

# DEPARTMENT OF MATHEMATICS

## “प्राग्-गणतः”

### यथा शिक्षा मयुषाणां तागाणां मनयोः यथा ।

### वैदिक वेदाङ्गं शास्त्राणां गणितम् सुवर्तति हि ।

## WALL MAGAZINE



### MATHS IN ECONOMICS & FINANCE

**1. Economics:** Refers to a fundamental concept which means the real world application for us to know the mathematical steps taken an understanding in economic system.

**2. Mathematical:** Refers to use of model and analysis in an economic system. It helps the individual, firm, organization and society to make a prediction and optimization strategy.

**3. Econometrics:** Differential equation and matrix are applied to model the dynamics of economic system, including income growth, inflation, and unemployment. Transition matrix is also used using mathematical step.

**4. Game Theory:** Algebra and probability theory are used to analyze strategic interaction between individuals in playing that equilibrium and other relation through strategic theory of equality.

**5. Financial Mathematics:** Refers to use of model from real world, with an option and future. It helps the present value, compound interest, and continuously compounding are important in financial calculation.

- *Shilpa Pal (3<sup>rd</sup> Sem)*

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**1. The money market:** The market for the supply and demand for short-term debt instruments is known as the money market. It is a market for the supply and demand for short-term debt instruments.

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- *Shilpa Pal (3<sup>rd</sup> Sem)*



### MATHS IN ASTRONOMY & PHYSICS

**1. Physics and Astronomy:** Mathematics plays a vital role in understanding the universe. It helps in describing the motion of objects, the structure of atoms, and the behavior of light and sound.

**2. Calculus:** Calculus is used to describe the motion of objects under various forces. It helps in understanding the acceleration and velocity of objects in motion.

**3. Algebra:** Algebra is used to solve problems related to the motion of objects. It helps in understanding the relationship between distance, time, and speed.

**4. Geometry:** Geometry is used to describe the shape and size of objects. It helps in understanding the properties of circles, triangles, and polygons.

**5. Trigonometry:** Trigonometry is used to solve problems related to the motion of objects. It helps in understanding the relationship between the sides and angles of a triangle.

- *Shilpa Pal (3<sup>rd</sup> Sem)*

## MULTIVERSE OF MATHEMATICS

**1. Mathematics:** It is a branch of science that deals with the study of numbers, shapes, and patterns. It is a branch of science that deals with the study of numbers, shapes, and patterns.

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### YOU KNOW WHAT'S COOLER THAN MAGIC? MATHS



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- *Shilpa Pal (3<sup>rd</sup> Sem)*



### MATHS IN COMPUTER SC. & AI

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- *Shilpa Pal (3<sup>rd</sup> Sem)*

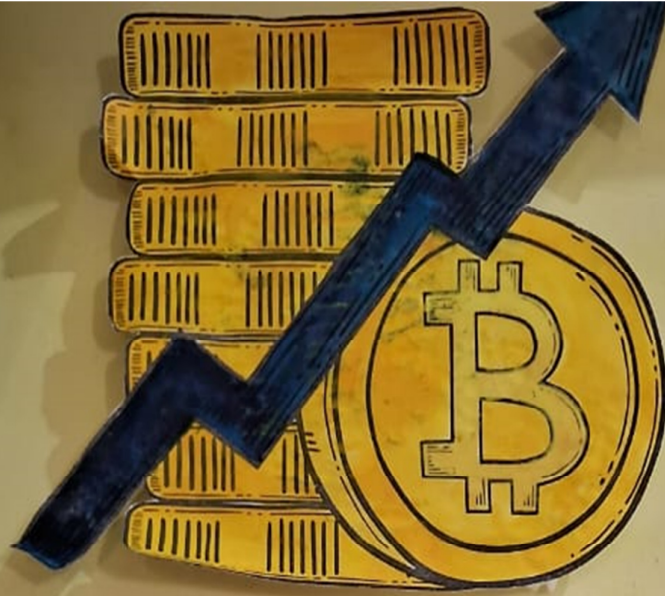
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Extremely Happy to  
transport the  
wall magazine.  
- *Shilpa Pal (3<sup>rd</sup> Sem)*





