सुतीर्थ

॥ न हि ज्ञानेन सदृशं पवित्रमिह विद्यते ॥

INDIA'S

Unique & Never

ENDING FESTIVITIES

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॥न हि ज्ञानेन सदृशं पवित्रमिह विद्यते ॥

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Message From the Vice Chancellor

Dear Readers,

India is a land of celebrations. Every month brings a festival, and every festival carries a lesson. Our traditions teach us unity, gratitude, and the joy of togetherness. At IITE, we cherish this cultural richness, making festivals not just events but experiences that shape values and strengthen our bonds.

Festivals remind us that India's strength lies in its diversity. Each festival tells a story of faith, harmony, and shared happiness. At IITE, we embrace this spirit. I encourage my readers to learn from every festival—its history, its people, and the values that connect us all.

Moreover, as educators, it is our core responsibility to nurture respect for all traditions. Let us celebrate not just with lights and colors but with open hearts and minds. Let us carry the spirit of our festivals beyond the campus—spreading kindness, unity, and cultural pride. Together, let us make IITE a vibrant place where learning and traditions go hand in hand. ■

With hope and determination,
Prof. R.C. Patel
Vice Chancellor
Indian Institute of Teacher Education

FESTIVALS: SOUL OF INDIA

India and festivals are inseparable. Every month, every season, and every region has a reason to celebrate. From the grand processions of Ganesh Chaturthi to the quiet prayers of Guru Nanak Jayanti, our country thrives on its festive spirit. Festivals are not just holidays; they are reflections of our traditions, values, and way of life.

The calendar begins with January, bringing the joy of Makar Sankranti, Pongal, Lohri, and Uttarayan. Though celebrated on the same day, each festival has its unique charm. While Punjab lights up with Lohri bonfires, Gujarat skies burst with colorful kites during Uttarayan. Down south, Pongal marks the harvest with sweet delicacies and warm family gatherings. Diversity in celebration, unity in spirit—that's India.

As spring arrives, March paints the country in colors with Holi, the festival of joy. People forget differences and come together, drenched in shades of love and laughter. In April, Sikhs celebrate Baisakhi, Bengalis welcome their New Year with Poila Boishakh, and Tamilians observe Puthandu. It's incredible how the same time of year signifies new beginnings in different parts of India.

The summer months bring grandeur with Eid-ul-Fitr, marking the end of Ramadan. Streets fill with the aroma of sevaiyan, and people exchange warm greetings. By August, patriotism and devotion go hand in hand with Independence Day, Raksha Bandhan, and Janmashtami. Brothers and sisters strengthen their bond with Rakhi, while Krishna's birth is celebrated with joyous processions and midnight prayers.

Autumn is the festival season in its full glory. Ganesh Chaturthi in September brings beautifully crafted idols and emotional farewells with "Ganpati Bappa Morya." By October, Navratri, Durga Puja, and Dussehra take over, with garba nights in Gujarat, grand pandals in Bengal, and Ram Leelas in North India. November lights up the country with Diwali, where homes glow with diyas, symbolizing the triumph of light over darkness.

December arrives with Christmas, proving that India's spirit of celebration knows no boundaries. From churches in Goa to midnight masses in Kerala, the festive cheer is everywhere. Our festivals are more than just rituals. They bring people together, break barriers, and remind us of our shared heritage. No matter where we come from, we celebrate together, proving that unity in diversity is not just a phrase—it is India's heartbeat. ■

Amalgamation of Art in Indian Festive Culture

Festivals in India are not just about rituals. They are about expressions of joy, devotion, and creativity. Every festival is a grand showcase of art, where dance, music, food, and traditions blend to create something magical. From the beats of dhol during Baisakhi to the delicate rangoli designs during Diwali, art is what makes Indian celebrations truly vibrant.

⏩ Dance – When Feet Speak the Language of Celebration

No Indian festival is complete without dance. Garba and Dandiya light up Navratri nights, where people twirl in colourful chaniya cholis to traditional beats. In Punjab, Bhangra turns Baisakhi into an energy-packed celebration. Down south, Kolattam (stick dance) during Pongal and Theyyam performances in Kerala festivals showcase devotion through powerful movements. Be it a temple procession or a wedding sangeet, dance is how we-Indians express our happiness.

⏩ Music – Folk Tunes that Bind Generations

Festivals bring music alive. Every region has its own melodies that pass down generations. Bhajans and Kirtans fill temples during Krishna Janmashtami and Ram Navami. Qawwalis create soulful vibes during Eid. Durga Puja is incomplete without Dhaak beats in Bengal, just like Ganesh Chaturthi feels empty without dhol-tasha. From Rajasthani Manganiyar folk songs to Tamil Nadu's Carnatic renditions, music during festivals binds people together in shared emotions.

⏩ Food – The Art that You Can Eat

Festive food is not just about taste—it's a craft. Every festival has its signature dish. Pongal has its sweet and savory Pongal rice, Holi has Gujiyas, and Eid is incomplete without biryani and sevaiyan. South Indian Onam Sadya is an artwork of 20+ dishes served on a banana leaf, while Bengali Durga Puja offers delicious bhog prasad. Making these dishes is an art, passed from one generation to the next, keeping traditions alive through flavors.

⏩ Colors, Crafts, and Creativity

Look around during festivals, and you'll see India's artistic soul everywhere. Rangoli and Alpana decorate doorsteps during Diwali and Pongal. Handmade torans and flower garlands add charm to every home. Durga Puja pandals are massive art installations, created with themes as grand as mythology or as modern as sustainability. Even the idols of Ganpati and Durga are sculpted with skill passed down through centuries.

⏩ Stories that Travel Through Time

Festivals are not just about what we do but also what we narrate. Grandmothers tell stories of Ramayana during Dussehra. Folk artists perform Pandavani in Chhattisgarh during harvest festivals. Puppet shows, shadow plays, and street performances keep our epics and folklore alive.

Festivals are India's way of preserving art in its most natural form. Be it through dance, music, food, or craft, every celebration adds a brushstroke to our cultural canvas. The best part? This art is not locked in museums.

It's alive, evolving, and passed down—one festival at a time. ■

Festivals in India are more than just grand celebrations. They are our greatest teachers. Every festival carries a deeper meaning, shaping our values, traditions, and way of life. They teach us patience, gratitude, togetherness, and resilience—all in the most joyful way. From Diwali's victory of light over darkness to Raksha Bandhan's lesson on love and duty, festivals silently guide us toward a meaningful life.

