

# Finding Start-Up Trends along with their Valuation by means of mathematical formulas and graphs

Aaditya Arora

Student, Sacred Heart Convert School, Punjab, India

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**Abstract** - This research paper summarizes the "The trend for upcoming startups along with their of valuation means of mathematical formulas and graphs." The data has been taken from 2008 to 2022. For this we have used different mathematical formulas, analyzed it graphically and structured it in the form of a research paper.

**Key Words:** Start-ups, Unicorns, Valuation, Revenue, Mathematical Formula

## 1. Introduction

For the past few years, India is thriving with new entrepreneurs which lead to significant growth and development of start-up culture in India. Indian markets have emerged as one of the leading destinations for the entrepreneurial ecosystem. Indian economy is currently at 5<sup>th</sup> position in world economic index and by 2024, India hopes to become 4<sup>th</sup> largest economy. The purpose of my research is to find the number of start-ups for upcoming years. This paper will help in finding the annual revenue and valuation contributed using start-ups in India. Some major factors are contributing to this culture:

1. **Technological Advancements:** India is still a developing country but due to Rapid advancements in technology, particularly in the field of the internet, lead to exponential growth of start-ups in India. The easy availability of cheap smart devices is another factor encouraging factor for the start-up cult.
2. **Government Support:** The Indian government has implemented various initiatives and policies to support start-ups. The "Start-up India" campaign launched in 2016 provides benefits such as tax exemptions, easier regulatory compliance, and access to funding and mentorship programs.
3. **Thriving Start-up Hubs:** Western influence of Metropolitan Cities culture in India is leading to the widening of the establishment. Cities like Bengaluru, Mumbai, Delhi-NCR, and Hyderabad have emerged as prominent start-up hubs in India. These cities offer a supportive infrastructure, a network of investors, access to talent, and a vibrant entrepreneurial ecosystem that fosters innovation and collaboration.
4. **Capital Funding:** India has witnessed a substantial increase in venture capital funding, with both domestic and international investors showing interest in Indian startups. This influx of funding has provided entrepreneurs with the necessary financial resources to fuel their business growth. India is now home to around 400 multibillion-dollar companies and excess capital in India is being invested in start-ups for future profits.
5. **Young Talent:** India is known for the logical and technical mindset of their youth. With technological advancement and the western culture approach, there is a societal change to entrepreneurship. More Individuals in India want to start their own company instead of working for someone else.

### 1.1 Building a Start-Up

Starting a startup can be an exhilarating yet challenging journey. While there is no guaranteed formula for success, here are some techniques that can increase your chances of building a successful startup:

1. **Identify a Problem:** Start by identifying a genuine problem or need in the market that your product or service can solve. Conduct thorough market research, analyze customer pain points, and understand the competitive landscape to ensure your startup addresses a real demand.
2. **Build a Strong Team:** Surround yourself with a talented and diverse team that shares your vision and brings complementary skills to the table. Hiring individuals with expertise in different areas such as technology, marketing, finance, and operations can help you build a solid foundation for your startup.

3. **Embrace Agility and Iteration:** Be prepared to adapt and iterate based on market feedback and changing circumstances. Startup success often comes from the ability to pivot, refine your strategies, and adjust your business model as you gain insights and learn from the market.
4. **Customer-Centric Approach:** Place your customers at the center of your startup's strategy. Continuously engage with your target audience, listen to their feedback, and prioritize their needs. Building strong customer relationships and delivering value to your users is essential for long-term success.
5. **Secure Adequate Funding:** Identify and secure the necessary funding to support your startup's growth. This can be through personal savings, bootstrapping, angel investors, venture capital firms, or government grants. Develop a compelling business plan and pitch that demonstrates your startup's potential for investors.
6. **Build a Strong Network:** Networking is crucial in the startup world. Attend industry events, join startup communities, and connect with mentors, advisors, and fellow entrepreneurs. These connections can provide valuable guidance, partnerships, and potential investment opportunities.
7. **Focus on Marketing and Growth:** Develop a robust marketing strategy to create awareness and generate traction for your startup. Utilize various channels, including digital marketing, social media, content marketing, and partnerships, to reach your target audience. Continuously measure and analyze your growth metrics to optimize your marketing efforts.
8. **Embrace Innovation and Agility:** Stay ahead of the curve by fostering a culture of innovation within your startup. Encourage creativity, experimentation, and a willingness to take calculated risks. Be open to exploring new technologies, trends, and business models that can give you a competitive edge.
9. **Perseverance and Resilience:** Building a successful startup is a long and challenging journey. It requires perseverance, resilience, and the ability to navigate obstacles and setbacks. Stay focused, learn from failures, and stay committed to your vision even during tough times.

