

# The mentors Digest



FEBRUARY 2025

ISSUE NO:21



The mentors monthly magazine

Time to change the way.....



## Our Founder & his Vision

Knowledge is the prime wealth among all wealths. In other words, knowledge is the best and important wealth among all wealths. Start your journey to find or explore the knowledge. Our founder and renowned scholar late Padmashri Dr Vellayani Arjunan's vision is to spread quality education to entire community and make it affordable.

Shri. Vellayani Arjunan was born on 10 February 1933 at Vellayani in the erstwhile Kingdom of Travancore. After receiving a Master of Arts degree in Malayalam, he went on to teach Malayalam Language and Literature at

Sree Narayana College in Kollam. He later became the first Malayalam lecturer in Aligarh Muslim University, from which he gained his PhD degree in 1964. After leaving Aligarh Muslim University, he was appointed director of the State Institute of Encyclopaedic Publications in Kerala

He was honoured with the Padma Shri award by the nation in 2008. Dr Arjun, who was the first Professor of Malayalam at the Aligarh University and head of the Department of Modern Indian Languages. He supervised 20 research scholars and published more than 100 research papers and articles. He had authored 40 books in different genres including poetry, short story, essays and literary criticism, and his books were prescribed as textbooks in Kerala schools from 1959 onwards.



Degree	Topic	Awarding Institution
D.Litt.	Influence of Sree Narayana Guru on Malayalam Poetry.	Aligarh Muslim University
D.Litt.	A Comparative Study of the Mutual Relations and Uniformity of Hindi and Malayalam Languages.	Agra University
D.Litt.	The influence of Hindi Vocabularies on the South Indian Languages: A Linguistic study.	Jabalpur University
Ph.D.	A Comparative Linguistic Study of Common Vocables of Hindi and Malayalam Languages.	Aligarh Muslim University

### Other degrees

Degree	Subject
B.A. Hons	Malayalam Language and Literature
M.A.	Malayalam Language and Literature
M.A.	Hindi Language and Literature
M.A.	Hindi Special
P.G. Diploma	Tamil, Telugu, Kannada



# The mentors Digest



## From the Editors Desk.....

### Embracing the Power of Technology: A Message to Students

"Students may know how to use some technology, but not all. If the teacher and student collaborate and start learning technology together, it would be beneficial for both teachers and students."



In today's fast-paced world, technology is not just a tool—it's a gateway to endless possibilities. It empowers you to learn beyond the walls of a classroom, connect with mentors worldwide, and turn your ideas into reality. Whether you're coding an app, researching breakthroughs, or collaborating online, technology amplifies your potential like never before. Stay curious, keep innovating, and use technology to shape a brighter future. The world is waiting for your genius!

### WHAT IS SPECIAL ABOUT THE MONTH OF FEBRUARY ?

**FEBRUARY 28** : National Science Day is celebrated in India on 28 February each year to commemorate the discovery of the **Raman Effect** by Indian physicist **Sir C.V. Raman** in 1928. This groundbreaking discovery, which explains the scattering of light and its effect on molecules, earned him the **Nobel Prize in Physics** in 1930, making him the first Indian to receive this honor in science. The day serves as a tribute to his contribution and aims to inspire scientific curiosity and innovation among students and researchers. On this day, schools, colleges, and research institutions across India organize science exhibitions, lectures, and competitions to promote awareness about the importance.



### National Science Day

of science and its role in everyday life. Each year, National Science Day is celebrated with a specific theme that focuses on key scientific issues relevant to society. These themes highlight advancements in fields such as environmental science, space technology, healthcare, and sustainable development. Over the years, this occasion has helped raise awareness about the significance of science and its impact on national progress. This day not only honors Sir C.V. Raman's legacy but also serves as an inspiration for young students and researchers. It reinforces the idea that scientific discoveries and innovations are crucial in solving improving human life.