Festivals as Teachers- Life LESSONS & INDIAN VALUES

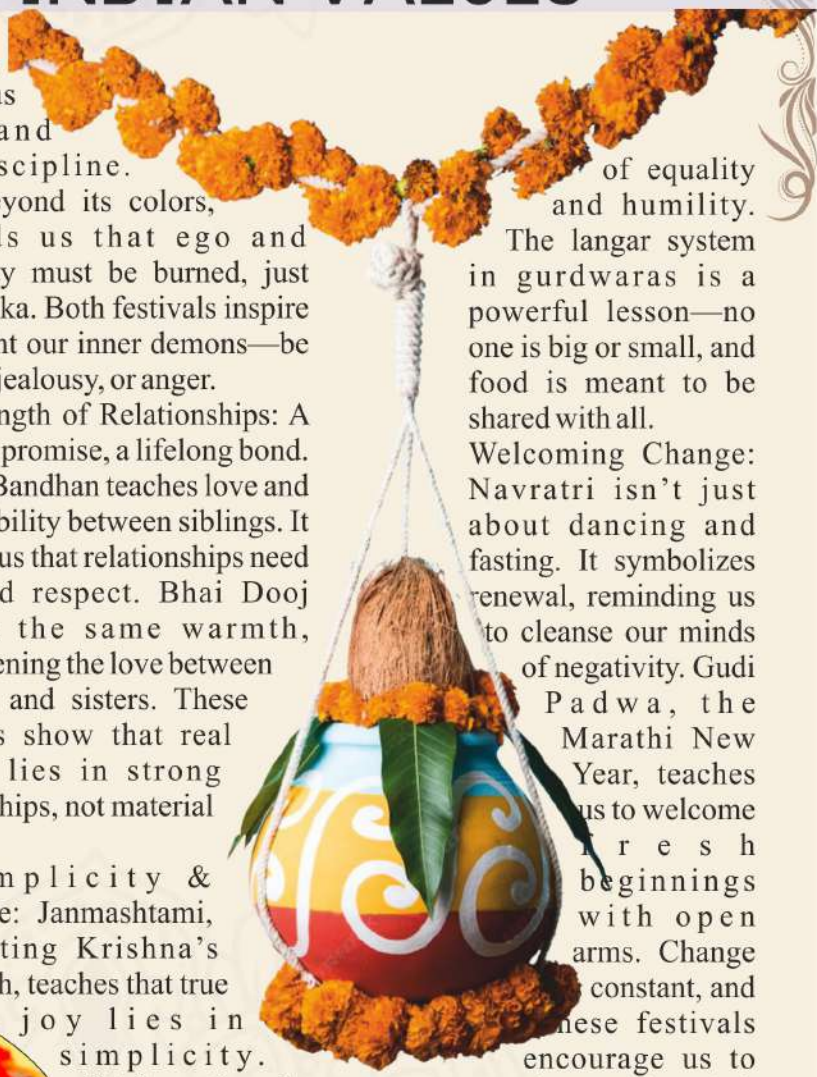
The Joy of Giving: Diwali is not just about lighting diyas. It's about spreading light in others' lives. Cleaning homes before Diwali is more than a ritual; it teaches us the importance of discipline and fresh beginnings. The act of sharing sweets and gifts reminds us that happiness grows when shared. Similarly, Eid teaches generosity through Zakat—helping those in need. These festivals remind us that wealth is not just in money but in kindness.

Unity in Diversity: Different names, same celebration. Pongal in Tamil Nadu, Makar Sankranti in the North, and Lohri in Punjab—all mark the harvest season. Yet, each state celebrates it differently. The lesson? Respect for diversity. India is a vast land with different cultures, yet we stand united. These festivals teach us to embrace differences while cherishing common roots.

Victory of Good Over Evil: Dussehra teaches us that no matter how powerful evil seems, goodness always wins. Ravan's defeat is not just a mythological tale—it is a lesson in courage, righteousness, and self-discipline. Holi, beyond its colors, reminds us that ego and negativity must be burned, just like Holika. Both festivals inspire us to fight our inner demons—be it greed, jealousy, or anger.

Strength of Relationships: A thread, a promise, a lifelong bond. Raksha Bandhan teaches love and responsibility between siblings. It reminds us that relationships need care and respect. Bhai Dooj carries the same warmth, strengthening the love between brothers and sisters. These festivals show that real wealth lies in strong relationships, not material things.

Simplicity & Gratitude: Janmashtami, celebrating Krishna's birth, teaches that true joy lies in simplicity. Krishna, though born in a palace, lived among the common people, spreading love and wisdom. Guru Purab, dedicated to Guru Nanak, reminds us of equality and humility. The langar system in gurdwaras is a powerful lesson—no one is big or small, and food is meant to be shared with all.



Welcoming Change: Navratri isn't just about dancing and fasting. It symbolizes renewal, reminding us to cleanse our minds of negativity. Gudi Padwa, the Marathi New Year, teaches us to welcome fresh beginnings with open arms. Change is constant, and these festivals encourage us to embrace it with positivity.

Festivals are not just about rituals. They shape our values, strengthen our bonds, and remind us what truly matters in life. Each celebration leaves behind a lesson, making us wiser, kinder, and more connected to our roots. ■

Festive Rituals as Scientific Nature of Celebrations

Indian festivals are full of colors, joy, and traditions. But have you ever wondered why we do certain rituals? Many of them have a scientific reason behind them, linked to nature, health, and well-being. Things that seem like a cultural practice is often a well-thought-out way to live in harmony with the seasons and our surroundings. Here's how science plays a role in our celebrations:

Holi – A Natural Detox: The bonfire of Holika Dahan purifies the air, killing bacteria that thrive in seasonal transitions. Traditional colors made from turmeric and flowers were good for the skin.

Diwali – Cleansing and Energy: Cleaning homes removes germs and insects post-monsoon. Lighting diyas and burning camphor purify the air. Dry fruits and sweets provide warmth for winter.

Makar Sankranti – Sunlight and Immunity: Flying kites in the morning boosts Vitamin D. Sesame and jaggery treats generate body heat and improve digestion.

Navratri – Fasting for Detox: Avoiding heavy foods during seasonal change improves metabolism. Eating millets and fruits supports digestion and immunity.

Karva Chauth – The Moon's Influence: Watching the moon before eating is calming. Fasting regulates digestion and helps the body reset.

Onam – The Science of Food: Banana leaves have antibacterial properties, making them perfect for serving food. The balanced Sadya meal provides complete nutrition.

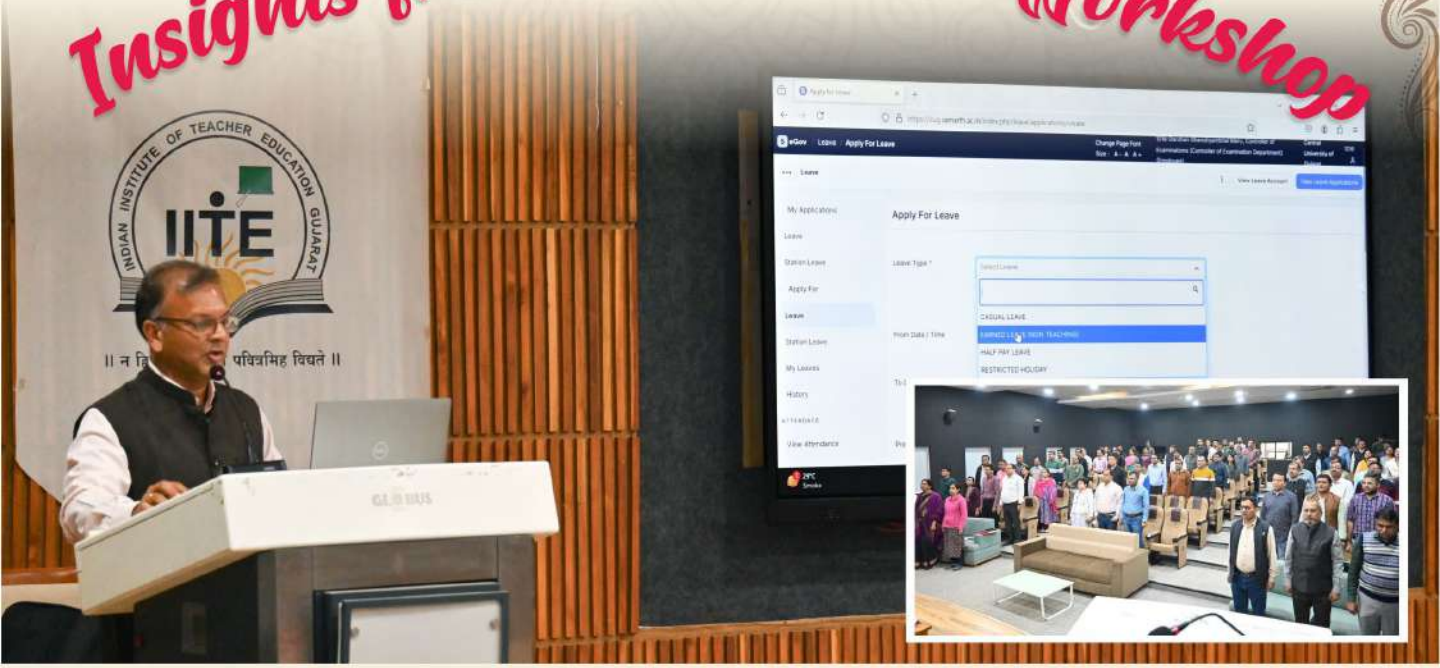
Eid – Fasting and Health: Roza (fasting) helps detoxify the body. Breaking the fast with dates provides instant energy and aids digestion.