Remember, building a startup is a dynamic process, and it's essential to adapt and learn from both successes and failures. These techniques can provide a strong foundation, but ultimately, your startup's success will depend on your ability to execute, innovate, and deliver value to your customers.

## 1.2 Unicorn Start-Ups

Unicorn start-ups are privately owned start-ups with a valuation of \$1 billion and over. These rare and highly successful start-ups have become the epitome of entrepreneurial achievement and innovation. These companies innovate some new strategies to overcome current problems and there are no or fewer competitors in the market. They capture the attention of investors, media, and aspiring entrepreneurs alike. They have a unique business model, scalability, and a strong market presence. Unicorn start-ups are known for their ability to attract substantial funding from already existing megacorps. Investors invest heavily in these companies because of their potential to deliver heavy profits over time. Their success stories inspire and fuel the dreams of countless entrepreneurs around the world, showcasing the immense possibilities and rewards of building a transformative business from scratch.

## 1.3 Top Unicorn Start-Ups in India

1. **Paytm:** Paytm is a leading mobile payments and financial services company. It offers a digital wallet, payment gateway, and e-commerce platform. It has expanded to include services such as insurance, banking, and wealth management.
2. **OYO Rooms:** OYO Rooms is a hospitality company that operates a network of budget hotels and accommodations. It provides standardized and affordable rooms with a seamless booking experience through its online platform.
3. **Byju's:** Byju's is an online learning platform that offers interactive educational content for students across various subjects and grade levels. It has gained popularity for its engaging video lessons and adaptive learning features.
4. **Zomato:** Zomato is an online food delivery and restaurant discovery platform. It allows users to order food from restaurants in their area and provides information, reviews, and ratings for various eateries.

5. Flipkart: Flipkart is one of India's largest e-commerce companies. It started as an online bookstore and expanded into various categories, including electronics, fashion, and home essentials. In 2018, Walmart acquired a majority stake in Flipkart.
6. Swiggy: Swiggy is a popular online food delivery platform in India. It partners with restaurants and enables users to order food for home delivery. Swiggy has a strong presence in several major cities across the country.
7. Paytm Mall: Paytm Mall is an e-commerce platform and a subsidiary of Paytm. It offers a wide range of products, including electronics, fashion, home appliances, and more. Paytm Mall focuses on providing a seamless online shopping experience.
8. Policybazaar: Policybazaar is an online insurance comparison platform. It allows users to compare and purchase various insurance products, including health insurance, life insurance, car insurance, and more, from multiple insurance providers.

### 1.4 Valuation of company:

The valuation of a company is a crucial and complex process aimed at determining the monetary value of a company. In simple words, start-up valuation is what it is worth in the market depending upon various market factors. Valuation tells a lot about a company and whether it is profitable and worth investing in. Investors look for the valuation document for final analysis before investing or becoming a part of a start-up. There are various ways you can calculate the valuation based on factors as well as assumptions. Starting step is to identify the market the start-up is present in along with its current size, stage of development, and potential growth. Then there are ways to find the exact price using various valuation methods. There are a lot of valuation methods but these two are the most appropriate ways that today's start-ups are using:

#### Valuation based on EBITDA:

EBITDA stands for Earnings before Interest, taxes, Depreciation, and Amortization. This is a common method to calculate the financial capability of a start-up. It is used as a financial performance metric to evaluate a company's operating efficiency and is particularly common in industries with high levels of capital expenditures or significant depreciation and amortization expenses.

Formula for EBITDA= Operating Income +Interest Expenses +Taxes +Depreciation +Amortization

#### 1. Valuation Based on Revenue and Growth:

Valuing a company on this basis is a very commonly used approach in the business world. There are several methods under revenue and growth but there are mainly two popular methods:

##### a. Discounted Cash Flow(DCF) Method:

DCF is an approach in which the projected cash flows of the startups are taken into account and discounted to their present value. This method tells about the cash flows in the future along with the present value. The formula for this is:

$$\text{Valuation} = (CF1/(1+r)^1) + (CF2/(1+r)^2) + \dots + (CFn/(1+r)^n)$$

Where CF1, CF2,....., CFn are the projected cash flows for each period (usually years) in the future and r is the required rate of return or the risk associated with the startup's cash flows.

