

The mentors Digest



APRIL 2024

ISSUE NO:11



The mentors monthly magazine

Time to change the way.....



Our Founder and 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





From the Editors Desk

Dear Students & future leaders,

BENEFITS OF A POSITIVE MINDSET IN STUDENTS AND TEACHERS

With the right attitude, students and teachers can constructively work together to create a positive learning environment. A positive mindset fosters collaboration in the classroom by encouraging everyone to view challenges and mistakes as opportunities for growth. A student's life can be so challenging at times. Through both practice and reflection, students can develop the capacity to have a positive mindset that will benefit them in their academic, professional, and social pursuits. Teachers who approach education with an optimistic outlook have been known to successfully instill a sense of motivation within the students they work with..

This can potentially influence those students in their later years when they reflect back on their experience. Just as young minds need to think positively about learning, it is important for educators to exhibit these same values if they hope to guide their pupils in doing so



WHAT IS SPECIAL ABOUT THE MONTH OF APRIL ?

APRIL 07 : World Health Day, observed annually on April 7th, aims to raise awareness about global health issues and promote initiatives for better health worldwide. Established by the World Health Organization in 1948, it focuses on different themes each year, from mental health to disease prevention. Through events like seminars, workshops, and media campaigns, the day encourages healthy lifestyles and addresses disparities in healthcare access. It also emphasizes global cooperation, especially evident during events like the COVID-19 pandemic. Ultimately, World Health Day underscores the importance of health as a human right and the need for collective action to ensure the well-being of all. World Health Day serves as a vital platform to mobilize support for preventive healthcare measures, advocating for policies that prioritize health equity and access to essential services for all individuals, regardless of their backgrounds. By spotlighting pressing health challenges and promoting collaborative efforts, it fosters a shared commitment to improving health outcomes on a global scale. Additionally, it recognizes the invaluable contributions of healthcare professionals and underscores the importance of solidarity in addressing emerging health crises, reinforcing the message that health is not just a personal concern but a collective responsibility for society as a whole.



THE INCREDIBLE JOURNEY BEHIND 'THE GOAT LIFE'

Step into the captivating world of cinema as we unravel the remarkable story behind 'The Goat Life,' a gripping survival drama that has captured hearts worldwide. Join us on a thrilling adventure through the making of this extraordinary film:

Dreams Unleashed: Imagine being transported to distant lands, where the sands of time tell tales of bravery and hope. Director Blessy's dream of bringing Benyamin's novel to life sparked in 2008, igniting a fire of creativity that refused to be extinguished.

Epic Adventure: Picture this - a team of fearless adventurers embarking on a quest across deserts and continents, armed with cameras and boundless determination. From the sandy dunes of Wadi Rum to the vast expanse of the Sahara, they chased the elusive essence of Najeeb's journey.

Actor's Odyssey: Dive into the world of Prithviraj Sukumaran, the actor who breathed life into the character of Najeeb. Witness his incredible transformation as he shed and gained weight, delving deep into Najeeb's emotions and struggles.

Global Harmony: Imagine a symphony of talents coming together, each adding their unique brushstroke to the masterpiece. From the soul-stirring music of A. R. Rahman to the meticulous craftsmanship of the crew, 'The Goat Life' is a celebration of collaboration.

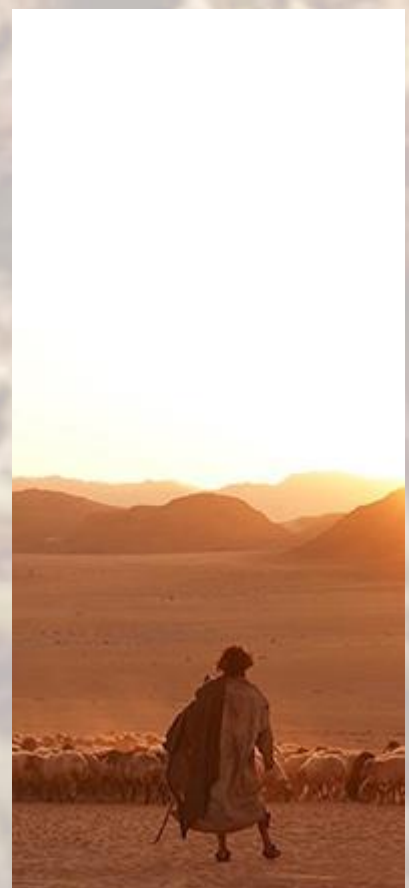
Trailblazing Promotion: Get ready for a rollercoaster ride of excitement as trailers and teasers tease our senses, offering tantalizing glimpses into Najeeb's world. From social media buzz to star-studded events, the anticipation for the film's release reaches fever pitch.