Baisakhi & Pongal – Agriculture and Gratitude: Celebrating harvest seasons keeps communities connected to nature. Rituals ensure respect for food and sustainable farming practices.

Christmas – Beating Winter Blues: Christmas traditions combat winter's harsh effects. Decorating with lights seasonal depression. Evergreen trees purify air. Singing carols with loved ones enhance emotional well-being, making Christmas a perfect blend of science and celebration.

Indian festivals are not just celebrations. They are deeply connected with nature, seasons, and well-being. Every ritual has a purpose beyond tradition. They are a perfect blend of culture, health, and science, helping us live in harmony with nature. ■

Insights from Samarth Workshop



The workshop on the effective operationalization of the Samarth Project was inaugurated on January 21, 2025 by distinguished dignitaries, Prof. R. C. Patel, Vice Chancellor IITE and shri Vadanshinh Bodana, Joint Director, Commissionerate of Higher education. It was jointly organised by the Commissionerate of Higher Education & IITE at the Auditorium of IITE, Gandhinagar. The Vice Chancellor emphasized the need for seamless integration of digital systems in the education sector, while the joint Commissioner discussed the strategic role of Samarth in enhancing the accessibility and efficiency of university operations.

The primary objective of the workshop was to provide participants with a comprehensive understanding of the Samarth Portal, its operationalization process, and how it can be effectively implemented across various state universities. The workshop aimed to equip university administrators, IT professionals, and faculty members with the necessary knowledge and tools for utilizing the Samarth Portal to streamline academic and administrative functions. All-in-All, 80 stakeholders across the state universities took total participation in the workshop.

The workshop consisted of two technical sessions.

Session 1: Introduction to the Samarth Portal

Session 2: Operationalization and Implementation Strategy

The mode of delivery for both sessions included PowerPoint presentations, followed by interactive discussions, allowing participants to raise questions and share experiences related to digital transformation in university operations.

Participants were asked to complete a feedback form at the end of the workshop, with the following key insights:

- **Relevance of Workshop:** The majority of participants found the workshop highly relevant, particularly in light of the ongoing digital transformation in higher education institutions.
- **Knowledge Delivery by Speakers:** Feedback on the knowledge delivery was overwhelmingly positive. The interactive nature of the sessions also allowed for better understanding of complex topics.
- **Content Depth:** Several participants mentioned that the examples and case studies shared during the discussions helped clarify how to apply the portal effectively within their own institutions.
- **Venue Facility:** The spacious environment also allowed for comfortable discussions and interaction among participants.
- Food and Refreshment Arrangements: Participants were satisfied with the variety and quality of refreshments provided during breaks, which added to the overall positive experience of the workshop.
- Registration Communication Process: The communication process for registration was smooth, and most participants reported receiving timely updates regarding the event schedule, workshop materials, and logistics.
- Overall Workshop Experience: Many expressed their appreciation for the informative nature of the workshop and the opportunity to engage with experts on a critical subject.

The one-day workshop on the effective operationalization of the Samarth Project successfully met its objectives. Participants left with a clear understanding of the portal's potential and actionable strategies for its effective implementation across state universities. The feedback from stakeholders has been overwhelmingly positive, reflecting the success of the event in advancing the understanding of digital transformation within the higher education sector.The workshop provided an excellent platform for sharing knowledge, addressing challenges, and fostering knowledge collaboration among key university stakeholders. ■

·NIRAV VYAS
HEAD OF IT DEPARTMENT
& ASSISTANT REGISTRAR

POETRY

एक अधूरी नज़्म

फ़िर से, कागज़ में जान आई
में भी नज़्म तराशने बैठा
वक्त की सियाही दौड़ रही लहू बनके
मैने उठायी सांस की कलम
कुछ मायूसी सी लगी
कुछ डर भी था ज़हन में
हाथ कांपते रह गए
अब की बार भी कहीं मेरी नज्म अपाहिज न रह जाए?

•AMIT SINGHALA
ASSISTANT REGISTRAR•IITE

Wings of Faith

Faith is the light that guides the soul,
A silent trust that makes us whole.
It stands as firm as ancient stone,
A bridge to cross when we're alone.

It whispers softly in the night,
A gentle spark, a steady light.
Unseen, but felt in every breath,
A hope that rises, life from death.

Faith does not falter, does not sway,
It roots us firmly through each day.
It holds storms, in silence wants to speak,
A strength that rises when we're weak.

In faith, we find our wings to soar,
And in its arms, we fear no more.

•DR. DEEPKUMAR TRIVEDI
ASSOCIATE PROFESSOR, IITE

હંમેશા મોજમાં રહેવું

જીવનમાં દુઃખના સ્ટેશન આવે છે ઘણા; પણ હું બહુ ઊભો રહેતો નથી,
આવે છે મોજ રૂપી સુપરફાસ્ટ ટ્રેન; જીવનમાં જે હું ક્યારેય ચૂકતો નથી.
સફળતાના સ્ટેશન પહેલા આવે છે; મહેનત, સંઘર્ષ અને નિરાશાના સ્ટેશન હું આ સ્ટેશનોથી ડરતો નથી,
આવે નહીં સફળતાનું સ્ટેશન જ્યાં સુધી, હું મારી રિઝર્વ સીટ (પ્રયત્ન) છોડતો નથી,
સાહિત્ય , સંસ્કૃતિ અને ગુજરાતી ભાષાના ગૌરવની વાત આવે ત્યારે હું પીછે હટ કરતો નથી.

-મોજ

MAYUR GOHIL
TRAINING OFFICER•IITE

આત્માની સ્વાધીનતા

મૂકી બાજુમાં ભૌતિક સ્વતંત્રતા,
શોધો તમે આત્માની સ્વાધીનતા.
આ મારું ને આ તારું મૂકી માયા પોતાનું,
કહો સાથે મળી આ તો આપણું સહિયારું.
હિંસા ને ચોરીથી નહિ મળે મનને શાંતિ,
સત્ય, પ્રેમ, અહિંસા જ અપાવશે ક્રાંતિ,
એક ડગલું આગળ વધી તો જુઓ,
એક વાર કોઈની મદદ કરી તો જુઓ,
પૂછો તમારા હૃદય ને છો તમે આઝાદ?
પળે પળ અધર્મ કરી ફરે છે નિષ્પાપ,
હોય તન મનમાં ભારતમાતાનું નામ,
ત્યારે જ રહેશે ભારત દેશ આબાદ.
વિવિધતામાં એકતા છે ભારત દેશમાં,
આત્માની સ્વાધીનતા લાવો સૌના મનમાં.

•HARSHA DODIYA
B.SC.B.ED. SEM - 8

જેમ-જેમ દિવસો વીતે છે

જેમ-જેમ દિવસો વીતે છે, મીઠું બાળપણ વીસરે છે.
મારે તો બાળક થાવું છે,
હવામાં ફૂલડાંઓની જેમ સીધેસીધું પથરાવું છે.
વનરાજીમાં ગાય છે કોયલ,
નાચે મન મૂકી ને મોર.
મારે પણ આ વગડો છોડી એ વનરાજી જાવું છે.
મારે નથી હસવું-રડવું માપી માપીને,
નથી બનવું રસવિહીન.
મારે તો વહેતાં ઝરણાંની માફક
ખળ-ખળ વહેતા જાઉં છે.
નથી રહેવું આજ-કાલના ચક્કરમાં,
મારે તો આજને માણતાં જાવું છે.
ચોપડાઓ સાથે મૈત્રી કરવી છે,
દફ્તરના બોજ તણાં દબાવું નથી.
શીખવી છે એક-બે નહિ,
આખી દુનિયાની રીત.
સાથે, મારે દુનિયાથી પ્રીત કરતા જાઉં છે.