##### b. Multiple Revenue Method:

The revenue multiple methods are based on factors such as the company's industry, growth prospects, profitability, and overall market conditions.

It involves using revenue multiple to determine the startup's valuation.

$$\text{Valuation} = \text{Revenue} \times \text{Revenue Multiple}$$

Revenue multiple is based on industry benchmarks or comparable data.

## 2. Pre-Revenue Valuation:

A startup in its early stages is just an idea, so there are no hard such methods that can give you exact results. There are ways that are based on assumptions and market comparison.

## 2. WHY I CHOSE THIS TOPIC?

From the start I want to start my own business and pursue my studies in Business. India is one step closer to become developed country, our honorable Prime Minister Narendra Modi started Make in India campaign to establish the basis of start-ups. The ability of the new business industry to disrupt traditional business models and introduce cutting edge technologies fascinate me. Additionally, studying startups allows me to explore the entrepreneurial journey, from inception to growth, and understand the risks and rewards entrepreneurs face.

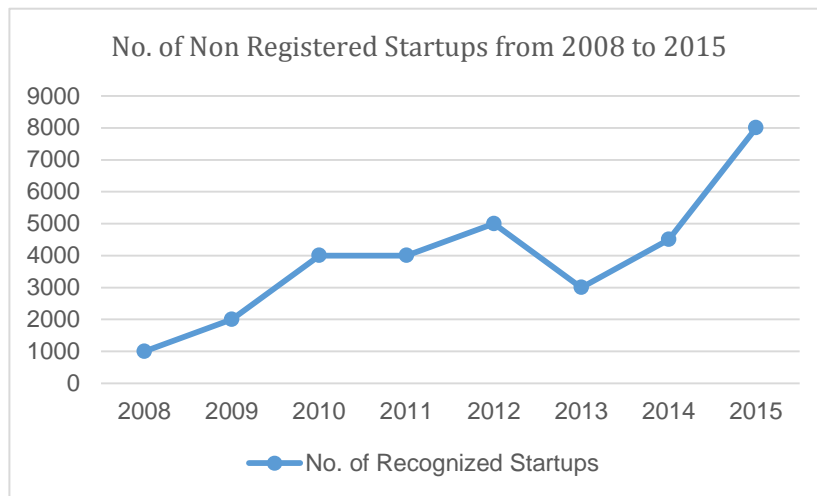
### 2.1 Raw data of no. of Star-ups from 2008 to 2022:

Sr. no.	Year	No. of Start-ups	No. of Unicorns
1	2008	1000	0
2	2009	2000	0
3	2010	4000	0
4	2011	4000	1
5	2012	5000	1
6	2013	3000	1
7	2014	4500	1
8	2015	8000	4

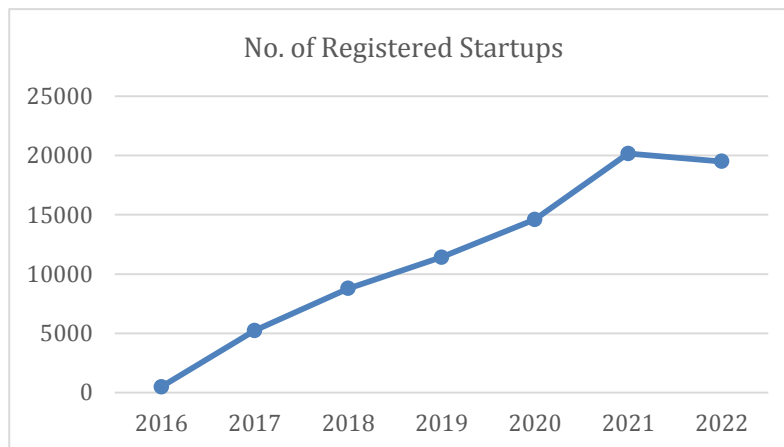
**Table 2.1: Non Registered Data for start-ups from 2008 to 2015 (Raw Data)**

Sr. no.	Year	No. of recognized Startups	No. of Unicorns
1	2016	471	2
2	2017	5233	1
3	2018	8775	8
4	2019	11417	9
5	2020	14596	10
6	2021	20160	44
7	2022	19500	22