# The mentors Digest



## WHAT IS DEEPSEEK AND WHY IS IT DISRUPTING THE AI SECTOR?

DeepSeek, a Chinese AI startup, has launched AI models that claim to rival or surpass leading U.S. models at a significantly lower cost. This has raised concerns among U.S. tech companies and impacted stock prices of major players like Nvidia.

### DeepSeek's Cost-Effective AI Models

- DeepSeek-V3 was trained with less than \$6 million worth of computing power using Nvidia H800 chips.
- DeepSeek's AI Assistant has overtaken ChatGPT as the top free app in the U.S. Apple App Store.
- DeepSeek-R1 is 20 to 50 times cheaper than OpenAI's o1 model, depending on the task.

### Industry Reactions and Skepticism

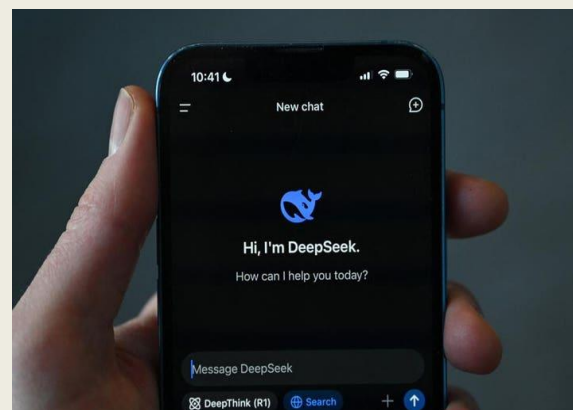
- Some experts, including Scale AI CEO Alexandr Wang, have questioned how DeepSeek obtained high-end AI chips, which are restricted by U.S. export controls.
- Bernstein analysts doubt that DeepSeek's total training costs were as low as the company claims.

### Background of DeepSeek

- The company is based in Hangzhou, China.
- Its controlling shareholder, Liang Wenfeng, is the co-founder of quantitative hedge fund High-Flyer.
- High-Flyer shifted focus to AI research in 2023 and has been linked to AI chip cluster patents.

### DeepSeek's Relationship with Beijing

- DeepSeek's founder Liang Wenfeng attended a closed-door symposium with Chinese Premier Li Qiang on January 20, 2025.
- This suggests potential government support, aligning with China's push for AI self-sufficiency amid U.S. tech export restrictions.



Did you know ?  
-40° C is equal to  
-40° F.



## A MOUSE WITH TWO DADS? SCIENCE JUST MADE IT HAPPEN!

Imagine a world where two dads could have a baby—without a mom! Well, scientists have taken a huge step toward that reality by creating a mouse with two biological fathers. Sounds like science fiction, right? But it actually happened!

### How Did They Do It?

Scientists used a special technique involving embryonic stem cells, which are like blank slates that can turn into different types of cells in the body. Normally, in mammals (including humans), a baby needs both a mother and a father because of "imprinting genes." These genes control how an embryo develops, and they usually have to come from both a male and a female parent.

In past experiments, scientists tried to create mice with two dads, but the embryos stopped developing early or had serious defects. This time, the researchers carefully edited 20 key imprinting genes to make the process work better. Once the embryos were modified, they were implanted into a surrogate mother, and amazingly, some of them survived!