•HITESHA RATHOD
B.A B.ED UG -4

સલામતી

ઘર હોય, રાહ હોય કે પછી ગમે તે હોય,
સંભાળવી પડશે આજ સલામતી.
હા, શક્ય છે તે અજાણતા આવે,
જાળવવી પડશે આજ સલામતી.
આ તો લોખંડ સાથે કામ પાર પાડવાનું છે,
માટે પોલાદી બનાવવી પડશે આજ સલામતી.
વાયુ હોય કે પાણી હોય તો પણ,
અણીશુદ્ધ બનાવવી પડશે આજ સલામતી.
જો જિંદગીની હરેક પળ માણવી હશે તો,
અમલમાં મૂકવી પડશે આજ સલામતી

•DARSHAN ZAVERI
JR. CLERK•IITE

THE HISTORY OF ZERO:

A Journey Through Time

Zero is one of the most fundamental concepts in mathematics, yet its development was far from straightforward. Despite its crucial role in arithmetic, calculus, and advanced mathematics, the idea of "nothingness" took centuries to be fully understood and accepted. This article traces the fascinating history of zero, from its earliest appearances in ancient civilizations to its indispensable role in modern science and technology.

The Origins of Zero

The origins of zero can be traced back to early civilizations that began conceptualizing "nothingness." The first recorded use of a zero-like symbol appeared in Mesopotamia around the 3rd century BCE. The Babylonians, who used a positional number system, employed a placeholder—depicted as two wedge-shaped marks—to indicate the absence of a digit in a number.

However, the true mathematical foundation of zero was laid in India during the 5th century CE. The Indian mathematician Brahmagupta formally defined zero in his seminal work, Brahmasphutasiddhanta, where he established arithmetic rules for operations involving zero. This groundbreaking step transformed zero from a mere placeholder into a number in its own right, paving the way for more advanced mathematical theories

Zero's Advancement in India

In India, the concept of zero, known as "shunya," continued to evolve. Indian mathematicians went beyond using zero as a placeholder and integrated it into arithmetic calculations. By the 7th century, Aryabhata had incorporated zero into his mathematical system, enabling more sophisticated calculations.

The symbol for zero, initially represented as a dot, was systematically documented in Brahmagupta's work and later refined by mathematicians such as Bhaskara II in the 12th century. This notation provided a more efficient way to represent zero, replacing earlier placeholders and setting the foundation for the modern numeral system.

Zero's Journey to the Arab World

Zero's journey did not stop in India—it reached the Arab world, where scholars played a crucial role in refining and disseminating mathematical knowledge. During the Islamic Golden Age (8th to 14th century), Arabic mathematicians adopted and expanded upon Indian numerical concepts, including zero, which they referred to as sifr.

The translation of Sanskrit mathematical texts into Arabic, including those of Brahmagupta, allowed for the integration of zero into the growing body of mathematical knowledge. A key figure in this process was Al-Khwarizmi, whose influential book, Al-Kitab al-Mukhtasar fi Hisab al-Jabr wal-Muqabala (The Compendious Book on Calculation by Completion and Balancing), introduced the decimal system, including zero, to the Islamic world. His work was later translated into Latin in the 12th century, helping spread zero to Europe.

Zero's Introduction to Europe

The acceptance of zero in Europe was gradual and met with resistance. By the 13th century, European scholars encountered zero primarily through Fibonacci, who introduced the Indian numeral system in his book Liber Abaci. Despite its mathematical advantages, zero was viewed with skepticism. Philosophical and religious concerns, as well as fears of fraud (such as its use to manipulate financial records), contributed to the reluctance to adopt it.

However, by the Renaissance, zero became an essential part of European mathematics. Its inclusion enabled the development of algebra and calculus, revolutionizing science and engineering. The ability to perform calculations with zero played a crucial role in mathematical discoveries that shaped the modern world.

Zero in the Modern World

Today, zero is recognized as a fundamental component of mathematics. It serves as the foundation for numerical systems, is central to calculus, and plays a crucial role in computer science. The invention of the binary system, which relies on just two digits—zero and one—became the basis for modern computing, digital technology, and electronic systems.

Zero also holds significance in scientific disciplines beyond mathematics. In physics, it represents absolute zero, the lowest possible temperature, where molecular motion ceases. In economics, it signifies balance, and in various fields, it serves as a reference point for measurements and calculations.

Conclusion

The history of zero is a testament to humanity's evolving understanding of mathematical abstraction. From its humble beginnings as a placeholder in Mesopotamia to its role as a cornerstone of modern mathematics, zero represents both the concept of nothingness and the infinite possibilities it enables. Its journey across civilizations highlights the interconnected nature of knowledge and the way mathematical ideas transcend time and geography, shaping the world as we know it today. ■

-DR. PARAS D UCHAT
ASSISTANT PROFESSOR, IITE

Music and Mathematics: The Interlaced Connection

"Music is a secret exercise in arithmetic of the soul. Music is the pleasure the human soul experiences from counting, without being aware of its act of counting"

- Gottfried Leibniz
Philosopher and Mathematician

At first glance, mathematics and music may seem like two entirely different realms—one governed by logic and precision, the other by emotion and creativity. However, a closer look reveals an intricate connection between them. The rhythms, patterns, and structural principles that shape music are deeply rooted in mathematical concepts. This relationship has been recognized for centuries, dating back to ancient Greek philosophers like Plato and Aristotle, who included music as part of the quadrivium—a group of core disciplines alongside Geometry, Arithmetic, and Astronomy.

One of the earliest mathematical explorations of music came from Pythagoras, who saw mathematics as the divine language of the universe. He formulated the Pythagorean Scale, based on the proportional relationships between musical harmonies. Similar studies on the mathematical foundations of sound and rhythm were conducted by early Indian and Chinese scholars, who examined their effects on human well-being. Today, modern research continues to explore how this intersection between music and mathematics enhances cognitive development, particularly in improving mathematical skills among students.

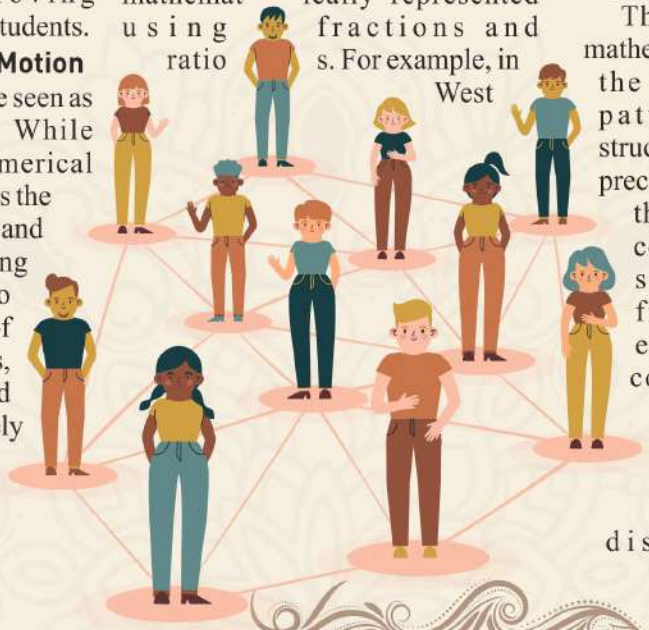
Music as Mathematics in Motion

At its core, music can be seen as mathematics in action. While mathematics studies numerical relationships, music explores the interplay of notes, rhythm, and timing, revealing surprising similarities between the two disciplines. The structure of music is built upon rhythms, tempos, beats, and measures—all of which rely on fractions and ratios. Musicians must inherently grasp mathematical concepts to perform accurately.

A striking example of this is Ludwig van Beethoven, who, despite losing his hearing, composed masterpieces like Moonlight Sonata by relying on mathematical patterns of sound. This illustrates how music's foundation in structure and numerical relationships transcends physical perception.

Mathematical Foundations in Indian and Western Music

The two most prominent musical traditions—Indian (Hindustani and Carnatic) and Western music—both depend on beats that organize time and structure musical compositions. These beats and rhythms can be mathematically represented using fractions and ratios. For example, in Western music, a 4/4 time signature means each measure consists of four beats, with each beat represented by a quarter note.



