

PAPER-I

ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

1. Express $1 + i\sqrt{3}$ in the modulus - amplitude form (or) polar form?

Given $1 + i\sqrt{3}$

upon comparing $1 + i\sqrt{3}$ with $x + iy$, we get

$$x = 1 \text{ and } y = \sqrt{3}$$

$$\begin{aligned} \text{Modulus} = r &= \sqrt{x^2 + y^2} \\ &= \sqrt{(1)^2 + (\sqrt{3})^2} \\ &= \sqrt{1+3} \\ &= \sqrt{4} \\ &= 2 \end{aligned}$$

$$\begin{aligned} \text{Amplitude, } \theta &= \tan^{-1}\left(\frac{y}{x}\right) \\ &= \tan^{-1}\left(\frac{\sqrt{3}}{1}\right) \\ &= \tan^{-1}(\sqrt{3}) \\ &= \frac{\pi}{3} \end{aligned}$$

$$\begin{aligned} \text{Modulus - amplitude form} &= r(\cos \theta + i \sin \theta) \\ &= 2\left(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3}\right). \end{aligned}$$

2. What is Physics and Discuss the Scope of Physics?

Physics is the branch of science that explores the fundamental principles governing the behavior of matter, energy, space, and time. It seeks to understand the fundamental laws that govern the universe at both the macroscopic and microscopic levels. Physics covers a wide scope, ranging from the study of subatomic particles and the behavior of quantum systems to the motion of celestial bodies and the fundamental forces of nature. It's a foundational science that underpins many other scientific disciplines and has practical applications in various fields, from engineering to astronomy.

The scope of physics is vast and encompasses a wide range of phenomena, from the incredibly small to the unimaginably large, and from the study of matter and forces to the nature of space and time. Here's a more detailed discussion of its scope:

- 1. Classical Mechanics:** This branch of physics deals with the motion of macroscopic objects under the influence of forces. It includes topics like kinematics (describing motion), dynamics (the causes of motion), and statics (objects at rest). Classical mechanics is fundamental to engineering and everyday life.
- 2. Thermodynamics:** This area focuses on the transfer of heat and the properties of matter at macroscopic scales. It plays a crucial role in understanding energy transfer, phase



Scan With Camera
Duration (02:25)



Scan With Camera
Duration (19:46)

transitions, and the behavior of gases, which is essential in areas like engineering, climate science, and material science.

3. **Electromagnetism:** This branch deals with electric and magnetic fields, their interactions, and how they affect matter. It's fundamental for understanding everything from electrical circuits to light propagation, electromagnetic waves, and more.
4. **Quantum Mechanics:** At the microscopic level, quantum mechanics describes the behavior of subatomic particles. It's a highly successful theory but often counterintuitive. It's essential for understanding the behavior of atoms, molecules, and the fundamental forces at this scale.
5. **Relativity:** Einstein's theories of special and general relativity transformed our understanding of space and time. They're crucial for understanding high-speed motion, gravity, and the behavior of extremely massive objects, like stars and black holes.
6. **Particle Physics:** This field goes deeper into the structure of matter, exploring subatomic particles and their interactions. It's about understanding the fundamental building blocks of the universe and the fundamental forces that govern their behavior.
7. **Cosmology:** This is the study of the universe on its largest scales. It deals with the origin, evolution, and eventual fate of the universe, as well as the study of galaxies, stars, and other celestial objects.
8. **Astrophysics:** Focusing on the behavior and properties of celestial objects, astrophysics covers everything from the birth and death of stars to the structure of galaxies and the properties of black holes.
9. **Nuclear Physics:** This branch deals with the behavior of atomic nuclei, nuclear reactions, and the structure of matter at an intermediate scale between particle physics and macroscopic physics.
10. **Biophysics:** Applying the principles of physics to understand biological systems, biophysics plays a significant role in understanding the physical mechanisms behind biological processes, from the structure of proteins to how cells move.

In essence, the scope of physics extends from the subatomic world of particles to the cosmic scales of the universe, and it has applications in virtually every field of science and technology.

3. Explain the Branches of Chemistry and their Significance?

Chemistry is a vast subject and its study is difficult without division into different branches. Hence, the modern chemistry is divided into various branches for the convenience of the student point of view. The branches of chemistry and their significance are discussed below.