**Table 2.2: Registered Data for start-ups from 2016 to 2022**



Graph 2.1: No. of estimated start-ups from 2008 to 2015



Graph 2.2: No. of Registered start-ups from 2016 to 2022

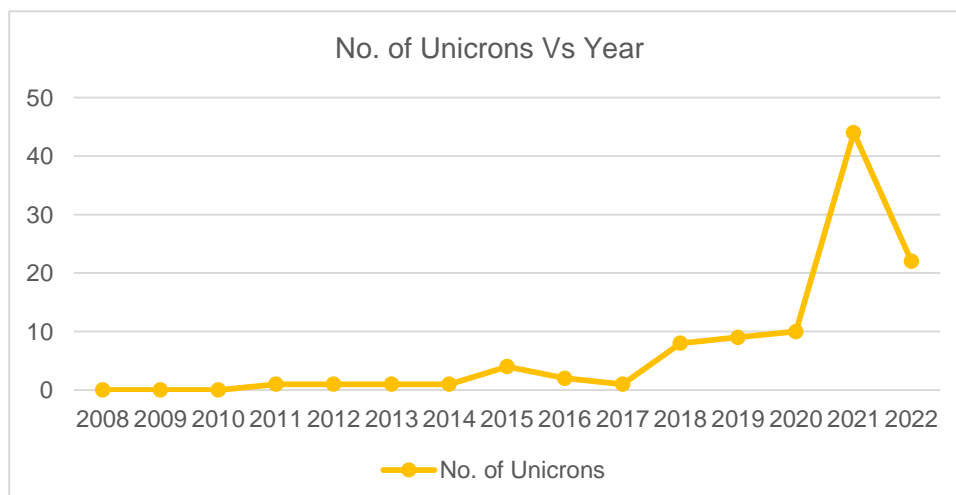
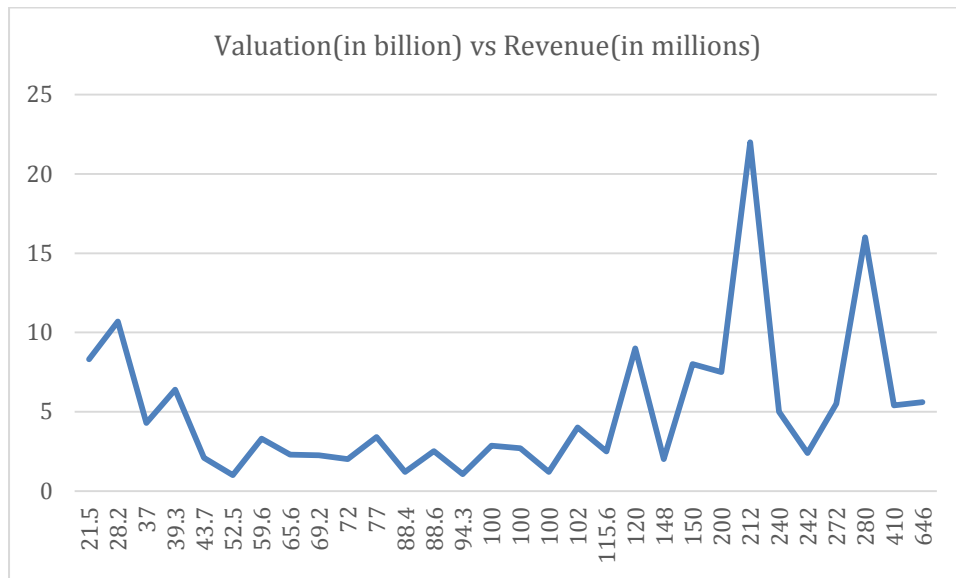


Table 2.3: No. of Unicorns vs Year

**2.2 Top 30 Unicorn start-ups with their Valuation and Revenue in 2023:**

Start-ups	Revenue(in Million)	Valuation(in billion)
Nykaa	21.5	8.3
Swiggy	28.2	10.7
Lenskart	37	4.3
CRED	39.3	6.4
Urban Company	43.7	2.1
Mobikwik	52.5	1
Cars24	59.6	3.3
MPL	65.6	2.3
upgrad	69.2	2.25
Firstcry	72	2
Unacademy	77	3.4
Cardekho	88.4	1.2
Makemytrip	88.6	2.52
Mamaearth	94.3	1.07
Bharatpe	100	2.85
Bigbasket	100	2.7
MyGlamm	100	1.2
Delhivery	102	4
Games24x7	115.6	2.5
OYO Rooms	120	9
Zerodha	148	2
Dream11	150	8
Razorpay	200	7.5
BYJUS	212	22
Ola Electric	240	5
Policybazaar	242	2.4
Phonepe	272	5.5
Paytm	280	16
Zomato	410	5.4
Pharmeasy	646	5.6