Western music follows a 12-note octave system, where each note's frequency increases by approximately 5.95% compared to the previous one, resulting in a frequency doubling with each octave. Similarly, in Hindustani music, these 12 notes are arranged within the saptak, comprising 'shudh swara' (pure notes) and 'vikrit swara' (altered notes). The precise tuning of these notes follows mathematical calculations, demonstrating how both traditions rely on structured numerical relationships to create harmonious compositions.

The intricate link between mathematics and music showcases the universal language of patterns, symmetry, and structure. Whether through the precise tuning of musical notes or the rhythmic balance of a composition, mathematics serves as an essential framework for musical expression. As research continues to uncover the cognitive benefits of this relationship, it becomes evident that understanding one discipline can enrich

appreciation for the other—bridging logic and creativity in a truly harmonious way.

Mathematics and Hindustani Classical Music are deeply interconnected, with various mathematical principles such as permutations and combinations, functions, series, and set theory playing a fundamental role in musical structures. These mathematical concepts are embedded so profoundly within music that they have become an integral part of its composition and theory.

The mathematical essence of music can be observed in elements such as Alankars (permutations and combinations of swaras), Tanas (ascending and descending sequences of swaras), music scales (octaves), musical intervals, Tihaais, Kayada, Paltas (combinations and sets), and even in the construction of musical instruments.

One of the most significant mathematical aspects of Hindustani Classical Music is Tala, which literally means "rhythmic cycle." It is an inseparable component of Indian music, governing vocal, instrumental, and dance performances by binding them to a structured rhythmic framework. The concept of Tala in Indian music is unique, as all compositions follow a specific rhythm. When rhythmic beats (known as Matras) occurring in a single cycle are used as the fundamental unit of measurement, they collectively form a Tala.

In Indian rhythm theory, beats are classified based on duration:

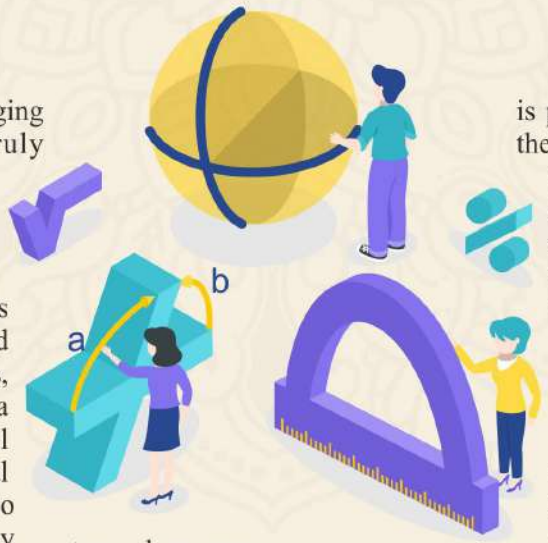
Drut: A half-beat (x/2)

Laghu: A single beat (x)

Guru: A double beat (2x)

Pluta: A triple beat (3x)

To understand this, imagine clapping at one-second intervals—each clap represents Laghu. If we double the frequency to



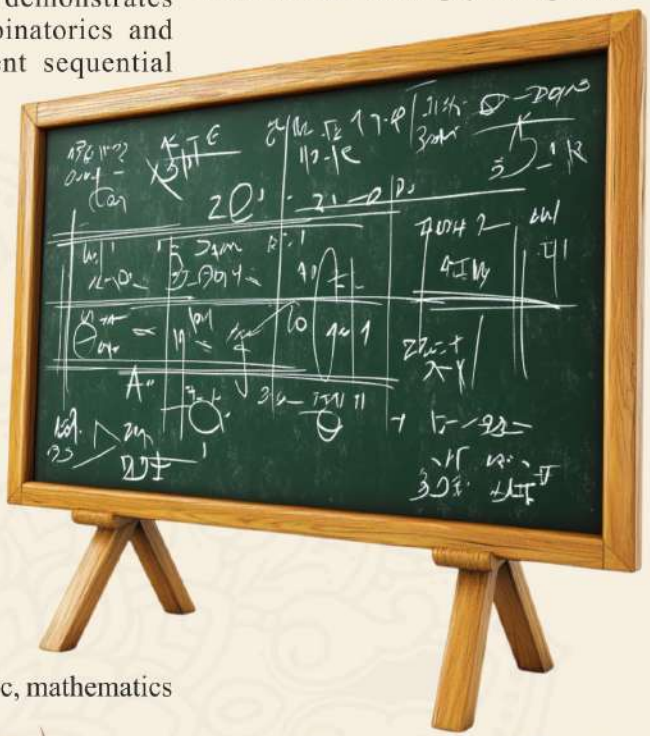
two claps per second (one every half-second), the claps are classified as Drut. Conversely, if we pause for one additional second after each clap, resulting in a two-second interval, the claps are termed Guru. Similarly, if each clap occurs every three seconds, it is labeled Pluta.

By systematically arranging these different time units in various sequences and combinations, different Talas are created. Mathematically, this process involves dividing time into proportional segments (x, 2x, 3x, and x/2) and arranging them systematically to generate distinct rhythmic cycles. This structuring of rhythmic patterns demonstrates principles of combinatorics and algebra, as different sequential arrangements of time units form the basis of various Talas.

Thus, Hindustani Classical Music exemplifies the deep mathematical foundation that governs its rhythmic and melodic structures, showcasing the seamless integration of mathematics into art.

In Western Music, mathematics is primarily used in music through the use of scales and chords. Scales, such as the major and minor scales, can be represented mathematically through the use of frequency ratios. Chords, which are made up of multiple notes played together, can also be represented mathematically through the use of intervals and frequency ratios. Understanding these mathematical principles allows musicians to create complex and harmonious melodies and chord progressions. In addition to the use of mathematics in the creation of music, the production and recording of music also relies heavily on mathematical principles. The use of sound waves, for example, can be represented mathematically through the use of frequency and amplitude. This knowledge is crucial for sound engineers and producers in order to create the desired sound and balance in a recording.

The connection between music and mathematics plays a significant role in children's cognitive development, helping them excel in math through musical learning. Frances Rauscher, a psychologist at



the University of Wisconsin, found in her research that preschoolers who received piano, rhythm, or singing instruction showed improved mathematics test scores, with rhythm students demonstrating the greatest gains. She explains that rhythm inherently involves ratios, proportions, and the subdivision of beats—concepts rooted in mathematics, including whole, half, and quarter notes. Studies further reveal that children who play musical instruments solve complex math problems more effectively than their peers. Music enhances cognitive skills by engaging problem-solving processes similar to composing, where text and rhythm are combined. Musical rhythms, like time signatures (4/4 or 2/4), require addition and subtraction to determine beats and divisions. Music also strengthens language skills, as musical phrases mimic verbal sentences with clear beginnings, middles, and ends, along with varying inflections. Both music and math center around pattern creation, and researchers note that composers often use mathematical structures in their works, appealing to our natural affinity for repetition and structure—explaining why choruses are so memorable. All music systems, from Western melodies to Hindustani Ragas and Japanese pentatonic scales, follow mathematically derived codes. This is especially evident in Indian classical music, where the concept of 'taal' is deeply connected to numbers. Shankar Mahadevan, an acclaimed Indian singer and composer with a computer science degree, reflects on how early exposure to harmonium and veena before the age of five likely nurtured his mathematical abilities, even if he didn't consciously link music to math at the time.

Our brain is arguably the most complex organ of our body. Everything happens in our brain. Different hemispheres of the brain are associated with different functions - the right brain dominates our creative, holistic and emotional side, while the left side of the brain is associated with logical and analytical thinking. And since we associate music with creativity and math with logic, we assume that each of these disciplines is controlled by a distinct side of the brain. Recent research has shown that each brain hemisphere processes frequencies and sounds differently. Which means that by listening to music which reaches and stimulates a certain side of the brain (classical music and minor tones for the left side, upbeat music and major tones for the right side), one can possibly create more balance between the two sides. Over the years, scientists are working with neurologists to strengthen each hemisphere.