Inorganic chemistry: Inorganic chemistry is a branch of chemistry that uses the study of chemicals primarily not based on carbon, but based on metals. Generally Inorganic chemicals found in rocks and minerals. Inorganic chemistry deals with the design and properties of materials involved in energy and information technology.

Physical chemistry: Physical chemistry is a branch of chemistry that involves the study of macroscopic properties, atomic properties, physical properties, changes of matter, energy of chemicals, rate of reactions, effect of thermal, electrical and light energies on matter. Physical chemistry deals with the energy transfers that occur in reactions and the physical structure of materials at the molecular level.

Organic chemistry: Organic chemistry is a branch of chemistry that involves in the study of chemicals containing carbon. Carbon is one of the most abundant elements on Earth and is capable of forming vast number of chemicals due to its high combining capacity with other carbon atoms or other elements. Almost all chemicals found in living organisms are based on carbon. Organic chemistry mainly involves in the synthesis of drugs (medicines).

Analytical chemistry: Analytical chemistry is the branch of chemistry that involves the study



Scan With Camera
Duration (06:53)

of the composition of matter. Analytical chemistry uses sophisticated scientific instruments to analyze an unknown material in order to determine various components present in a sample. Analytical chemistry mainly used for the separation, identification and quantification of chemicals present in the sample of matter.

Biochemistry: Biochemistry is the branch of chemistry that involves in the study of chemical processes that occur in living things. Biochemistry used for the development of new medicines along with organic chemistry and also gives the information regarding the interaction of medicines with the body.

Nuclear chemistry: Nuclear chemistry is a branch of chemistry that involves in the study of radioactivity. Nuclear chemistry mainly focuses on protons, neutrons, and atomic nuclei. The largest elements have unstable nuclei. So, they undergo nuclear reactions like nuclear fission.

Materials Chemistry: Materials chemistry is a branch of chemistry that involves the creation and study of chemical materials. Polymer chemistry is becoming a popular area of material chemistry. Polymers, lubricants and fuels like materials are widely used for daily activities and in industries.

Environmental Chemistry: Environmental chemistry is the branch of chemistry that gives the relationship between environment and chemistry. It is mainly used for identification and controlling of different types of pollution which occur in nature.

4. Discuss the Applications of Physics in Industry? (Electronics and Semiconductor Industry, Robotics and Automation, Automotive and Aerospace Industries)

Physics plays a crucial role in various industries, including electronics and semiconductor, robotics and automation, and automotive and aerospace. Here's a detailed discussion of its applications in each of these industries:

1. Electronics and Semiconductor Industry:

- **Quantum Mechanics and Solid-State Physics:** The understanding of quantum mechanics is essential for designing and manufacturing semiconductor devices such as transistors, diodes, and integrated circuits. Quantum mechanics governs the behavior of electrons in materials, leading to the development of advanced electronic components.
- **Optics:** Optics is essential for designing optical components, lasers, and photonic devices used in modern communication systems, data transmission, and sensors.
- **Electromagnetism:** Electronics heavily relies on the principles of electromagnetism for generating and transmitting electrical signals. This knowledge is crucial for the design of antennas, microwave circuits, and other communication systems.
- **Materials Science:** Understanding the properties of materials at the atomic level is crucial for selecting suitable materials in the fabrication of electronic components, ensuring desired properties like conductivity, insulation, and thermal stability.

2. Robotics and Automation:

- **Mechanics and Dynamics:** Classical mechanics helps in designing robotic systems by predicting the motion and stability of robot arms, grippers, and other components. Knowledge of dynamics allows engineers to create efficient and precise robotic movements.
- **Control Systems:** Physics principles are used to develop control systems that regulate the behavior of robots. This involves feedback mechanisms, sensors, and algorithms to ensure the robot's stability and accurate performance.
- **Sensors and Actuators:** Physics plays a significant role in the development of sensors (e.g., cameras, lidar, accelerometers) and actuators (e.g., motors, servos) used in robotics for sensing the environment and performing precise movements.



Scan With Camera
Duration (08:10)

3. Automotive and Aerospace Industries:

- **Thermodynamics:** Understanding the principles of thermodynamics is crucial for designing efficient engines in the automotive industry and optimizing energy transfer processes in aerospace engines, such as jet turbines.
- **Fluid Dynamics:** Knowledge of fluid dynamics is used to design aerodynamic profiles for vehicles in both industries, reducing drag and increasing fuel efficiency.
- **Materials Engineering:** Advanced materials are essential for lightweighting and improving the overall efficiency and safety of vehicles. Physics guides the development of materials that can withstand extreme conditions, such as high-speed impacts or high-temperature environments.
- **Control Systems and Avionics:** Physics principles are used in the design of control systems for both vehicles and aircraft, ensuring stability, precise control, and safety.

