

# The mentors Digest





### **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. founder and renowned Our 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 а Master of Arts degree in Malayalam, he went on to teach Malayalam Language and Literature at Sree Naravana College Kollam.He later in the first became Malavalam Aligarh lecturer in 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	Торіс	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,

engratulations

On Passing Your Exams. Extremely proud of your achievement. Hope to see you succeed more in the future.



### Celebrating Excellence - Our 10th Grade achievers

It is with immense pride and joy that we extend our heartfelt congratulations to the outstanding toppers of each subject in our 10th grade cohort. Your hard work, dedication, and unwavering commitment to academic excellence have truly paid off, and you have set a shining example for your peers. As you celebrate this remarkable achievement, we encourage you to look beyond the marks and accolades. Let this success be the foundation on which you build your dreams. Chase your passion, be curious, and never stop learning. True success lies not only in scoring high pursuing genuinely but in what excites and inspires vou.

We would also like to place on record our deepest appreciation for the exceptional faculty members of \*The Mentors\* online platform. Your tireless efforts, innovative teaching methods, and constant encouragement have played a pivotal role in shaping these young achievers. Your dedication to nurturing academic brilliance, even in virtual settings, is truly commendable. To our dear students - may this success be just the beginning. Keep striving, keep dreaming, and keep moving forward.

The future is yours to shape.

Congratulations once again to our toppers - you make us proud!







**Only One Earth - Our Shared Responsibility** 

As we mark World Environment Day on  $5^{th}$  June, we are reminded of a profound truth: we have only one Earth, and its protection is not a choice—it's a necessity.

World Environment Day in 2025 will focus on ending plastic pollution. The Republic of Korea will host the global celebrations.

For decades, plastic pollution has seeped into every corner of the world, leaching into the water we drink, into the food we eat, and our bodies. While plastic pollution is a major concern, it is also one of the most fixable of today's environmental challenges, with some obvious solutions at hand.

From climate change to plastic pollution, from vanishing forests to depleting water sources, our planet is sending distress signals. But amid these challenges lies hope—hope born from action, innovation, and collective will. Whether through conserving energy, reducing waste, planting trees, or choosing sustainable habits, every action counts. Let us not underestimate the power of individual efforts when multiplied across communities and countries. This Environment Day, let's not just celebrate nature—let's commit to nurturing it. Let today be a turning point, where awareness leads to responsibility, and responsibility leads to lasting change. Because the future depends on what we choose today.

Let's choose wisely. Let's choose Earth.

**#BEATPLASTICPOLLUTION** 



### HOW AI CAN SAVE ENERGY—BY RUNNING BACKWARD

Can reversible computing be the green future of AI?

### What Is Reversible Computing?

Imagine a computer that runs calculations forward and backward—like rewinding a movie. That's the idea behind reversible computing, which saves energy by never deleting data. This approach avoids the heat loss that occurs when traditional computers discard information, making it a promising solution for energy-hungry technologies like artificial intelligence (AI).

The Physics Behind It: In the 1960s, IBM physicist Rolf Landauer showed that deleting data causes energy loss—an unavoidable heat cost. But his colleague Charles Bennett proposed a workaround: uncomputation—doing calculations, keeping the result, then reversing the steps to erase the rest without heat loss.

Why It Was Ignored (Until Now): Though intriguing, reversible computing was too slow and memory-hungry to be practical. In the 1990s, researchers like Michael Frank tried building efficient reversible chips. But back then, traditional chips kept improving rapidly, so interest faded.



Why It's Back in the Spotlight: Today, conventional chips are hitting physical limits, and AI needs enormous computing power. Reversible chips run cooler and can be packed closer together, saving both energy and space. New research, including work by Hannah Earley, shows how to balance speed and heat precisely.Frank and Earley are now co-founding Vaire Computing to bring reversible chips to the real world.

• Why It Matters for Students: This isn't just theory anymore—it's a shift in how we might power future AI. Engineers and computer scientists of your generation could help create sustainable computing systems that don't burn through energy.

Reversible computing could be the key to greener AI.