$\nu$	nu	NEW
$\xi, \Xi$	xi	KSIGH
$\omicron$	omicron	OM-uh-CRON
$\pi, \Pi$	pi	PIE
$\rho$	rho	ROW
$\sigma, \Sigma$	sigma	SIG-muh
$\tau$	tau	TOW (as in cow)
$\upsilon, \Upsilon$	upsilon	UP-suh-LON
$\phi, \Phi$	phi	FEE, or FI (as in hi)
$\chi$	chi	KI (as in hi)
$\psi, \Psi$	psi	SIGH, or PSIGH
$\omega, \Omega$	omega	oh-MAY-uh

## MATHS IN ECONOMICS & FINANCE

In Economics & Finance, Mathematics is a foundational bridge between theory and real-world application. Join up as we explore how mathematical insights enhance our understanding of economic systems.

i) Microeconomics:- Calculus is used to model and analyze consumer and producer behaviour. Concepts like marginal utility, profit maximization, and elasticity involve differentiation and optimization techniques.

ii) Macroeconomics:- Differential equations and calculus are employed to model the dynamics of economic systems, including economic growth, inflation, and unemployment. Equilibrium analysis is often done using mathematical tools.

iii) Game Theory:- Algebra and probability theory are used to analyze strategic interactions between individuals or firms. Nash equilibrium and other solution concepts involve solving systems of equations.

iv) Financial Mathematics:- Calculus is used to model financial derivatives, such as options and futures. Concepts like present value, compound interest, and continuous compounding are important in financial calculations.

- Little Pal (3<sup>rd</sup> Sem).





**Magic No.**  
with your shoe size & age

1. Write down your shoe size  
eg. 7
2. Times 5       $7 \times 5 = 35$
3. Add 50       $35 + 50 = 85$
4. Times 20     $85 \times 20 = 1700$
5. Add 1018     $1700 + 1018 = 2718$
6. Take away your birth year  
eg. 2003

2718

$\Rightarrow$	$\alpha$	$\beta$	$\gamma$	$\delta$	$\Delta$	$\theta$
IMPLIES	ALPHA	BETA	GAMMA	DELTA	THETA	
$\varphi$	$\psi$	$\eta$	$\epsilon$	$\lambda$	$\mu$	$\Sigma$
PHI	PSI	ETA	ZI	LAMBDA	MU	SIGMA
$\in$	$\notin$	$\int$	$\exists$	$\perp$		
BELONGS TO	NOT BELONGS TO	INTEGRAL	THERE EXISTS	PERPENDICULAR		
$\therefore$	$\because$	$\overline{AB}$	$\overline{AB}$	$\overline{AB}$	$\angle$	
BEFORE	BECAUSE	LINE SEGMENT AB	LINE AB	RAY AB	ANGLE	
		$\cap$	$\emptyset$	$\subset$	!	
		INTERSECTION	EMPTY SET	SUBSET	EXCLAMATION	

## MATHS IN ASTRONOMY & PHYSICS

In physics and astronomy mathematics serves as a guiding light, illuminating paths from theory to celestial discovery. Our journey reveals how mathematical intricacies enrich our understanding of the universe.

i) Classical Mechanics:- Differential equations are used to describe the motion of objects under various forces. Concepts like integration, differentiation, and vector calculus are applied to study the trajectory of projectiles, motion of planets, and more.

ii) Quantum Mechanics:- Linear algebra and complex numbers are crucial for understanding wave functions and quantum states. Operators and eigenvalues are used to analyze quantum systems and predict their behaviour.

iii) Celestial Mechanics:- Calculus is applied to analyze the motion of celestial bodies, including planets, comets and satellites. Kepler's laws and Newton's law of gravitation are fundamental concepts.

iv) Cosmology:- Geometry and calculus are used to model the expansion of the universe, calculate distances to galaxies, and analyze cosmic microwave background radiation.