### What's the Catch?

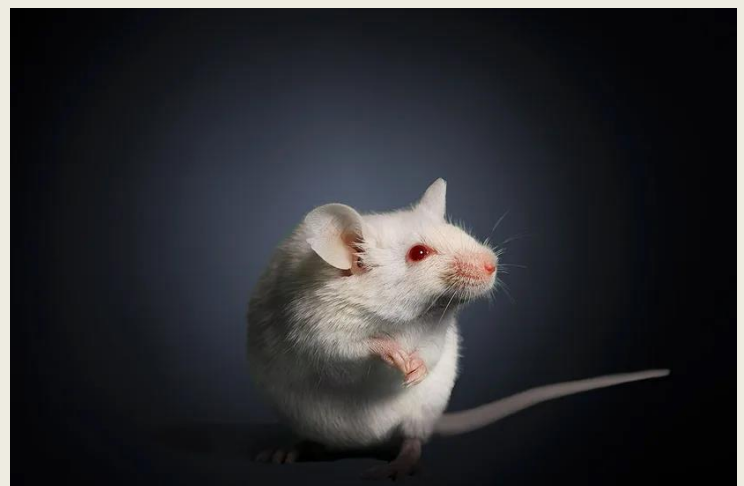
Even though this experiment was a success, it's far from perfect. Only 11.8% of the embryos actually made it to birth, and even fewer survived to adulthood. Those that did grow up had some health

problems, grew abnormally, and couldn't have babies of their own. So while this is a major breakthrough, it's definitely not ready for humans anytime soon!

### What's Next?

The scientists are now working on fixing the health problems and seeing if the technique can work in larger animals like monkeys. If they succeed, this research could lead to huge advancements in medicine, like improving treatments for infertility or even growing organs for transplants.

So, could this mean that humans might one day have babies without moms? That's still a long way off. But one thing's for sure—science is constantly pushing the boundaries of what we thought was possible!





## HOW LIFE SURVIVES IN ALMOST TOTAL DARKNESS

### Life in the Dark

Most living things depend on sunlight to survive. Plants and algae use photosynthesis to turn light into energy, fueling entire ecosystems. But what happens when there's almost no light at all? Scientists have long wondered how little light is needed for photosynthesis to work. They calculated a theoretical minimum—but until recently, no one had ever seen it happen in real life. That changed when scientists went on a daring expedition into the Arctic's polar night, where the sun disappears for months. There, under thick layers of ice and snow, tiny algae were found actively photosynthesizing—using less than one-hundred-thousandth of the light of a sunny day!

### A Daring Arctic Expedition

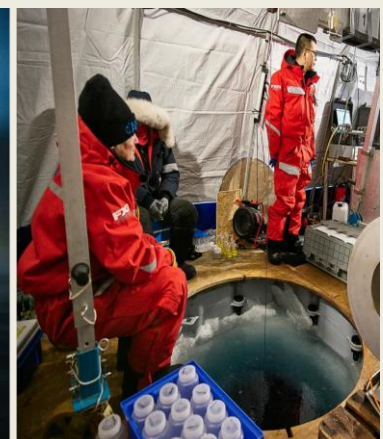
In winter 2020, biogeochemist Clara Hoppe and her team lived on an icebreaker ship, frozen into an Arctic ice floe, to study how life survives in extreme darkness. They drilled holes in the ice to collect seawater samples and analyzed tiny algae living beneath the frozen surface. At first, everything seemed still. But as the first weak rays of spring sunlight returned, something amazing happened—the algae came to life! They started absorbing carbon and growing, proving that photosynthesis was happening at the absolute lowest light levels ever recorded in nature.

### The Light That's Almost No Light

So, just how little light are we talking about? Scientists placed ultra-sensitive sensors under the ice to measure light levels. What they found was shocking—just 0.04 micromoles of light per square meter per second. That's about one drop of water compared to a full bathtub of light on a sunny day! Despite this barely-there light, the algae were ready. Instead of being fully dormant, they had been running on “low power,” waiting for the first sign of sunlight to kick-start their growth.

### Why Does This Matter?

This discovery changes how we think about life in extreme environments. Scientists used to believe that the Arctic was a frozen wasteland in winter, with everything shutting down until the sun came back. But now, we know that life can keep going, even in near-total darkness! This research could also help us understand life in the deep sea, where light barely reaches. And who knows? If life can survive under such extreme conditions here on Earth, could something similar exist on other planets or even moons with icy oceans? The Arctic may be cold and dark, but it turns out, it's far from lifeless!