**Table 2.2: Top 30 start-ups according to their Valuation**



Graph 2.3: Valuation (in billions) vs Revenue (in millions) in 2023

### 3. MATHEMATICAL FORMULATION/CALCULATIONS:

Graphs are made on the graph paper as well as excel. With the help of this graph, we calculated mathematical formulas. Taking into consideration as much point as possible but exception are also there. So following are the three graphs:

Actual Data in Blue and Mathematical Graph in Orange.

#### **Graph 3.1: No. of registered Start-ups from 2016 to 2022:**

We consider 2016 as 1, 2017 as 2.....and 2022 as 7.

Plotting years as 1, 2, 3 , etc. in X-Axis. And number of registered start-ups in y-axis. After manually drawing graph and on excel. We concluded quadratic equation covers maximum number of plots considering  $y = Ax^2 + Bx + C$ .

- Taking  $x=1, y=471$

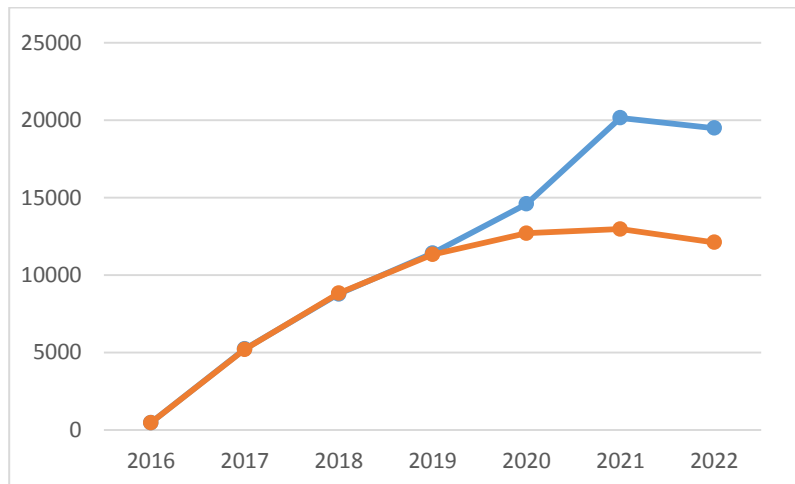
$$471 = A + B + C$$

- $x=2, y=5233$

$$5233 = A \cdot 2^2 + B \cdot 2 + C$$

- $x=4, y=11328$

$$11328 = A \cdot 4^2 + B \cdot 4 + C$$



**Graph 3.2: Calculated Data Vs Actual Data for No. of Registered Start-ups from 2016 to 2022.**

By solving using calculator we get,  
**Formula:  $y=6422x-560x^2 - 5400$**

Where “y” is no. of registered startups and “x” is 1, 2, 3..... (1 represents 2016, 2 represents 2017 and so on).  
 Exception: From 2020 to 2022 because of Covid-19 due to high surge in Health sector start-ups and E-commerce sector.

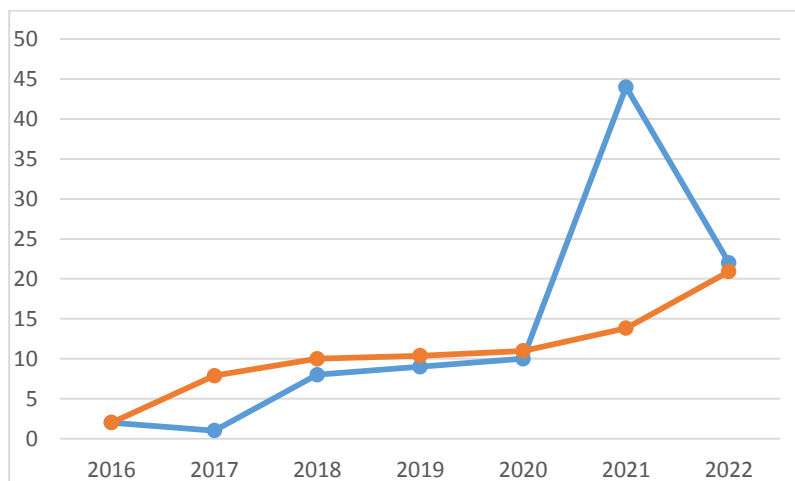
**Graph 3.2: Unicorn Start-ups from 2016 to 2022:**

Again considering x=2016 as 1, 2017 as 2 .....2022 as 7.