### PERSONALIZED GENE EDITING SAVED A BABY

But can this life-saving tech reach more people?

✤ What Happened? : Baby KJ Muldoon was born with a rare genetic liver disorder that caused toxic ammonia buildup. Traditional treatments like low-protein diets and medications weren't enough, and he was too small for a liver transplant. So, doctors at Children's Hospital of Philadelphia (CHOP) created a personalized gene therapy just for him—using a precise gene-editing tool based on CRISPR.

Now the Therapy Worked: Scientists used a CRISPR base editor—a molecular "pencil" that corrects single DNA letters without cutting the DNA.It changed a faulty A (adenine) in KJ's CPS1 gene to the correct G (guanine).The base editor was delivered into his liver cells using mRNA inside lipid nanoparticles—similar to the COVID mRNA vaccines.In just six months, the team designed, tested, and delivered the therapy. KJ received three doses and is now stable enough to eat more protein and use less medication.

\* Why It's Revolutionary: Most gene therapies are "one-size-fits-some" pre-approved for known mutations. But KJ's case was "made-to-order" for his unique DNA. That makes it the first reactive gene therapy, tailored after diagnosis. Scientists call it a "new medical subspecialty."

Che Roadblocks Ahead: Despite this breakthrough, widespread use of personalized gene editing faces hurdles:

**b** High cost: One-off therapies are expensive, and insurance may not cover them.

 $\widehat{\mathbf{m}}$  Regulatory limits: The FDA typically approves gene therapies for specific mutations, not general approaches.

Lack of expertise: Many doctors don't yet know how to design or deliver personalized treatments.

 $\leq$  Organ limits: We can reach the liver, skin, or eyes easily— but not all organs (like kidneys).

Timing: Some diseases may require treatment before birth which we're not ready for yet.

● Why It Matters for Students: KJ's case signals the future of medicine precision tools that could treat rare, deadly diseases one patient at a time. But scaling this technology will take engineers, geneticists, and doctors with new training, tools, and policies. ? You could help build the future of personalized medicine.



### THE MOLECULAR BOND THAT HELPS SECURE YOUR MEMORIES

How do lifelong memories survive when the brain's molecules don't?

### The Memory Mystery

Your body constantly recycles its molecules —most degrade in days or weeks. So how do memories last for decades? Neuroscientists Todd Sacktor and André Fenton uncovered a possible answer: a persistent bond between two proteins that keeps memory alive at the cellular level.



#### Meet the Memory Molecules

Sacktor discovered a protein called PKM $\zeta$ , which helps strengthen the connections (synapses) between neurons—a key part of memory storage. But PKM $\zeta$  doesn't last forever. The breakthrough came when researchers found that PKM $\zeta$  binds to another protein, KIBRA. Together, they form a stable complex that preserves memories by maintaining synaptic strength.

### 渗 How They Proved It

Using brain tissue and live mice, the team showed that when PKM $\zeta$  and KIBRA link up, memories form and persist. Disrupting the bond—even weeks later—erased the memory. This suggests it's not the individual molecules that last, but the bond between them that acts like a memory anchor.

#### 🗱 Why It Solves an Old Puzzle

In 1984, Nobel-winning scientist Francis Crick asked how memories can outlast the short life of molecules. This new study offers an elegant answer: as one protein degrades, the bond allows a replacement to slot in-preserving the memory trace at specific synapses.

Why It Matters for Students This research connects biology, chemistry, and physics to one of life's biggest questions: How do remember? lf you're we interested in neuroscience, molecular biology, or memory disorders like Alzheimer's, this discovery shows how tiny molecular links could hold vast personal histories.



Molecular memory may be fragile—but it's also beautifully resilient.



Congratulations

### On Passing Your Exams.

Extremely proud of your achievement. Hope to see you succeed more in the future.