Exposure to music might "excite and enhance the cortical firing patterns" used in spatial-temporal reasoning, which is the ability to mentally move objects in space and time to solve multi-step problems. Such reasoning is required for higher brain functions such as chess, mathematics, and engineering and for composing music. Learning and solving math involves the spatial region of the brain. There is a term called the "Mozart effect", which claims that listening to Mozart's music improves children's general intelligence. Several other researchers have found out that enrolling children for any kind of music lessons from a young age helps them perform tasks involving spatial-temporal reasoning more effectively, especially in mathematics which involves spatial memory. While listening to music may be beneficial in improving cognition and mathematics skills, performing music presents other advantages. Learning an instrument requires immense dedication and patience, which are qualities that help children to excel not only in school, but in life as well. Music training can enhance social skills, making it an invaluable tool for collaboration.

It has also been found that children who play a musical instrument have a better memory and attention span, improved fine motor skills and greater creativity. Learning music at an early age can provide not only an academic advantage, but, and more importantly, also joy, relief and an outlet for emotions.

Several institutions worldwide are using the concept of teaching basic and advanced concepts of mathematics like algebra and geometry through music. Music has always been intricately linked with

maths. Teaching numbers through music helps children grasp concepts more easily. For instance, a mother walks her fussy baby around the house, singing and patting his back as per the rhythm of the lullaby. She might not know it, but her rhythmic patting is her baby's first experience of patterning, a mathematical concept linked to advanced maths like algebra.

A study showed that listening to music during a math test could improve performance by 40 percent. According to another study, just the tapping of a beat helped children learn fractions at a faster pace. In general, kids tend to retain information better when it's associated with music and dance as opposed to only verbal instructions.

The Learning Through The Arts (LTTA) program established by the Royal Conservatory of Music, Canada, has teachers and professional artists, working in collaboration together, to bring out innovative lessons in mathematics, science and other subject areas using art, dance, story and song. In a research study, Peter Jusczyk, professor of psychology and cognitive science, University of Oregon, USA, showed that babies as young as four-and-a-half-months prefer music that is sequential-not broken up by odd, misplaced pauses. This gives rise to the theory that even babies' brains may understand the concept of order, which is the fundamental law of mathematics.

All research conducted in this particular field points to one common factor- that music as an activity in itself can contribute to

the better understanding of mathematical concepts. Many mathematicians who also turn out to be gifted musicians. Pythagoras said, "There is geometry in the humming of the strings, there is music in the spacing of the spheres." Einstein used to play the violin when he was stuck on a mathematical problem. By concentrating on the problem at hand (left brain) while playing the piano or violin (right brain), he was able to strengthen the communication between the two hemispheres of his brain and increase brain power. Cymra Haskell, professor of mathematics at the USC Dornsife College of Letters, Arts and Sciences, USA, has said "When I write down a proof of a result in mathematics, it feels like a puzzle coming together. There can be an intense pleasure in that, similar to the pleasure I feel when I listen to a beautiful piece of music or gaze at a beautiful painting or go for a walk in the mountains, on the beach or in a wood."

In conclusion, mathematics and music may seem like two unrelated disciplines, but they are in fact deeply connected. From the use of mathematical principles in the creation and production of music, to the representation of musical elements through mathematical notation, the connection between mathematics and music is undeniable. Understanding this connection can not only deepen our appreciation of music, but also improve our ability to create and produce it. So, let's embrace the world of music with open arms, embark in a journey of pure bliss and encourage the young children and students to take systematic interest in pursuing music for a possible enhancement in their cognitive and analytical abilities. ■

DR JUMISREE SARMAH PATHAK
ASSISTANT PROFESSOR, PHYSICS

The Hidden Patterns of Math

For as long as I can remember, I have been fascinated by the intricate shapes and patterns found in nature. Many of us marvel at the beauty of the living world, but my curiosity pushed me to seek deeper answers. In my search, I stumbled upon an extraordinary discovery—one that not only provided fascinating insights but also connected mathematics to the very fabric of nature in ways I had never imagined.

Take a moment to observe the patterns on the fur of wild animals. Have you ever wondered why leopards have rosettes or cheetahs have spots? Their striking designs seem purposeful, and indeed, they are. Initially, I assumed the answer lay in biology, but to my surprise, I found that the key to these patterns lies within mathematical equations. This revelation led me to the work of a brilliant scientist—Alan Turing—and his groundbreaking theory known as Turing Patterns.

A Mathematical View of the Zebra's Stripes

Let's start with a question: Is a zebra black with white stripes or white with black stripes? The correct answer is that zebras are black with white stripes, a feature that helps them evade blood-sucking flies. Intriguing, right? Now, let's step into the mind of a mathematician and explore how these stripes emerge through mathematical principles.

The Reaction-Diffusion System

At the heart of Turing's theory is a mathematical model called the reaction-diffusion system. This system describes how two or more substances—known as morphogens—interact and spread across a given space, forming patterns over time.

The Activator-Inhibitor Mechanism

Imagine two morphogens:

- The activator, which stimulates stripe formation.
- The inhibitor, which prevents stripe formation in nearby regions.

The activator has a short-range influence, affecting only its immediate surroundings, while the inhibitor has a broader reach, suppressing activator growth in distant areas.

The Formation of Stripes

- **Initial Condition:** Imagine a patch of zebra skin starting as completely white. Small, random variations at the molecular level (due to genetic or environmental factors) cause an increase in the activator concentration in certain areas.
- **Self-Enhancement and Inhibition:** As the activator grows, it amplifies its own production, creating a positive feedback loop. However, it also triggers the production of the inhibitor, which diffuses over a larger area and restricts activator growth in neighboring regions.
- **Pattern Formation:** This interaction between activator and inhibitor leads to the emergence of alternating black and white stripes.

Why Stripes Instead of Spots?

The type of pattern—whether stripes, spots, or something else—depends on various factors, including the diffusion rates of the activator and inhibitor and the strength of their interaction. In zebras, these factors favor stripe formation rather than spots, much like how a leopard's fur favors a different pattern.

Real-World Evidence

Although Turing's hypothesis began as a theoretical concept, evidence supporting it has been found in various biological systems. Scientists continue to investigate the exact molecular processes behind zebra stripes, but Turing patterns provide a fundamental framework for understanding these natural designs.

Incorporating Turing Patterns in Education

Engaging Students with Real-World Mathematics

In an Indian classroom, posing thought-provoking questions like "Why do zebras have stripes?" can

break away from traditional math instruction. By linking mathematical concepts to real-world examples, such as animal patterns, students struggling to see the relevance of math in their daily lives may develop a newfound curiosity. Hands-on activities involving Turing patterns can encourage students to explore and experiment, making learning more engaging.

Leveraging Technology for Deeper Learning

Integrating technology into this topic is both accessible and effective. Students can use simulations on their computers or smartphones to visualize reaction-diffusion systems and explore how different variables impact pattern formation. More advanced learners can dive deeper into complex mathematical models, expanding their understanding of natural patterns beyond zebras.

Beyond Zebras: Real-World Applications

The beauty of Turing patterns extends far beyond animal markings. Students can apply these concepts to design camouflage patterns for real-world applications, from military technology to fashion. Such projects not only develop their problem-solving skills but also boost their confidence in applying mathematical concepts creatively.

Conclusion

By exploring the hidden patterns in nature, we open doors to a new perspective on mathematics — one that is deeply connected to the world around us. This approach fosters inclusive and contextualized learning, making mathematics more exciting and relevant in a diverse classroom setting.

By incorporating modern applications, we can inspire students to see mathematics as more than just numbers—it becomes a key to understanding the mysteries of nature and beyond. ■

RUSHIRAJ GADHVI
COMPUTER PROGRAMMER/
NETWORK ENGINEER AT IITE

The Biodiesel Potential of Jatropha gossypiifolia: A Versatile Solution

As the world transitions towards renewable energy solutions, several plant species have emerged as viable candidates for biodiesel production. One such species is Jatropha gossypiifolia, commonly known as the bellyache bush. This plant presents a sustainable and eco-friendly alternative to address the global energy security crisis. This study explores its potential as a biodiesel feedstock, highlighting its botanical characteristics, advantages, and challenges.