In summary, physics underpins many aspects of these industries, from the fundamental behavior of materials to the design of complex systems. The application of physics principles in these fields leads to technological advancements, innovation, and the development of more efficient and capable devices and systems.

5. What is Firewall? How does it works? and Explain the importance of Firewall in Networks?

Firewalls prevent unauthorized access to networks through software or firmware. By utilizing a set of rules, the firewall examines and blocks incoming and outgoing traffic.

Fencing your property protects your house and keeps trespassers at bay; similarly, firewalls are used to secure a computer network. Firewalls are network security systems that prevent unauthorized access to a network. It can be a hardware or software unit that filters the incoming and outgoing traffic within a private network, according to a set of rules to spot and prevent cyberattacks.

Key Uses of Firewalls

- Firewalls can be used in corporate as well as consumer settings.
- Firewalls can incorporate a security information and event management strategy (SIEM) into cybersecurity devices concerning modern organizations and are installed at the network perimeter of organizations to guard against external threats as well as insider threats.
- Firewalls can perform logging and audit functions by identifying patterns and improving rules by updating them to defend the immediate threats.
- Firewalls can be used for a home network, Digital Subscriber Line (DSL), or cable modem having static IP addresses. Firewalls can easily filter traffic and can signal the user about intrusions.
- They are also used for antivirus applications.
- When vendors discover new threats or patches, the firewalls update the rule sets to resolve the vendor issues.
- In-home devices, we can set the restrictions using Hardware/firmware firewalls.

How Does a Firewall Work?

As mentioned previously, firewalls filter the network traffic within a private network. It analyses which traffic should be allowed or restricted based on a set of rules. Think of the firewall like a gatekeeper at your computer's entry point which only allows trusted sources, or IP addresses, to enter your network.

A firewall welcomes only those incoming traffic that has been configured to accept. It distinguishes between good and malicious traffic and either allows or blocks specific data packets on pre-established security rules.



Scan With Camera
Duration (14:48)

These rules are based on several aspects indicated by the packet data, like their source, destination, content, and so on. They block traffic coming from suspicious sources to prevent cyberattacks.

For example, the image depicted below shows how a firewall allows good traffic to pass to the user's private network.

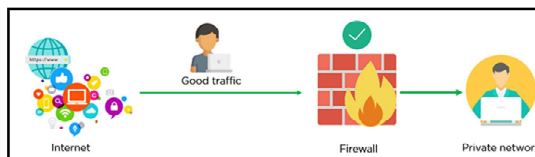


Fig: Firewall allowing Good Traffic

However, in the example below, the firewall blocks malicious traffic from entering the private network, thereby protecting the user's network from being susceptible to a cyberattack.

This way, a firewall carries out quick assessments to detect malware and other suspicious activities.

There are different types of firewalls to read data packets at different network levels. Now, you will move on to the next section of this tutorial and understand the different types of firewalls.

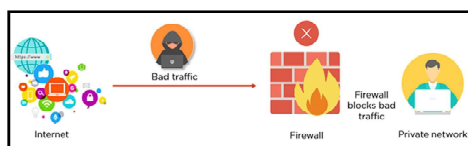


Fig: Firewall Blocking Bad Traffic

Types of Firewalls

A firewall can either be software or hardware. Software firewalls are programs installed on each computer, and they regulate network traffic through applications and port numbers. Meanwhile, hardware firewalls are the equipment established between the gateway and your network. Additionally, you call a firewall delivered by a cloud solution as a cloud firewall.

There are multiple types of firewalls based on their traffic filtering methods, structure, and functionality. A few of the types of firewalls are:

- **Packet Filtering**

A packet filtering firewall controls data flow to and from a network. It allows or blocks the data transfer based on the packet's source address, the destination address of the packet, the application protocols to transfer the data, and so on.

- **Proxy Service Firewall**

This type of firewall protects the network by filtering messages at the application layer. For a specific application, a proxy firewall serves as the gateway from one network to another.