### Celebrating Excellence - Our 10th Grade Toppers

## **SCIENCE**





Harini Pankaj Prasoon 99 MARKS



Vrisa P Vibin 97 MARKS



Narayan Shankar 97 MARKS



Aditya Sineesh 96 MARKS



Ashikha Afsal 96 MARKS



Yacoub Punnen Kaitharam **95 MARKS** 



Vignesh Gopalakrishnan 94 MARKS



Mishruti Bhaskar Pandya **94 MARKS** 



Afreen Huda 94 MARKS



Tvisha Panigrahi 93 MARKS



Olivea Ann Mathew 93 MARKS



Elton Anthony Dsouza 92 MARKS



Anshuman Azad 92 MARKS



Aishwaryambika Vempati 91 MARKS



S.Yuvasri Raksha 90 MARKS

# SOCIAL TOPPERS



Abhinav Sabu 95 MARKS



Jessica Elizabeth Philips 94 MARKS



Anish Kattishettar 93 MARKS



Alan Sebastian Jose 90 MARKS



Afreen Huda 90 MARKS





Rambabu Hari Baskar 99 MARKS



Tvisha Panigrahi 96 MARKS



Aarush Sunil Kumar 99 MARKS



Aditya Sineesh 96 MARKS



Yacoub Punnen Kaitharam 97 MARKS



Vrisa P Vibin 96 MARKS



Olivea Ann Mathew 97 MARKS



Amogh Rajesh Kaushik 95 MARKS





Shreya Nair 95 MARKS



Madhav Ravisanker Panicker 94 MARKS



Abhiraj Pillai 93 MARKS



Abel Mathew Vincent 92 MARKS



Akshay Mahesh Mukhi 91 MARKS



Lakshan Dhanasekar 91 MARKS



Mishel Mariam Manish 91 MARKS



### MATHEMATICS TOPIC OF THE MONTH:

CONCEPT

ЛАР

### DIFFERENTIABILITY

### Class XII



#### 'EITHER YOU RUN THE DAY OR THE DAY RUNS YOU.' - JIM ROHN

### SCIENCE TOPIC OF THE MONTH:

### ESSENTIAL CONCEPTS OF PHYSICAL CHEMISTRY

Get well-prepared for exams with quick revision of important formulae of physical chemistry.

#### Some Basic Concepts of Chemistry • Percentage yield = Theoretical yield Actual yield × 100 Mass of one atom of the element Atomic mass = $\frac{1}{12}$ × Mass of an atom of C-12 = Eq. mass × Valency Molecular mass 6.4 Atomic mass = Specific heat (cal/g) Atomicity Molecular mass = 2 × Vapour density • Number of gram atoms = Gram atomic mass (GAM) w (g) Number of gram molecules = Gram molecular mass (GMM) w (g) Number of gram equivalents = Gram equivalent mass (GEM) Atomic mass Equivalent mass of an element = Valency Molecular mass of acid · Equivalent mass of an acid =-Basicity • Equivalent mass of a base = Molecular mass of base Percentage composition = Molar mass of compound Mass of the element $\times 100$ Mass % = Mass of solute Mass of solution × 100 • Molarity (M) = $\frac{W_B \times 1000}{M_B \times V \text{ (in mL)}}$ • Normality (N) = $\frac{W_B \times 1000}{EM_B \times V \text{ (in mL)}}$ • Molality $(m) = \frac{W_B \times 1000}{M_B \times W_A \text{ (in g)}}$ where, $W_B =$ Mass of solute, $M_B =$ Molecular mass of solute $W_A = Mass of solvent$ • Mole fraction, $x_B = \frac{n_B}{n_A + n_B}$ and $x_A = \frac{n_A}{n_A + n_B}$ • $M_1V_1/n_1 = M_2V_2/n_2$ or $N_1V_1 = N_2V_2$ • $M_3(V_1 + V_2) = M_1V_1 + M_2V_2$ • $\frac{1}{x_B} = 1 - \frac{M_B}{M_A} + \frac{1000d}{M_A \times M} = 1 + \frac{1000}{m \times M_A}$ Number of moles = Molarity × Volume Number of equivalents = Normality × Volume

CONCEPT

**CLASS XI** 

- Molecular formula = n × Empirical formula
- n = Molecular formula mass
- Empirical formula mass