## CONCEPT MAP

### MATHEMATICS TOPIC OF THE MONTH:

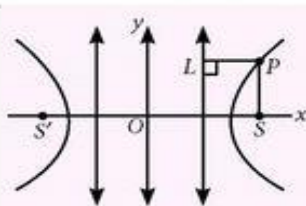
## HYPERBOLA

Class XI

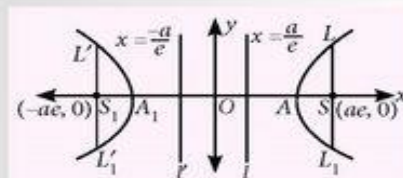
- Locus of a point which moves in such a way that the difference of its distance from two fixed points (foci) is always constant.

- General equation of second degree  $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$

represents a hyperbola if  $\Delta = \begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix} \neq 0$  and  $h^2 > ab$ .



Standard form is given by  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$



- Centre :  $O(0, 0)$
- Foci :  $S(ae, 0), S'(-ae, 0)$
- Vertices :  $A(a, 0), A'(-a, 0)$
- Directrices :  $x = \frac{a}{e}$  and  $x = -\frac{a}{e}$
- Transverse axis :  $AA' = 2a$
- Conjugate axis :  $2b$
- Latus rectum :  $LL' = L'L' = \frac{2b^2}{a} = 2a(e^2 - 1)$

A hyperbola is said to be rectangular hyperbola, if the asymptotes are at right angle i.e.,  $\theta = 90^\circ$ . Equation of rectangular hyperbola is  $x^2 - y^2 = a^2$  or  $xy = c^2$ .

### Definition

### Hyperbola

### Standard form

### Definition

### Rectangular Hyperbola

### Properties

### Important Results

### Conjugate Hyperbola

If  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  is one hyperbola, then its conjugate hyperbola is given by  $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$

If  $A\left(ct_1, \frac{c}{t_1}\right)$  and  $B\left(ct_2, \frac{c}{t_2}\right)$  are the points lying on the hyperbola  $xy = c^2$  then

- Vertices of  $xy = c^2$  are  $(c, c), (-c, c)$
- Foci :  $(\pm c\sqrt{2}, \pm c\sqrt{2})$
- Equation of directrices is  $x + y \pm c\sqrt{2} = 0$

- Slope of chord at  $A = -\frac{1}{t_1}$

- Chord subtend right angle at the vertices.

- Slope of tangent at  $A = -\frac{1}{t_1^2}$

- Locus of the point of intersection of tangents at the end point of chords is  $x + y = 0$ .

$$S \equiv \frac{x^2}{a^2} - \frac{y^2}{b^2} - 1, S_1 \equiv \frac{x_1x}{a^2} - \frac{y_1y}{b^2} - 1,$$

$$S_{11} \equiv \frac{x_1^2}{a^2} - \frac{y_1^2}{b^2} - 1, S_2 \equiv \frac{x_2x}{a^2} - \frac{y_2y}{b^2} - 1, S_{22} \equiv \frac{x_2^2}{a^2} - \frac{y_2^2}{b^2} - 1, S_{12} \equiv \frac{x_1x_2}{a^2} - \frac{y_1y_2}{b^2} - 1,$$

- Location of  $P(x_1, y_1)$  :  $P$  is inside the hyperbola if  $S_{11} > 0$ .  
 $P$  is outside hyperbola if  $S_{11} < 0$ ,  $P$  is on the hyperbola if  $S_{11} = 0$ .
- Chord with midpoint  $P(x_1, y_1)$  :  $S_1 = S_{11}$
- Chord joining the points  $P(x_1, y_1)$  and  $Q(x_2, y_2)$  :  $S_1 + S_2 = S_{12}$
- Tangent at  $P(x_1, y_1)$  :  $S_1 = 0$
- Chord of contact of tangents from  $P(x_1, y_1)$  :  $S_1 = 0$
- The tangents with slope  $m$  are  $y = mx \pm \sqrt{a^2m^2 - b^2}$
- Pair of tangents from  $P(x_1, y_1)$  :  $S_1^2 = S_{11}S$
- Normal at  $P(x_1, y_1)$  :  $\frac{a^2x}{x_1} + \frac{b^2y}{y_1} = a^2 + b^2 = a^2e^2$