Botanical Overview

Jatropha gossypiifolia is a hardy shrub that grows between 2.5 to 4 meters in height, thriving in tropical and subtropical regions.

Leaves: Initially purplish-red, turning green upon maturity, with 3-5 lobes and covered in fine white glandular hairs.

Flowers: Dark-red corolla with 6-8 stamens and bifid stigmas; blooms from August to November.

Fruits: Three-lobed capsules containing oil-rich red seeds with a caruncle.

Its ability to grow in infertile soils makes it a suitable crop for biodiesel production, as it does not compete with food crops on prime agricultural land.

Geographical Distribution

Native to tropical regions of America, Mexico, and the Caribbean, Jatropha gossypiifolia has been introduced and naturalized across various tropical and subtropical regions. In Gujarat, India, it is locally known as Vilayati Erandi (વિલાયતી એરંડી) and is commonly used as a hedge plant. It can also be spotted growing outside the IITE Campus.

Biodiesel Production Potential

Jatropha gossypiifolia is an abundant source of non-edible oil, making it a promising candidate for sustainable biodiesel production. Key highlights include:

Oil Content: The seeds contain 38% oil, a high yield for biodiesel production.

Biodiesel Yield Efficiency: 90% conversion efficiency, producing minimal waste.

Heating Value: 40.8 MJ/kg, comparable to conventional diesel.

Seed Oil Recovery: 85% efficiency, maximizing output.

The transesterification process,

in which triglycerides react with alcohol and a catalyst, converts the seed oil into biodiesel, with glycerol as a by-product. Optimization of factors like alcohol-to-oil ratio, catalyst concentration, and reaction temperature can significantly improve biodiesel yield.

Comparison with Jatropha curcas

Jatropha gossypiifolia is often compared with its close relative, Jatropha curcas (રતનજોત), another well-known biodiesel crop. While most research has focused on Jatropha curcas, Jatropha gossypiifolia offers several advantages:

Soil Adaptability: Thrives in various soil types, including marginal lands.

Pest Resistance: Demonstrates natural resistance to pests, reducing pesticide dependence.

Oil Composition: Contains a favorable balance of fatty acids, enhancing biodiesel quality.

Visual data such as bar graphs and radar charts illustrate comparative traits between these two species, evaluating parameters such as oil content, biodiesel yield efficiency, heating value, land suitability, and seed oil recovery.

Environmental and Socioeconomic Impact

Expanding the cultivation of Jatropha gossypiifolia aligns with India's efforts to reduce fossil fuel dependency while creating rural employment opportunities. In Gujarat, where it is locally known as Vilayati Erandi, large-scale cultivation can offer economic benefits to farmers and contribute to decentralized energy solutions.

However, sustainable agricultural practices are essential to prevent issues such as land-use conflicts and ecological invasiveness.

Cultivation Zones

Green Areas: Suitable for cultivation.

Red Areas: Fertile agricultural land, unlikely to be used for Jatropha farming.

Pink Areas: Arid and desert regions unsuitable for growth.

Advantages

- **Non-Edible Oil:** Ensures biodiesel production does not affect food supplies.
- **Marginal Land Cultivation:** Grows on degraded soils, reducing competition with food crops.

Challenges

- **Toxicity:** Contains toxic compounds, requiring careful handling.
- **Yield Variability:** Oil yield is influenced by soil quality, climate, and cultivation techniques, necessitating further optimization.

Additional Applications

Beyond its biodiesel potential, Jatropha gossypiifolia has multiple uses:

- **Traditional Medicine:** Used to treat fevers, wounds, and gastrointestinal ailments.
- **Pharmaceutical Benefits:** Contains anti-inflammatory, antimicrobial, and analgesic properties due to its bioactive compounds.

Pesticidal Use: Extracts act as natural pest repellents, adding to its agricultural value.

Conclusion

With its high oil yield, adaptability, and diverse applications, Jatropha gossypiifolia presents a promising alternative for biodiesel production. Ongoing research and technological innovations aimed at mitigating challenges like toxicity and yield inconsistency will further enhance its viability. By integrating this versatile plant into sustainable energy strategies, we move closer to a greener and more energy-secure future.

Jatropha gossypiifolia is more than just a plant—it represents a vision for renewable energy and environmental responsibility. ■

AUM DESAI
B.SC. B.ED. SEMESTER · 2

Life in Space: Exploring the Unknown

The idea of life beyond Earth has captivated humanity for centuries. With rapid advancements in space exploration and technology, scientists are now closer than ever to uncovering the possibilities of extraterrestrial life and the feasibility of human habitation in space. This article delves into ongoing scientific discoveries, potential space habitats, and the challenges of living beyond our planet.

The Search for Extraterrestrial Life

Astrobiology, the study of life in the universe, aims to identify planets and moons capable of supporting life. NASA's Mars Rover Perseverance is currently exploring Mars, searching for evidence of ancient microbial life, as past liquid water presence makes it a prime candidate (NASA, 2021). Beyond Mars, Europa, one of Jupiter's moons, is believed to have a subsurface ocean beneath its icy shell, offering a potential habitat for life (Hand et al., 2009).

Additionally, the study of exoplanets—planets beyond our solar system—has identified thousands of worlds, with some located in the habitable zone of their stars, where liquid water could exist (Seager, 2013). These discoveries keep the hope of finding extraterrestrial life alive.

Human Life in Space

Human presence in space has been a reality since the mid-20th century. The International Space Station (ISS) serves as a research hub where astronauts conduct experiments on the effects of microgravity on the human body, including muscle and bone loss (Smith et al., 2014). Such studies are critical for preparing long-duration missions to Mars and beyond.

However, space travel poses significant risks. Radiation exposure from cosmic rays and solar radiation is a major concern. To address this, space agencies are developing advanced shielding technologies to protect astronauts (Cucinotta et al., 2001).

Potential Habitats for Future Space Colonies

The Moon and Mars are considered the most viable locations for future human settlements.

The Moon, being Earth's closest celestial neighbor, is ideal for testing new space technologies. Its water ice deposits could be converted into oxygen and rocket fuel, making long-term missions more sustainable (National Academies of Sciences, Engineering, and Medicine, 2020).

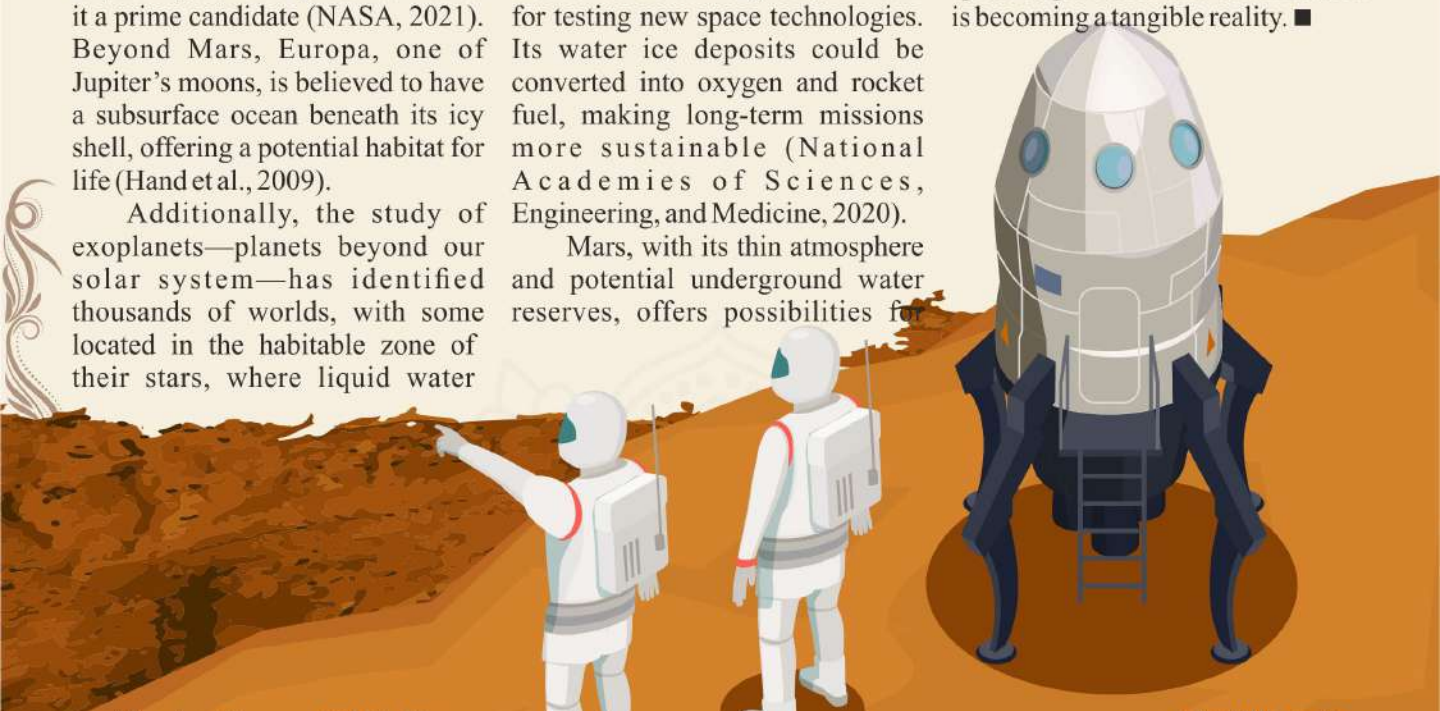
Mars, with its thin atmosphere and potential underground water reserves, offers possibilities for human colonization. However, challenges such as extreme temperatures and low atmospheric pressure must be overcome.