#### **Structure of Atom**

• Radius of nucleus 
$$(R) = R_0 A^{1/3}$$
  
 $R_0 = \text{Constant} (= 1.33 \times 10^{-13} \text{ cm})$   
 $A = \text{Mass number of atom}$   
•  $\overline{v} = \frac{1}{\lambda} = \frac{v}{c}; E = \frac{hc}{\lambda} = hv = hv_0 + \frac{1}{2}mv^2$   
•  $\overline{v} = 109,677 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right) \text{ cm}^{-1}; v = 3.29 \times 10^{15} \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right) s^{-1}$   
•  $mvr = \frac{nh}{2\pi}; r_n = \frac{n^2 a_0}{Z} \text{ or } \frac{52.9n^2}{Z} \text{ pm}$   
•  $E_n = -R_H \left(\frac{Z^2}{n^2}\right) = -2.18 \times 10^{-18} \left(\frac{Z^2}{n^2}\right) \text{ J/atom}$   
or  $\frac{-Z^2}{n^2} \times 1312 \text{ kJ/mol}$  or  $\frac{-Z^2}{n^2} \times 13.6 \text{ eV/atom}$   
•  $v_n = \frac{2.19 \times 10^6 \times Z}{n} \text{ m s}^{-1}$   
•  $\Delta E = R_H \left(\frac{1}{n_i^2} - \frac{1}{n_f^2}\right) = 2.18 \times 10^{-18} \left(\frac{1}{n_i^2} - \frac{1}{n_f^2}\right)$   
•  $\lambda = \frac{h}{mv} = \frac{h}{p} = \frac{h}{\sqrt{2mE_k}} = \frac{h}{\sqrt{2mqV}}$   
•  $\Delta x \cdot \Delta p \ge \frac{h}{4\pi}$  or  $\Delta x \cdot \Delta v \ge \frac{h}{4\pi m}$   
• Schrödinger wave equation :  
 $\nabla^2 \psi + \frac{8\pi^2 m}{h^2} (E - V)\psi = 0; \nabla = \text{ Laplacian operator}$   
• Maximum no. of spectral lines produced when an electron returns from  $n_2 \rightarrow n_1 = \frac{(n_2 - n_1)(n_2 - n_1 + 1)}{2}$   
• No. of lines in the spectrum when an electron returns from  $n_2 \rightarrow n_1 = \frac{(n_2 - n_1)(n_2 - n_1 + 1)}{2}$   
•  $I.E. = E_\infty - E_n = 2.18 \times 10^{-18} \times \frac{Z^2}{n^2} \text{ J/atom}$   
or  $13.6 \times \frac{Z^2}{n^2} \text{ eV/atom}$   
• Orbital angular momentum  $= \sqrt{l(l+1)} \frac{h}{2\pi}$ 

- Spin multiplicity = 2S + 1;
- S = Sum of spin quantum numbers.
- Radial nodes = n l 1; Angular nodes = l
- Total no. of nodes = n 1

'THE MOST EFFECTIVE WAY TO DO IT, IS TO DO IT.' - AMELIA EARHART



### **TWIST YOUR MIND** (Answers will be given in the July 2025 digest)

### <u>RIDDLLES</u>

### 1. I'm always in front of you,But you can never see me.You can chase me, waste me, or kill me, But you'll never outrun me.What am I?

2. The more you take away from me, the bigger I get. What am I?



### **BRIGHT SPOTS: POSITIVE EVENTS FROM MAY 2025**

- 1. UAE declares 2025 as the "Year of Community"
- 2. Goa achieves 100% literacy

Nord

- 3. UK launches world's first gonorrhea vaccine
- India becomes world's fastest-growing economy India sees record ₹19,860 crore foreign portfolio inflow in May 2025.
- 5. Major archaeological finds in Peru and Syria reveal ancient secrets

**Ascetic** : Characterized by severe self-discipline and abstention from all forms of indulgence.

MAY ANSWERS

RIDDLES : 1. Shirt 2. A telephone 3. Nose PUZZLE : 7

**'THE SECRET OF GETTING AHEAD IS GETTING STARTED.' – MARK TWAIN** 

### <u>PUZZLE</u>



The Mentors website launched , please log onto

### www.thementors.co.in





### 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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