Cinematic Triumph: As the curtains rise on 'The Goat Life,' we invite you to join Najeeb on his awe-inspiring journey of courage and redemption. Through its spellbinding storytelling and breathtaking visuals, the film promises to whisk you away on an unforgettable adventure.

In 'The Goat Life,' the magic of cinema meets the power of storytelling, creating an immersive experience that will leave you spellbound. So grab your popcorn, buckle up, and prepare to embark on the adventure of a lifetime!

Did You Know ?

Did you know that a shrimp's heart is located in its head





NATURE'S HAVEN: INSIDE SEATTLE'S AMAZON SPHERES

The Amazon Spheres in Seattle, Washington, represent a groundbreaking fusion of nature and modern architecture. Conceived through collaboration between Amazon and NBBJ, these three massive glass spheres embody the philosophy of biophilic design, aiming to reconnect urban dwellers with the natural world. By recognizing humanity's inherent affinity for nature, these structures offer a much-needed respite from the concrete jungle, providing a space where visitors can immerse themselves in a lush, biodiverse environment.

Inside the Amazon Spheres, visitors are greeted with a breathtaking scene reminiscent of a tropical cloud forest. With verdant foliage, tranquil water features, and a diverse array of plants sourced from around the globe, the spheres create a harmonious ecosystem that fosters biodiversity and ecological balance. The intricate design, featuring pentagonal hexecontahedron panels, allows natural light to permeate the space, essential for sustaining the thriving flora within.

Beyond their aesthetic appeal, the Amazon Spheres serve as dynamic workspaces designed to enhance creativity and well-being for Amazon employees. With innovative meeting spaces nestled among the foliage and tranquil relaxation areas, the spheres offer an environment conducive to collaboration and inspiration. Thoughtful design elements aim to improve productivity while fostering a deep connection with nature.

The sustainability of the Amazon Spheres is a key aspect of their design, showcasing Amazon's commitment to responsible stewardship of resources. State-of-the-art climate control systems maintain optimal conditions for the plants, while rainwater harvesting and greywater recycling minimize environmental impact. These sustainable practices set a new standard for architecture, demonstrating the potential for eco-conscious design to shape the cities of the future.

While primarily serving Amazon employees, the Amazon Spheres also welcome the broader Seattle community through scheduled public visits. These opportunities allow visitors to experience the transformative beauty of biophilic design firsthand, offering a glimpse into a future where urban spaces seamlessly integrate with the natural world. Ultimately, the Amazon Spheres symbolize the harmonious coexistence of human innovation and ecological consciousness, inspiring us to rethink our approach to urban architecture and environmental sustainability.





REVOLUTIONIZING NEUROSCIENCE: THE BREAKTHROUGH OF 3D-PRINTED BRAIN TISSUE

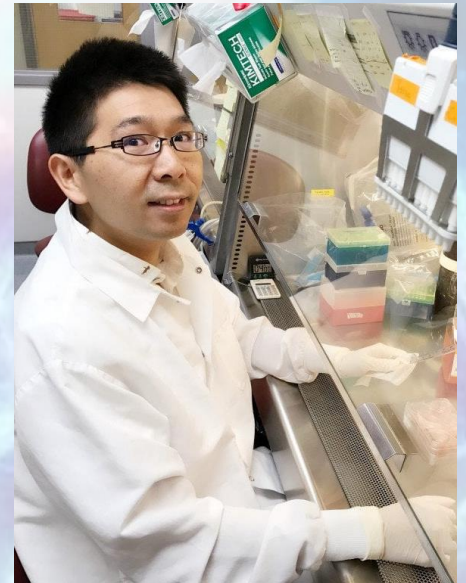
Scientists achieved a significant milestone in neuroscience by developing the world's first 3D-printed brain tissue, mimicking natural brain functionality. This breakthrough promises to advance understanding of neurological disorders like Alzheimer's and Parkinson's, potentially improving treatments.

The approach diverges from traditional vertical stacking, using a horizontal method with a softer "bio-ink" gel to house neurons derived from induced pluripotent stem cells. This gel supports neuron growth and interconnection, crucial for communication.

Maintaining a thin tissue structure ensures optimal oxygen and nutrient access, promoting complex network formation. The tissue includes support cells, enhancing functionality.

Remarkably, the printed brain tissue facilitates neuron communication, crucial for brain function. Compared to brain organoids, this technique offers precise cell manipulation for detailed exploration of brain function and pathology.

This breakthrough revolutionizes stem cell biology, neuroscience, and neurological disorder understanding, promising significant advancements in brain research and therapeutic development.



The longest time someone has spent holding their breath underwater is 24 minutes and 37 seconds.