- **Stateful Inspection**

Such a firewall permits or blocks network traffic based on state, port, and protocol. Here, it decides filtering based on administrator-defined rules and context.

- **Next-Generation Firewall**

According to Gartner, Inc.'s definition, the next-generation firewall is a deep-packet inspection firewall that adds application-level inspection, intrusion prevention, and information from outside the firewall to go beyond port/protocol inspection and blocking.

- **Unified Threat Management (UTM) Firewall**

A UTM device generally integrates the capabilities of a stateful inspection firewall, intrusion prevention, and antivirus in a loosely linked manner. It may include additional services and, in many cases, cloud management. UTMs are designed to be simple and easy to use.

- **Threat-Focused NGFW**

These firewalls provide advanced threat detection and mitigation. With network and endpoint event correlation, they may detect evasive or suspicious behaviour.

PAPER-II

ADVANCES OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

SCAN
MEScan With Camera
Duration (04:55)

1. Find the equation of the line passing through the point of intersection of the lines. $2x - 5y + 1 = 0$, $3x + 2y = 8$ and making equal intercepts on the axes.

Let (α, β) be the point of intersection of $2x - 5y + 1 = 0$, $3x + 2y = 8$

$$\therefore 2\alpha - 5\beta + 1 = 0 \dots\dots\dots(1)$$

$$\text{and } 3\alpha - 2\beta - 8 = 0 \dots\dots\dots(2)$$

from (1) and (2) we get

$$\begin{array}{r} \alpha \quad \beta \quad 1 \\ -5 \quad 1 \quad 2 \quad -5 \\ 2 \quad -8 \quad 3 \quad 2 \end{array}$$

By the method of cross multiplication

$$\frac{\alpha}{40 - 2} = \frac{\beta}{3 + 16} = \frac{1}{4 + 15}$$

$$\Rightarrow \frac{\alpha}{38} = \frac{\beta}{19} = \frac{1}{19} \Rightarrow \alpha = 2, \beta = 1$$

$$\therefore p = (2, 1)$$

Equation of the line with equal intercepts is

$$\frac{x}{a} + \frac{y}{a} = 1 \Rightarrow x + y = a$$

This passes through $p(2, 1)$

$$\therefore 2 + 1 = a \Rightarrow a = 3$$

\therefore The required line equation is

$$x + y = 3.$$

2. Discuss the Recent Advances in Bio-Physics?

Here are some recent advances in various subfields of biophysics:

1. Biophysical Imaging:

- **Super-resolution Microscopy:** Super-resolution microscopy techniques such as STED (stimulated emission depletion) and SIM (structured illumination microscopy) have enabled researchers to visualize structures within cells and tissues at nanometer resolutions, revealing details previously inaccessible with conventional microscopy.
- **Cryo-Electron Microscopy (Cryo-EM):** Cryo-EM has become a powerful tool for studying biomolecules and cellular structures. Recent advancements in detector technology and image processing have led to higher resolutions, allowing researchers to visualize complex biological assemblies in their native states.

2. Biomechanics:

- **Single-Cell Biomechanics:** Advances in microfluidics and force measurement techniques have facilitated the study of individual cells' mechanical properties. This

SCAN
MEScan With Camera
Duration (08:52)

has implications in understanding cell migration, differentiation, and disease-related changes.

- **Organ-on-a-Chip:** Biomechanics has merged with microfluidics to create “organ-on-a-chip” platforms. These microscale devices replicate the mechanical and biochemical properties of specific organs, providing insights into organ function, drug testing, and disease modeling.

3. Neurophysics:

- **Connectomics:** Neurophysicists are working on mapping the intricate connectivity of neurons in the brain, known as connectomics. Advanced imaging and data analysis techniques are helping to unravel neural circuits and their roles in various cognitive functions.
- **Neuromodulation Techniques:** Techniques like optogenetics and magnetic stimulation allow researchers to modulate neural activity with high precision. These methods have implications for understanding brain function and treating neurological disorders.

4. Molecular Biophysics:

- **Single-Molecule Studies:** Technological advancements have enabled researchers to study individual biomolecules in real-time. This has led to insights into molecular processes such as DNA replication, protein folding, and enzymatic reactions.
- **Computational Approaches:** Molecular dynamics simulations and computational modeling have become more sophisticated, allowing researchers to explore complex biomolecular systems and predict their behavior at atomic resolution.

