings in Iran
- Iran attacked U.S. bases and nearby countries using missiles and drones
- Important trade routes like the **Strait of Hormuz** were disrupted
- Civilian areas and infrastructure were also affected

These events caused fear and instability across the world.

Global Impact of the War

The Iran–USA war has affected not only the two countries but the entire world:

- Oil prices increased sharply due to supply disruption
- Global trade was affected, especially in Asian countries like India
- Inflation increased, making daily life expensive
- Financial markets became unstable

Because of these effects, even countries far away from the conflict are facing economic difficulties.

Current Situation

Although there have been attempts for ceasefire and peace talks, tensions between the two countries are still high. Both sides remain cautious, and the situation is uncertain.

Conclusion

The Iran–USA war shows how political conflicts between powerful nations can affect the entire world. It is not just a military issue but also an economic and social problem. The war has increased global uncertainty, affected prices of essential goods, and created challenges for common people. Peaceful negotiation and cooperation are necessary to avoid further damage and ensure global stability.

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Introduction to Machine Learning

Machine Learning (ML) is a subset of Artificial Intelligence (AI) that enables computers to learn from data and improve their performance without being explicitly programmed. Instead of following fixed instructions, ML systems identify patterns and make decisions based on experience.

How Machine Learning Works

Machine learning models are trained using data. The system learns relationships within the data and uses this knowledge to make predictions or decisions. The more quality data provided, the better the model performs.

Types of Machine Learning

- **Supervised Learning:** Learns from labeled data (e.g., classification, regression)
- **Unsupervised Learning:** Finds patterns in unlabeled data (e.g., clustering)
- **Reinforcement Learning:** Learns through trial and error using rewards and penalties

Applications of Machine Learning

Machine learning is widely used in:

- Healthcare (disease prediction)
- Finance (fraud detection)
- E-commerce (recommendation systems)
- Social media (content filtering)

Advantages and Challenges

ML provides automation, accuracy, and efficiency. However, it requires large datasets, computational power, and careful handling of bias and errors.

Conclusion

Machine learning is a powerful technology that is shaping the future of computing by enabling systems to learn, adapt, and make intelligent decisions.

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GREEN PLANT SOURCES

Green plants are the fundamental source of life on Earth, providing food, oxygen, and energy for almost all living organisms. Through the process of photosynthesis, green plants convert sunlight, carbon dioxide, and water into glucose and oxygen, forming the base of the food chain. They are primary producers, meaning they create their own food and supply energy to herbivores, which in turn support carnivores and omnivores. Common green plant sources include trees, shrubs, grasses, herbs, and aquatic plants such as algae. These plants are rich in chlorophyll, the pigment responsible for their green color and their ability to capture solar energy. Many crops like rice, wheat, maize, and vegetables are green plant sources that sustain human populations worldwide. Fruits such as apples, bananas, and mangoes also originate from green plants and provide essential vitamins and minerals. Green leafy vegetables like spinach, lettuce, and kale are especially nutritious and contribute to a healthy diet.

In addition to food, green plants provide raw materials such as timber, fibers, and medicinal compounds. Plants like neem, tulsi, and aloe vera are widely used in traditional medicine for their healing properties. Green plants also play a vital role in maintaining ecological balance by absorbing carbon dioxide and releasing oxygen, thus reducing the impact of climate change. Forests, which

are dense collections of green plants, serve as habitats for countless species and help regulate temperature and rainfall patterns. They prevent soil erosion by holding the soil together with their roots and improve soil fertility through the decomposition of organic matter. Aquatic green plants contribute to oxygen levels in water bodies and support marine ecosystems.

Green plants also influence the water cycle by releasing water vapor through transpiration, which eventually forms clouds and precipitation. They act as natural air filters, removing pollutants and improving air quality. Urban green spaces, such as parks and gardens, enhance human well-being by providing fresh air and reducing stress. In agriculture, green plants are cultivated for food, fodder, and biofuel production. Biofuels derived from plants, such as ethanol and biodiesel, are renewable energy sources that reduce dependence on fossil fuels.

Furthermore, green plants are essential for biodiversity, supporting a wide range of insects, birds, and animals. Pollinators like bees depend on flowering plants for nectar, aiding in plant reproduction. Green plants also contribute to cultural and economic aspects of human life, being used in rituals, decorations, and industries. Overall, green plants are indispensable sources of life, energy, and environmental stability, making their conservation crucial for the sustainability of our planet.