Eiffel Tower can be 15 cm taller during the summer due to the expansion of the iron caused by heat





MATHEMATICS CHAPTER OF THE MONTH:

APPLICATION OF DERIVATIVES

CONCEPT MAP

Class XII

Rate of Change of Quantities

- Let $y = f(x)$ then $\frac{dy}{dx}$ or $f'(x)$ denotes the rate of change of y w.r.t. x and its value at $x = a$ is denoted as $\left[\frac{dy}{dx}\right]_{x=a}$.

Marginal Cost and Marginal Revenue

- Let C be the total cost of producing and marketing x units of a product, then marginal cost (MC), is $MC = \frac{dC}{dx}$.
- The rate of change of total revenue with respect to the quantity sold is the marginal revenue, $MR = \frac{dR}{dx}$.

Errors and Approximations

Let $y = f(x)$, Δx be the small change in x and Δy be the corresponding change in y . Then, $\Delta y = \frac{dy}{dx}(\Delta x)$.
These small values Δx and Δy are called differentials.

- (i) Absolute Error : Δx (ii) Relative Error : $\frac{\Delta x}{x}$
(iii) Percentage Error : $\left(\frac{\Delta x}{x} \times 100\right)$

Increasing and Decreasing Functions

Increasing Function

Increasing Function	without derivative test	If $x_1 < x_2 \Rightarrow f(x_1) \leq f(x_2) \forall x_1, x_2 \in (a, b)$
	with derivative test	If $f'(x) \geq 0$ for each $x \in (a, b)$
Strictly Increasing Function	without derivative test	If $x_1 < x_2 \Rightarrow f(x_1) < f(x_2) \forall x_1, x_2 \in (a, b)$
	with derivative test	If $f'(x) > 0$ for each $x \in (a, b)$

Decreasing Function

Decreasing Function	without derivative test	If $x_1 < x_2 \Rightarrow f(x_1) \geq f(x_2) \forall x_1, x_2 \in (a, b)$
	with derivative test	If $f'(x) \leq 0$ for each $x \in (a, b)$
Strictly Decreasing Function	without derivative test	If $x_1 < x_2 \Rightarrow f(x_1) > f(x_2) \forall x_1, x_2 \in (a, b)$
	with derivative test	If $f'(x) < 0$ for each $x \in (a, b)$

Maxima And Minima

They exist at critical points only.

Critical Points

- $f(x)$ doesn't exist
- $f'(x)$ doesn't exist
- $f'(x) = 0$

Global Max., Global Min.

Global Max. : Max. value of $f(x)$ in domain.
Global Min. : Least value of $f(x)$ in domain.

Local Maxima And Local Minima

Local Maxima : At $x = a$
 $f(a - h) < f(a) > f(a + h) (h \rightarrow 0)$
Local Minima : At $x = a$
 $f(a - h) > f(a) < f(a + h) (h \rightarrow 0)$

First derivative test

- $x = a$ is local max. if $f'(a) = 0$ and $f'(x)$ changes from +ve to -ve.
- $x = a$ is local min. if $f'(a) = 0$ and $f'(x)$ changes from -ve to +ve.

Second derivative test

- Find the roots of $f''(x) = 0$
- Suppose $x = a$ is one of the roots.
- At those points, if $f''(x) < 0 \Rightarrow f(x)$ is maximum at $x = a$, or if $f''(x) > 0 \Rightarrow f(x)$ is minimum at $x = a$.

Higher order derivative test

- If $f''(a) = 0$ check $f'''(x)$ at $x = a$
If $f'''(a) = 0$, neither max. nor min.
- $f'''(a) = 0$ repeat process considering $f'(x)$ as $g(x)$.



BRAIN MAP

CLASS XI

SCIENCE CHAPTER OF THE MONTH:

NEWTON'S LAWS OF MOTION

Problem Solving Strategies

- Identify the unknown forces and accelerations.
- Draw FBD of bodies in the system.
- Resolve forces into their components.
- Apply $\Sigma \vec{F} = M\vec{a}$ in the direction of motion.
- Apply $\Sigma \vec{F} = 0$ in the direction of equilibrium.
- Write constraint relation if exists.
- Solve equations $\Sigma \vec{F} = M\vec{a}$ and $\Sigma \vec{F} = 0$.