Taking y as number of unicorns,

We plotted a graph and try to draw different graphs by hand fitting, converting maximum numbers of points.

We get cubic equation.



**Graph 3.1: Calculated Data Vs Actual Data for No. of Unicorns from 2016 to 2022.**



**Formula:  $y=0.333x^3-0.875x^2+15.7x-9.625$**

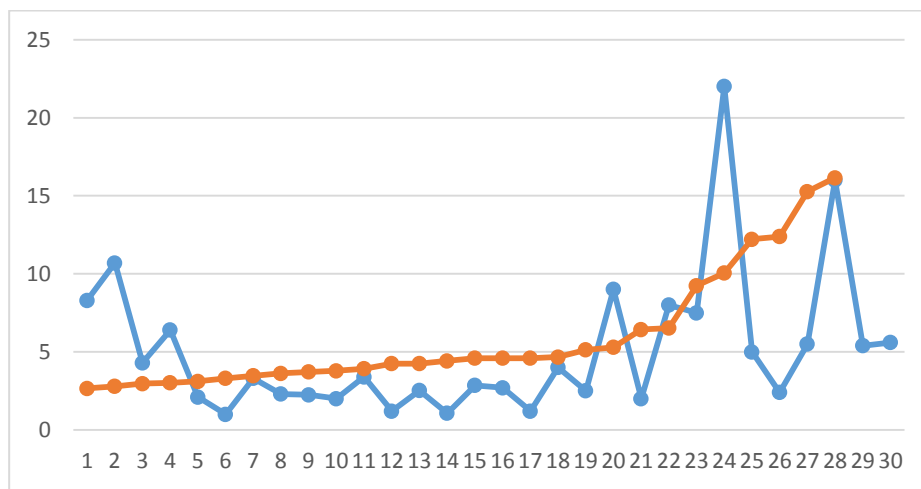
Where “y” represents no. of Unicorns and “x” represents 1, 2, 3.....(1 represents 2016, 2 represents 2017 and so on).

**Graph 3.3: Valuation (in billions) V/s Revenue (in millions) for top 30 start-ups :**

Through different formulas to calculate evaluation is given using internet, we derived a new formula.

Consider x= revenue of start-up (in millions)  
y=valuation of start-up (in billions)

we calculate y as exponential/power equation.



**Graph 3.2: Calculated Data Vs Actual Data Valuation (in Billions) vs Revenue (in millions).**

**Formula:  $y=0.29*(1.007)^x$**

Where “y” is valuation (in billions) and “x” is revenue (in millions).

**4. EXPLANATION and CONCLUSION:**

My aim to do this research was to study mathematical formulation and economic of business entrepreneurship/start-ups and I am successful in doing this by formulating mathematical expression from the data with the help of graphs, though it is theoretical formulation only, Practical results may vary. These formulas may be helpful to start-up business entrepreneurs. Theoretical and Practical things may vary because of the business risk, economy, inflation and other so many factors affecting the start-up culture.

As Albert Einstein quoted that in theory, theory and practice are the same. In practice, they are not.

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## **BIOGRAPHIES**

### ***Aaditya Arora***

- Currently studying in Sacred Heart Convent School in class XII
- Green house captain of the school
- Cofounder of smiles to build
- 2 time silver medalist in international informatics Olympiad
- Silver medalist in international maths Olympiad.

*Under the guidance of:*

### ***Dr. Mamta Jain***

- M.Sc (Mathematics) (Double gold medallist)
- M.Phil (Computer Applications) with honours From University of Roorkee (now IIT Roorkee)
- PhD (Mathematics)
- 5 papers published in international journals Former Lead Auditor ISO 9001,ISO -22000 School Accreditation Examiner by QCI
- 26 years of teaching experience

### ***Er. Raunaq Jain***

- B.E Mechanical Engineering From Thapar Institute of Engineering and Technology.
- School Physics Topper.
- Mechanical Mentor from from session 2019-2020.
- Upcoming Data Analyst at Deloitte.