5. Bioinformatics:

- **Structural Bioinformatics:** Advances in computational methods have facilitated the prediction of protein structures, protein-ligand interactions, and the analysis of complex biomolecular structures.
- **Genomic Data Analysis:** The field of bioinformatics has seen substantial growth in analyzing large-scale genomic data, including DNA sequencing, functional genomics, and personalized medicine.

These recent advances in biophysics are transforming our understanding of biological systems at various scales, from individual molecules to entire organisms. They hold promise for driving breakthroughs in medicine, drug development, tissue engineering, and our overall comprehension of life’s fundamental processes.

3. Explain the Fundamental Principles and Applications of Chemical Biology?

Chemical biology is a multidisciplinary field. It explains the relationship between chemistry and biology. It focuses on the manipulation of biological systems using chemical tools and approaches.

Chemical biology is a dynamic field. In recent years it is mainly used to elaborate biological processes, develop new therapeutic interventions and to understanding of life at the molecular level.

Fundamental Principles of Chemical Biology:

Chemical biology seeks to understand and influence biological systems by employing chemical techniques to investigate and modulate biological molecules.

Chemical biology involves the design and synthesis of small molecules, peptides and other compounds that selectively interact with specific biomolecules like proteins, nucleic acids and lipids. These interactions can clarify fundamental cellular processes, elucidate signaling pathways and find out the roles of biomolecules in health and disease.

By providing a deeper understanding of the molecular basis of life, chemical biology offers insights into previously unexplored areas of biology.



Scan With Camera
Duration (07:27)

Applications of Chemical Biology:

- (a) Chemical biology mainly used in drug discovery, identification of new drug targets and the design of compounds with enhanced selectivity and efficiency.
- (b) Chemical biologists can develop drugs that exactly target disease related proteins, which leads to the development of more effective and safer therapies.
- (c) Chemical biology techniques are used to manufacture proteins with tailored functions, enhancing their stability, activity and specificity. These proteins can serve as catalysts, sensors, or therapeutic agents.
- (d) Chemical biology contributes to the development of molecular probes and imaging agents that allow researchers to visualize and monitor biological processes in real-time.
- (e) Chemical biology is crucial for understanding cellular dynamics and disease progression, as well as for guiding medical interventions.
- (f) Chemical biology is essential for decoding the complex interaction of genes and their products within biological systems.
- (g) Chemical biology mainly used for the development of bioorthogonal reactions, which selectively occur within living systems without interfering with natural biological processes. Hence, these reactions facilitate the labeling, tracking and manipulation of biomolecules in their native environments.

Chemical biology has applications from medicine to materials science, and its impact continues to expand as new techniques.



Scan With Camera
Duration (10:07)

4. Discuss the Application of Medical Physics like Radiation Therapy and Nuclear Medicine?

Here are the applications of medical physics in radiation therapy and nuclear medicine in detail:

Radiation Therapy:

Radiation therapy, also known as radiotherapy, is a medical treatment that uses ionizing radiation to target and destroy cancer cells while minimizing damage to surrounding healthy tissue. Medical physicists play a crucial role in ensuring accurate delivery of radiation therapy and optimizing treatment plans.

Here's how medical physics is applied in radiation therapy:

1. **Treatment Planning:** Medical physicists collaborate with radiation oncologists and dosimetrists to develop precise treatment plans. Using advanced imaging techniques, they create 3D models of the patient's anatomy, determine the appropriate radiation dose, and select the optimal angles for radiation delivery.
2. **Dose Calculation:** Medical physicists use specialized software to calculate the radiation dose distribution within the patient's body. They ensure that the prescribed dose is delivered accurately to the tumor while sparing nearby critical structures.
3. **Quality Assurance:** Medical physicists perform rigorous quality assurance checks on radiation equipment to ensure its accuracy and safety. This involves regular calibration, testing, and maintenance of linear accelerators and other treatment devices.
4. **Intensity-Modulated Radiation Therapy (IMRT):** IMRT is a technique that modulates the intensity of the radiation beams to conform to the shape of the tumor, enabling higher doses to be delivered while minimizing damage to healthy tissues. Medical physicists optimize the IMRT plans to achieve the desired treatment outcomes.