Newton's 2nd Law

The rate of change of linear momentum of a body is directly proportional to the external force applied on the body in the direction of force.

$$F = \frac{dp}{dt} = ma$$

Angle of Friction (θ) and Angle of Repose (α)

$$S = \sqrt{R^2 + f_1^2}$$

$$\tan \theta = \frac{f_1}{R} = \mu_s = \tan \alpha$$

\therefore Numerically, $mg \sin \alpha$ and $mg \cos \alpha$

$\theta = \alpha$

When there is no friction

- $a_A = F/m$; $a_B = 0$
 - A will fall from B after time
- $$t = \sqrt{\frac{2L}{a}} = \sqrt{\frac{2mL}{F}}$$

Friction present between A and B ($F < f_f$)

- Combined system will move together with $a = F/(M+m)$

Friction present between A and B ($F > f_f$)

- Relative acceleration
 - $a = a_A - a_B = \frac{MF - \mu_k mg(m+M)}{mM}$
 - A will fall from B after time
- $$t = \sqrt{\frac{2L}{a}} = \sqrt{\frac{2mML}{MF - \mu_k mg(m+M)}}$$

Inertia of rest
Inertia of motion
Inertia of direction

Newton's 1st Law

A body continues its state of rest or motion until unless an external force is acted on it.

Pseudo Force

$$\vec{F}_{ext} + \vec{F}_{pseudo} = M\vec{a}$$

$$\vec{F}_{pseudo} = -M\vec{a}_{frame}$$

For non-inertial frame of reference

Rocket Propulsion

Instantaneous velocity $v = u \log_e \left(\frac{m_0}{m_t} \right) - gt$

Acceleration $a = \frac{u}{m} \frac{dm}{dt} - g$

Burn out speed $v_{max} = u \log_e \left(\frac{m_0}{m_t} \right)$

Thrust $F = -u \frac{dm}{dt}$

Walking



Newton's 3rd Law

To every action there is always an equal and opposite reaction.

$$\vec{F}_{AB} = -\vec{F}_{BA}$$

Horse Cart Type System

For horse cart type system

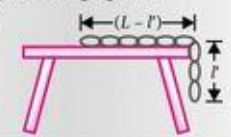
$$a = \frac{F_x - f}{M_H + M_{cart}}$$

F_x = horizontal component of reaction force
 f = frictional force

Maximum Length of Hanging Chain

Length of a chain hanging in air

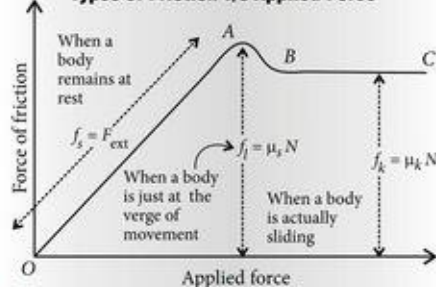
$$l' = \frac{\mu L}{1 + \mu}$$



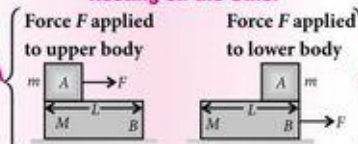
The motion resisted by a bonding between the body and the surface in contact represented by single force called

FRICITION

Types of Friction v/s Applied Force



Motion of Two Bodies One Resting on the Other



When there is no friction

- $a_B = F/M$ and $a_A = 0$
 - A will fall from B (backward) after time t
- $$\therefore t = \sqrt{\frac{2L}{a}} = \sqrt{\frac{2ML}{F}}$$

Friction present between A and B ($F < f_f$)

- Both the bodies will move together
- $a = \frac{F}{M+m}$ and $f_1 = \mu_s mg$
- Pseudo force on the body A, $F' = ma = \frac{mF}{m+M}$

Friction present between A and B ($F > f_f$)

- Relative acceleration
 - $a = a_A - a_B = -\left[\frac{F - \mu_k g(m+M)}{M} \right]$
 - A will fall from B (backward) after time
- $$t = \sqrt{\frac{2L}{a}} = \sqrt{\frac{2ML}{F - \mu_k g(m+M)}}$$



TWIST YOUR MIND

(Answers will be given in the May 2024 digest)

RIDDLES

1. I speak without a mouth and hear without ears. I have no body, but I come alive with the wind. What am I?
2. I am full of holes, but I can still hold a lot of water. What am I?
3. I am an odd number. Take away one letter and I become even. What number am I?

PUZZLE

Find the missing number .

4			
6	2		
9	?	1	
19	10	7	6

Bright Spots: Positive Events from March 2024

- Vantara, the world's largest potential wildlife rescue center, launched by Anant Ambani in Jamnagar, Gujarat .
- United Kingdom Expected To Introduce Bill To Ban Smoking Among Young People.
- TATA IPL 2024 kicks off with blockbuster clash !
- World Water Day highlights sustainable water management.
- International Women's Day champions gender equality

**word
of the
month**

Tranquil : Free from disturbances ; calm.

MARCH ANSWERS

RIDDLES: 1. DARKNESS 2.PIANO 3.19 TIMES

PUZZLE : 26 ($14+4+3= 21$, $21+3+2= 26$, $26+2+1= 29$)

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

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GRADE - 12	Mathematics , Physics & Chemistry

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