## SCIENCE TOPIC OF THE MONTH:

### Surface Chemistry

Surface chemistry is the study of chemical reactions at interfaces. It is closely related to surface engineering which aims at modifying the chemical composition of a surface for desired improvement. Surface science has importance in catalysis, electrochemistry and geochemistry.

## CONCEPT MAP CLASS XII

### Applications of Colloids

Colloids have very vast applications from food products to industries like rubber etc.

### In Nature and Everyday Life

#### Food Articles

Number of food articles that we eat, are colloidal in nature, e.g.,

- **Milk**: Fat dispersed in water.
- **Bread**: Air dispersed in baked dough.

#### Medicines

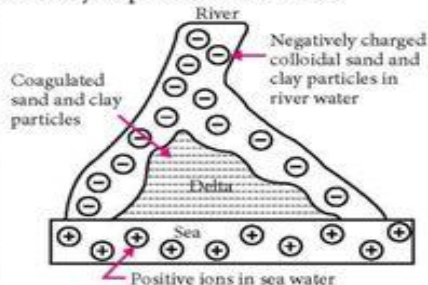
- Colloidal medicines are more effective as they are easily absorbed in the body, e.g.,
  - **Silver colloid**: Germicidal
  - **Copper colloid**: Anticancer
  - **Mercury colloid**: Antisypilis
- Colloidal dispersion of gelatin is used in coating over tablets and granules.

#### Blood Coagulation

Blood consists of negatively charged colloidal particles (albuminoid substances). On applying ferric chloride solution, it causes coagulation of blood to form a clot which stops further bleeding.

#### Formation of Delta

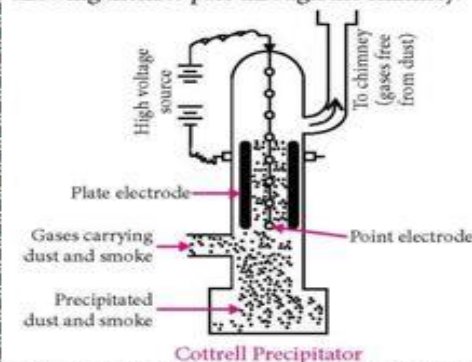
Formation of delta shaped heap of sand, clay, etc. where river falls into sea due to coagulation of sand/clay particles by electrolytes present in sea water.



### In Industries

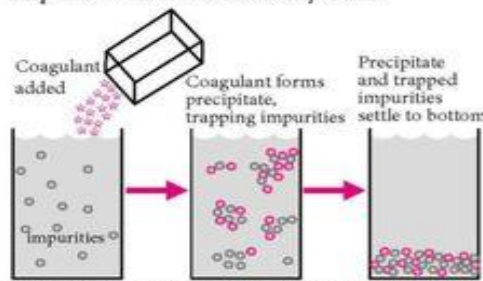
#### Smoke Precipitation

Smoke is a big problem for environment as it is the major cause of air pollution. Coagulation of the dispersed colloidal particles (smoke) occurs on metal plates before allowing them to pass through the chimney.



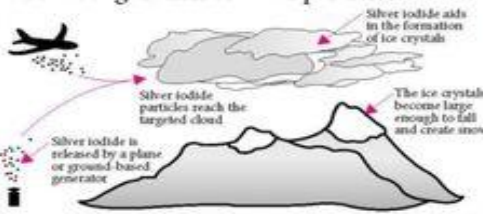
#### Purification of Drinking Water

Addition of the electrolyte (like alum) for water purification is based on the fact that impure water is a colloidal system.



#### Artificial Rain

Due to mixing of oppositely charged sand or common salt with the clouds to bring about coagulation of water particles.