- Bikiran Chakma (5<sup>th</sup> Sem)



Alexander Grothendieck (28<sup>th</sup> March 1928 - 13<sup>th</sup> November, 2014)

Contributions and Impact :- Alexander Grothendieck made profound and transformative contributions to a wide array of mathematical domains. His work extended to Algebraic Geometry, Category Theory, Homological Algebra, Number Theory and Functional Analysis. His revolutionary approach to Algebraic Geometry influenced the study of Theoretical Physics, particularly String Theory, where certain mathematical concepts he introduced found applications. Grothendieck's work had an indirect impact on the broader scientific community, emphasizing deep structural insight and novel methodologies that transcended disciplinary boundaries.

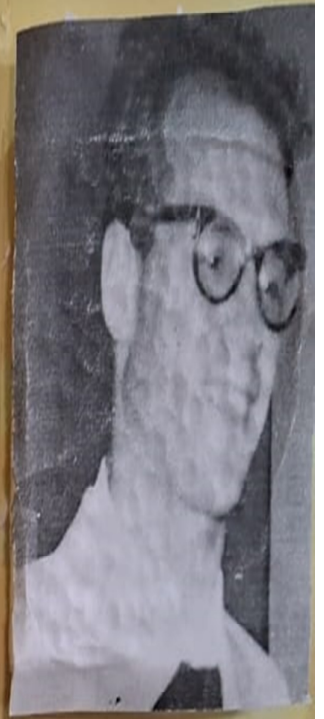
Awards and Achievements :- (i) Fields Medal,

(ii) Crafoard Prize,

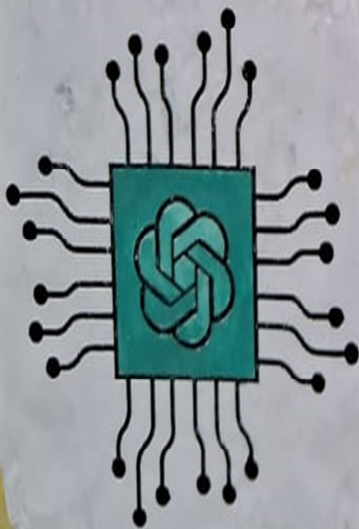
(iii) King Faizal International Prize,

(iv) Cole Prize.

- Mohit Podder (5<sup>th</sup> Sem)







ChatGPT

John von Neumann (28<sup>th</sup> December, 1903 - 8<sup>th</sup> February, 1957)

Contributions & Impact:- John von Neumann's legacy encompasses diverse scientific realms. In mathematics, his contributions reshaped Set Theory, Functional Analysis, and Game Theory. He made significant strides in Physics, spanning Quantum Mechanics, Statistical Mechanics and Nuclear Physics. His influence even extended to Economics and Statistics through pivotal work in Decision Theory and Stochastic Processes. Moreover, the Mathematician's visionary work in Computer Science laid the foundation for modern computing. His interdisciplinary impact underscores an exceptional intellectual legacy.

Awards and Achievements:- Enrico Fermi Award,

(ii) Presidential Medal of Merit.

(iii) Bôcher Memorial Prize.

(iv) American Meteorological Society Award.

- Mohit Podder (5<sup>th</sup> Sem)



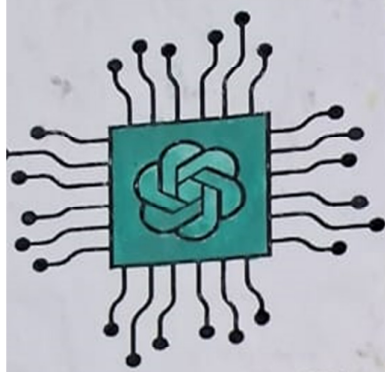
# WALL MAGAZINE

## FACTS

- The oceans produce the majority of the oxygen on Earth. Salt was once used as currency, where the English term "salary" comes from.
- Wearing headphones for an hour multiplies the bacteria in your ear by 700%.
- The tallest mountain in the solar system is Olympus Mons on Mars.
- In a room of 23 people there's a 50% chance that two people have the same birthday. It is called "THE BIRTHDAY PARADOX".
- The numbers on opposite sides of a die always add up to seven.
- Did you know that  $x\%$  of  $y = y\%$  of  $x$ ?
- According to the four-colour theorem, any map can be coloured using only four colours so that regions sharing a boundary do not share the same colour.
- India's Chandrayaan-1 was the first mission to detect water on the Moon.