Ethical Considerations

As humanity ventures into space, ethical concerns must be addressed. Preventing contamination between Earth and extraterrestrial environments is critical. Space agencies adhere to planetary protection protocols to minimize the risk of biological contamination (Conley, 2005).

Conclusion

The question of life in space remains one of the most profound scientific inquiries. While the search for extraterrestrial life continues, research has significantly advanced our understanding of human survival beyond Earth. Through continued innovation, international collaboration, and scientific exploration, the vision of deep-space exploration and colonization is becoming a tangible reality. ■



·AAYUSHI GOR
M.A.M.ED. SEMESTER· -6

ACTIVITIES AT A GLANCE

Field Visits

9th January 2025: B.A.-B.Ed. Semester 6 students embarked on an enlightening visit to the Nisarg Community Science Centre, Gandhinagar, as a part of their curriculum with Prof. Jayna Joshi. ■

18th January 2025: Centre of Extension Services, Indian Institute of Teacher Education, Gandhinagar, organized an educational visit to Dandi Kutir for the students of IITE. ■

Workshops & Talk

21st January 2025 – SAMARTH Workshop: The Commissionerate of Higher Education and IITE jointly organized a one-day workshop on the Effective Operationalization of the SAMARTH Platform. The event was inaugurated by Hon'ble Vice Chancellor Prof. R.C. Patel and Registrar Dr. Anil Varsat, with Chief Guest Shri Vadansinh Bodana (Joint Director of the Commissionerate of Higher Education, Gujarat) Experts Prof. Mukesh Kumar Mehlawat, Delhi University and Shri Darshanbhai Maru, Central University of Gujarat shared valuable insights during the workshop. ■

Workshops & Talk

22nd January 2025 – Scientist Interaction: The Gujarat Vigyan Sammelan 2025 was held for the PG students at IITE wherein science and curiosity took center stage. The event buzzed with energy as our Hon'ble Vice Chancellor, Prof. R.C. Patel, Dr. Pallab Bhattacharya (Scientist at NIPER Ahmedabad), and Dr. Bhushit Vaishnav (Scientist at PRL Ahmedabad) shared their expertise on the "Importance of Science Education." The event was collaboratively organized by the Center of Education, IITE, and Vigyan Gurjari. ■

ACTIVITIES AT A GLANCE

Workshops & Talk

21th January 2025 – The Center of Education organized a workshop on Hands-on Learning in Physics for B.Sc. B.Ed. Semester 2 students. Guided by Mr. Avinash Jaiswal, students explored 50 working models of fundamental Physics concepts. ■

REPUBLIC DAY CELEBRATION AT IITE

The 76th Republic Day was celebrated with vibrant enthusiasm and patriotism. The event was honoured by the presence of Hon'ble Vice Chancellor Prof. R.C. Patel and former Vice Chancellor of BKNM University, Dr. Chetan Trivedi. The celebration fostered a spirit of unity, purpose, and national pride, leaving a lasting and memorable impact on all those present. ■

Teachers' Trainings

The 35th 'Nipunta ki Aur' training program on Empowering Science Teachers with NEP 2020 (Batch-1) was organized from 17th to 18th January 2025 under the Government of Gujarat Grant. A total of 23 science teachers from the Surendranagar district participated in the training, which included both sessions and practical experiences.

The inaugural session was graced by Prof. R.C. Patel, Hon. Vice Chancellor, IITE; Dr. Shailendra Sharat, Director, National Institute of Pharmaceutical Education and Research; and Dr. Arvind Ranade, Director, National Innovation Foundation, India, and National Secretary, Vigyan Bharti, as distinguished guests. ■

The 35th 'Nipunta ki Aur' training program, titled "Empowering Science Teachers with NEP 2020 (Batch-02) for Dahod's science teachers organized during 21st and 22nd January 2025. Hon'ble Cabinet Minister for Tribal Development, Primary, Secondary, and Adult Education, Shri Kuber Dindor, graced the inaugural occasion as Chief Guest. ■

ACTIVITIES AT A GLANCE

TEACHERS' TRAININGS

The 36th 'Nipunta ki Aur' training program, titled "Empowering Science Teachers with NEP 2020-Batch-3" organized during 23rd and 24th January 2025 for science teachers from Kheda District. The event was inaugurated by the Chief Guest Shri Vivasvanji Hebalkar, Kshetra Sangathan Mantri of Vigyan Bharti, along with Dr. Niraj Kumar Singh, Scientist-D and Joint Director of the Gujarat Biotechnology Research Center, GoG. ■

MALAVIYA MISSION TEACHER TRAINING CENTRE:

6th January 2025 – 2nd Short Term Programme on, 'Advances in Physical and Nano Science' at the UGC, Malaviya Mission Teacher Training Centre, IITE, Gandhinagar organized during 6th January to 11th January 2025. Event was inaugurated in august by the presence of Hon'ble Vice Chancellor - Prof. R.C.Patel and Prof. Ajoy Ghatak. Their speeches motivated participants to enhance their knowledge. ■

27th January 2025 – 1st Guru Dakshta Faculty Induction Programme: This event was inaugurated in presence of Prof. Saroj Sarma, a professor at Guru Gobind Singh Indraprastha University, New Delhi, delivered the keynote address, emphasizing the significance of professional development for educators. Prof. R.C. Patel, Hon'ble Vice Chancellor, delivered the presidential address. ■

20th January 2025 – 3rd Short Term Programme on, 'Advanced Tools and Resources for Teaching Biological Sciences' at the UGC, Malaviya Mission Teacher Training Centre, IITE, Gandhinagar was inaugurated in august presence of Hon'ble Vice Chancellor - Prof. R.C.Patel and Prof Pallab Banerjee. Their speech motivated participants to enhance their knowledge. ■

Students of IITE were also greeted by Hon'ble Vice-Chancellor for presenting their skills at AIU West Zone Youth Festival. ■

Students of IITE cleared the GSET 2024 exam for which Hon'ble Vice-Chancellor, Prof. R.C. Patel, congratulated and encouraged them to sustain their dedication while striving for greater achievements in the future. ■

Ruhit Bardhan (M.Sc.-M.Ed. PG 4) and Kandarp Acharya (M.Sc.-M.Ed. PG 4) along with other PG students and researchers edited a book titled: 'Reimagining Higher Education with AI' which was inaugurated by Hon'ble Vice Chancellor. ■

CELEBRATION AT IITE