### Applications of Adsorption

Adsorption finds extensive applications in research laboratories and in industries. It can be used to remove certain classes of pollutants from air and industrial waste water.

#### In Gas Masks

Gas masks are used to adsorb poisonous gases (e.g.,  $\text{Cl}_2$ ,  $\text{CO}$ , oxides of sulphur etc.) and thus purify the air for breathing. Activated charcoal is used for this purpose.

#### Removal of Colouring Matter from Solution

Many substances such as sugar, juice and vegetable oils (having coloured impurities) can be decolourised by using adsorbents like activated charcoal or fuller's earth, e.g., animal charcoal is used as a decolouriser in the manufacture of cane sugar.

#### Heterogeneous Catalysis

Mostly heterogeneous catalytic reactions proceed through the adsorption of gaseous reactants on solid catalyst, e.g.,

- Finely powdered nickel is used for the hydrogenation of oils.
- Finely divided vanadium pentoxide ( $\text{V}_2\text{O}_5$ ) is used in the Contact process for the manufacture of sulphuric acid.

#### In Curing Disease

Some drugs can adsorb the germs and kill them hence, save us from diseases.

#### Separation of Inert Gases

Due to the difference in degree of adsorption of gases by charcoal, a mixture of inert gases can be separated by adsorption on coconut charcoal at different temperatures.



## TWIST YOUR MIND

(Answers will be given in the March 2025 digest)

### RIDDLES

1. A tree doubled in height each year until it reached its maximum height over the course of ten years. How many years did it take for the tree to reach half its maximum height?
2. What do the letter "t" and an island have in common?

### PUZZLE

$$\bullet \times \bullet = 16$$

$$\bullet \times \blacktriangle \times \blacktriangle = 36$$

$$\bullet \times \blacktriangle \times \blacksquare = 72$$

$$\bullet + \blacktriangle + \blacksquare = ?$$

## Bright Spots: Positive Events from JANUARY 2025

- Scientists developed a promising new therapy for Alzheimer's, showing significant memory improvement in early trials.
- A new AI-powered system improved accessibility for visually impaired individuals, allowing better navigation of public spaces.
- A universal flu vaccine entered final-stage trials, raising hopes for long-term protection against multiple strains.
- NASA successfully landed its next-generation lunar rover, paving the way for long-term moon missions.
- Engineers unveiled a bioengineered material that self-repairs, revolutionizing construction and manufacturing.
- Global poverty rates hit a record low, with more people lifted out of extreme poverty than in previous years.

**word  
of the  
month**

**Lagom** : It is a Swedish word that means "just the right amount" or "not too much, not too little"

### JANUARY ANSWERS

RIDDLES : 1.The lid of saucepan 2.Second 3.Your name

PUZZLE : 1

# The mentors Digest



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# The mentors Digest



## ABOUT US

### Affordable Quality education .....

By understanding the need of aspiring students, India's renowned Industrial & Academic experts Mr. Manoj PL (Refining Specialist, Academician and founder Director Epinox Prompt Consulting Engineering Ltd), Ms. Chitra Jayasankar (Educational advisor, Tagore Educational trust) are there to bridge the gap of ensuring quality education for the students. We have formulated an online platform for providing significantly exceeding educational experience through online tuitions (classes 6-12), IAS bridge programs and finishing school for fresh engineers and other professionals. We will ensure excellent learning experience to students and 100% satisfaction level to parents.

Interested parents who are willing to associate with this concept are requested to contact



## Online TUITION

<b>GRADE - 6 &amp; 8</b>	<b>Mathematics &amp; Science</b>
<b>GRADE - 10</b>	<b>English ,Science, Social Science &amp; Maths</b>
<b>GRADE - 11</b>	<b>Physics ,Chemistry ,Biology &amp; Maths</b>
<b>GRADE - 12</b>	<b>Mathematics &amp; Physics</b>

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