- Parthajit Sarania (5<sup>th</sup> Sem)





ChatGPT

- (ii) Preparation
  - (iii) Bôcher Memorial Prize.
  - (iv) American Meteorological Society Award.
- Mohit Podder (5<sup>th</sup> Sem)

## MATHS IN COMPUTER SC. & AI

At the nexus of computer science and AI lies mathematics, the common language shaping algorithms, neural networks and innovations alike. Here we uncover how these mathematical foundations seamlessly advance both disciplines.

### Algorithms and Data Structure:-

Mathematics particularly, discrete mathematics, is foundational for analyzing and designing efficient algorithms and data structures. Concepts like graph theory, combinatorics, and set theory are essential.

ii) Machine Learning:- Linear algebra, calculus, and statistics are foundational for understanding machine learning algorithms, such as regression, decision trees, neural networks and support vector machines.

iii) Natural Language Processing (NLP):- Probability theory, statistics and linguistics concepts are applied in NLP to understand and generate human language, powering applications like chat-bots and language translation.

iv) Simulation and Modeling:- Differential equations and numerical methods are used to simulate complex systems and model real-world phenomena in fields like physics, biology and economics.

- Gaurav Bhowal (5<sup>th</sup> Sem)



# MATHS IN MUSIC

From captivating harmonies to soul-stirring rhythms, music's world resonates with mathematics' harmonious interplay. As we explore its nuanced depths, we unveil how distinct mathematical disciplines thread through its diverse facets, enriching melodies and rhythms alike:

i) Harmony and Chord Progressions:- Music theory involves algebraic operations to analyze and create harmonic relationships between chords, enabling musicians to compose pleasing chord progressions.

ii) Rhythm and Timing:- Mathematics of arithmetic sequences and fractions are essential in understanding and creating rhythmic patterns, beats, and time signatures in music.

iii) Acoustics and Sound Waves:- Differential equations and trigonometry are used to study the properties of sound waves, resonance, and the way musical instruments produce sound.

iv) Musical Scales and Tuning:- Number theory and logarithmic calculations are applied to define musical scales, intervals, and tuning systems, empowering harmonic relationships.

- Mohit Poddar (5th Sem)



# OPEN PROBLEMS:-

Q1) A restaurant sells its sandwiches in triangular shape side lengths of whose are 3 inch, 4 inch, 5 inch. Is it possible to pack each sandwich in a triangular box of side length  $(3^2+1)$  cm,  $(4^2-1)$  cm,  $(5^2+1)$  cm. (1 inch = 2.54 cm).

Q2) There is a Whatsapp group of some people who follow people only from that particular group on Instagram. If each person follows at least ~~one~~ person from the group, then at least how many people should there be in the group in order to ensure that they've distinct numbers of followings?

Q3) A wholesaler dealing in Eggs initially decides to stock 100 trays of eggs in the beginning of a particular month. He then decides to sell the trays in sets of 7, 14, 25 or 35 only, for which he'd simultaneously restore the trays by sets of 4, 20, 28, 29 respectively. Will he completely run out of trays of eggs at the end of the month?

- Mohit Podder (5<sup>th</sup> Sem)

Chief Editors:-

(i) Mohit Podder (5<sup>th</sup> Sem)

(ii) Titi Pal (3<sup>rd</sup> Sem)

Members:-

Bikram Chakma,  
Gaurav Bhowal, Paromita Dutta,  
Parthajit Sarania, Sommoni Deka,  
Koushik Thakuria, Jalima Akhtar,  
Abhinav Barman.

Extremely Happy to  
inaugurate the  
club magazine.  
Nice One.

Mohit  
16/12/23