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CONSUMER AWARENESS IN DIGITAL MARKETING

Consumer awareness in digital marketing refers to the knowledge and understanding that consumers have about online products, services, advertisements, and their rights while using digital platforms and it plays a very important role in today's internet-based world where people depend heavily on websites, mobile apps, and social media for shopping and information as it helps individuals identify genuine products and avoid fake ones while making better decisions through comparing prices, checking reviews, and understanding product details and at the same time it protects them from online threats such as phishing scams, fake websites, misleading advertisements and data privacy issues because aware consumers know how to verify secure websites by checking HTTPS avoid clicking suspicious links and never share sensitive information like passwords or OTPs while also being cautious about influencer marketing and exaggerated promotional claims and this awareness further extends to understanding pricing strategies where fake discounts are common so consumers learn to compare across platforms before purchasing and it also includes knowledge about return refund and exchange policies to avoid post-purchase problems along with the importance of using secure payment methods and avoiding unsafe networks during transactions and protecting personal data by limiting app permissions and downloading only from trusted sources and moreover consumer awareness ensures that individuals understand their basic rights such as the right to safety right to information right

to choose and right to redressal if something goes wrong which empowers them to take action against unfair practices while governments and organizations also contribute by implementing laws like the Consumer Protection Act and promoting awareness campaigns and digital platforms support this by providing transparent product details verified reviews and secure payment gateways and overall consumer awareness not only helps individuals stay safe and confident while engaging in digital marketing but also promotes ethical business practices builds trust between buyers and sellers reduces the chances of fraud and ultimately creates a fair secure and transparent digital marketplace where informed consumers can make smart and responsible decisions.

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Business Economics

Business economics is the study of how economic principles are applied to business decision-making in order to achieve organizational goals efficiently. It combines concepts from Economics and business management to analyze problems related to production, cost, demand, supply, and pricing. Business economics helps managers understand how to allocate limited resources in the most effective way while maximizing profits and minimizing costs. It involves the application of both Microeconomics, which focuses on individual firms and markets, and Macroeconomics, which deals with the overall economy, including inflation, unemployment, and economic growth. Demand analysis is a

key aspect, as it helps businesses predict customer behavior and adjust their strategies accordingly. Cost analysis allows firms to determine the most efficient level of production and identify ways to reduce expenses. Pricing decisions are also crucial, as setting the right price affects sales, revenue, and competitiveness in the market. Business economics also studies market structures such as perfect competition, monopoly, and oligopoly to help firms understand their competitive environment. It plays an important role in forecasting future trends and uncertainties, enabling businesses to plan effectively. Decision-making under risk and uncertainty is another important area, where managers evaluate different alternatives before choosing the best course of action. Government policies, taxation, and regulations also influence business

decisions, and business economics helps in understanding their impact. International trade and globalization are additional areas where economic principles guide business strategies. By applying economic theories and tools, business economics helps organizations improve efficiency, achieve growth, and sustain long-term success in a competitive environment.

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**BANKING THEORY LAW AND
PRACTICE**

Banking Theory, Law, and Practice represents a comprehensive study of financial intermediation, covering the principles of money management, legal regulatory frameworks, and operational procedures of commercial banking. Theoretically, banks act as financial intermediaries that accept deposits and

provide loans, creating credit through the multiplier effect and regulating the money supply, which is critical for economic stability and growth. The legal foundation, often rooted in the Banking Regulation Act of 1949 and RBI Act 1934, provides necessary supervisory powers to the Reserve Bank of India to regulate licensing, branch expansion, and bank management to protect depositor interests. The law further defines the fiduciary relationship between a banker and a customer, establishing the legal basis for debtor-creditor roles and statutory protections for both paying and collecting bankers regarding negotiable instruments like cheques. Banking practice involves the day-to-day operations, including handling various accounts (current, savings, fixed deposits), processing loan applications, and managing risks. Modern banking practice has evolved to include advanced electronic fund transfers (NEFT, RTGS), ATM services, and online banking, transforming traditional banking operations. Lending policies are governed by principles of safety, liquidity, and profitability, requiring banks to secure advances through pledges, mortgages, or hypothecation. The legal aspect covers crucial acts such as the Negotiable Instruments Act 1881, which validates cheque usage and endorsements, and the SARFAESI Act 2002, which enables banks to recover debts efficiently. The law of limitation plays a key role in lending, restricting the period within which a bank can initiate legal action for debt recovery. Sound banking theory emphasizes maintaining adequate capital reserves and liquidity ratios (CRR/SLR) to ensure stability, particularly during financial crises. Ethical standards, such as KYC (Know Your Customer) and anti-money laundering (AML) procedures, are integrated into daily operations to prevent fraud. The banking ombudsman acts as a critical mechanism

for resolving customer disputes and grievances efficiently. Specialized banking includes agricultural finance, export credit, and microfinance, supporting diverse sectors. The practice also includes agency services (collecting dividends, insurance premiums) and general utility services (safe deposit lockers). Ultimately, the study of banking theory, law, and practice ensures that institutions operate legally, profitably, and securely, maintaining public confidence in the financial system.