5. **Image-Guided Radiation Therapy (IGRT):** IGRT uses imaging technology (such as CT, MRI, or cone-beam CT) to visualize the tumor's position before and during treatment. Medical physicists help ensure that the patient's position is accurate and the radiation is delivered to the correct target.
6. **Stereotactic Radiosurgery (SRS) and Stereotactic Body Radiation Therapy (SBRT):** These techniques deliver highly focused and precise radiation doses to small tumors or lesions. Medical physicists design treatment plans that achieve sub-millimeter accuracy.

Nuclear Medicine:

Nuclear medicine is a medical specialty that uses small amounts of radioactive materials, known as radiopharmaceuticals, to diagnose and treat diseases. Medical physicists are involved in various aspects of nuclear medicine, including imaging and therapy:

1. **Diagnostic Imaging:** In nuclear medicine, radioactive tracers are introduced into the body, and their distribution is imaged using specialized cameras. Medical physicists contribute to the development of imaging protocols, calibration of cameras, and image reconstruction.
2. **Single-Photon Emission Computed Tomography (SPECT):** SPECT provides 3D images of radiotracer distribution within the body. Medical physicists optimize imaging parameters and correct for various artifacts to ensure accurate diagnosis.
3. **Positron Emission Tomography (PET):** PET scans use positron-emitting radionuclides to visualize metabolic processes. Medical physicists work on PET system calibration, image reconstruction, and quantitative analysis.
4. **Therapeutic Applications:** Nuclear medicine includes targeted radionuclide therapies. Medical physicists are involved in treatment planning, dose calculations, and patient-specific dosimetry for therapies like radioiodine therapy for thyroid cancer or radioligand therapy for neuroendocrine tumors.
5. **Radiation Safety:** Medical physicists ensure that nuclear medicine procedures are safe for both patients and healthcare providers. They establish protocols to minimize radiation exposure while obtaining accurate diagnostic information.
6. **Hybrid Imaging:** Medical physicists contribute to the integration of nuclear medicine techniques (PET or SPECT) with other imaging modalities like CT or MRI, creating hybrid images for better anatomical and functional information.

In summary, medical physicists play a vital role in radiation therapy and nuclear medicine by ensuring accurate treatment delivery, optimizing imaging techniques, and maintaining radiation safety standards. Their expertise is essential for enhancing patient outcomes and safety in these medical fields.

5. What is Number System?

Explain Different Number Systems used in Computers?

The language we use to communicate with each other is comprised of words and characters. We understand numbers, characters and words. But this type of data is not suitable for computers. Computers only understand the numbers.

So, when we enter data, the data is converted into electronic pulse. Each pulse is identified as code and the code is converted into numeric format by ASCII. It gives each number, character and symbol a numeric value (number) that a computer understands. So to understand the language of computers, one must be familiar with the number systems.



Scan With Camera
Duration (17:17)

The Number Systems used in Computers are:

- Binary number system
- Octal number system
- Decimal number system
- Hexadecimal number system

Binary Number System :

It has only two digits '0' and '1' so its base is 2. Accordingly, In this number system, there are only two types of electronic pulses; absence of electronic pulse which represents '0' and presence of electronic pulse which represents '1'. Each digit is called a bit. A group of four bits (1101) is called a nibble and group of eight bits (11001010) is called a byte. The position of each digit in a binary number represents a specific power of the base (2) of the number system.

Octal Number System :

It has eight digits (0, 1, 2, 3, 4, 5, 6, 7) so its base is 8. Each digit in an octal number represents a specific power of its base (8). As there are only eight digits, three bits ($2^3=8$) of binary number system can convert any octal number into binary number. This number system is also used to shorten long binary numbers. The three binary digits can be represented with a single octal digit.

Decimal Number System :

This number system has ten digits (0, 1, 2, 3, 4, 5, 6, 7, 8, 9) so its base is 10. In this number system, the maximum value of a digit is 9 and the minimum value of a digit is 0. The position of each digit in decimal number represents a specific power of the base (10) of the number system. This number system is widely used in our day to day life. It can represent any numeric value.

Hexadecimal Number System :

This number system has 16 digits that ranges from 0 to 9 and A to F. So, its base is 16. The A to F alphabets represent 10 to 15 decimal numbers. The position of each digit in a hexadecimal number represents a specific power of base (16) of the number system. As there are only sixteen digits, four bits ($2^4=16$) of binary number system can convert any hexadecimal number into binary number. It is also known as alphanumeric number system as it uses both numeric digits and alphabets.

