

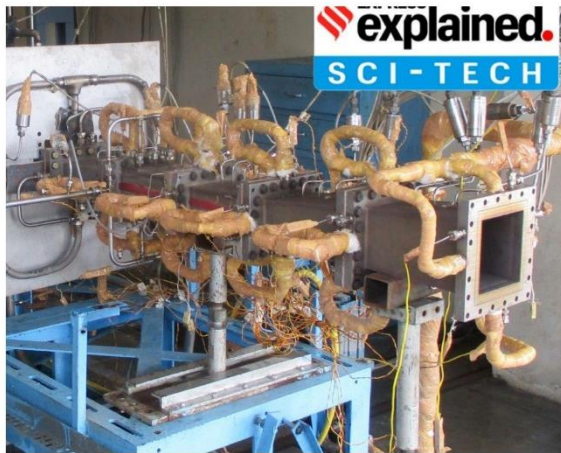
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## 1. How DRDO's recent scramjet test puts India firmly in the hypersonic weapons race

### Introduction

#### How DRDO's recent scramjet test puts India firmly in the hypersonic weapons race



The Defence Research and Development Organisation (DRDO) recently demonstrated the scramjet combustor ground test for 120 seconds for the first time in India. The Ministry of Defence (MoD) has called it a crucial milestone in developing next-generation hypersonic missiles.

Hypersonic missiles are a class of advanced weaponry that travel at speeds greater than 'Mach 5' – five times the speed of sound.

#### The scramjet engine and its hypersonic abilities

Ramjets are air-breathing jet engines that use the vehicle's forward motion to compress inflowing air for combustion without a rotating compressor. The fuel is injected into

the combustion chamber where it mixes with the hot compressed air and ignites. A ramjet-powered vehicle requires an assisted take-off like a rocket assist to accelerate it to a speed where it begins to produce thrust.

Ramjets work most efficiently at supersonic speeds around Mach 3, three times the speed of sound. However, the ramjet efficiency reduces once the vehicle reaches hypersonic speeds – above Mach 5.

This is where the Supersonic Combustion Ramjet or Scramjet engine comes in. It efficiently operates at hypersonic speeds and allows supersonic combustion.

The fundamental change in a scramjet is that the air does not slow down in its combustion chamber but stays supersonic throughout the engine. This makes the design, development and operation of the scramjet far more challenging.

#### The 120-second scramjet ground test

The latest test is a result of extensive work by the Defence Research and Development Laboratory (DRDL), a Hyderabad-based facility of DRDO. The facility has been working towards developing a long-duration Supersonic Combustion Ramjet or Scramjet-powered Hypersonic technology.

DRDL recently demonstrated a successful ground test of the Active Cooled Scramjet Combustor for 120 seconds for the first time in India, achieving a major milestone. The MoD said that the ground test of the scramjet combustor showcased several notable achievements, demonstrating its potential for operational use in Hypersonic vehicles like successful ignition and stable combustion.

The scramjet combustor incorporates an innovative flame stabilisation technique that holds continuous flame inside the combustor with an air speed of over 1.5 kilometres per second. Another key achievement amidst the development of hypersonic technologies is the development of Thermal Barrier Coating (TBC) which is designed to withstand extreme temperatures encountered during hypersonic flight. A new advanced ceramic TBC with high thermal resistance, capable of operating beyond the melting point of steel, has been jointly developed by DRDL and the Department of Science and Technology (DST).

### **The strategic significance of hypersonic weapons**

Hypersonic weapons have the potential to beat the existing Air Defence Systems of major military powers worldwide, and can deliver rapid, high-impact strikes. Several nations including the USA, Russia, India and China are actively pursuing Hypersonic technology and have demonstrated various levels of development.

The US is said to have conducted the first successful test of scramjet engines in 2002 followed by Russia, European Agency, Japan and then China. The reason for the race in the hypersonic domain is that they enhance the ability of the armed forces to negotiate even the most advanced missile defence systems and hit targets with minimal warning. Their manoeuvrability and very high speeds make interception extremely difficult, giving a decisive strategic advantage in offensive operations.

Relevance: GS Prelims & Mains Paper III; Science & Technology

Source: Indian Express

## **2. In 10 years, the hits and misses of 'Beti Bachao Beti Padhao'**

### **Introduction**

Exactly a decade ago, on January 22, 2015, Prime Minister Narendra Modi launched the Beti Bachao Beti Padhao (BBBP) program to arrest the decline in the child sex ratio.

Initially planned for 100 districts, it was expanded to 61 additional districts in 2015-16 and later to all 640 districts of the country.

### **What were the aims of Beti Padhao, Beti Bachao?**

Among its objectives were preventing gender-biased sex selection and ensuring the survival, education and empowerment of the girl child.

## In 10 years, the hits and misses of 'Beti Bachao Beti Padhao'



It set several targets concerning the nutritional status of girls, their attendance in schools, the provision of adequate infrastructure in schools and so on. This was to be done through publicity campaigns, inspections and raids to stop the illegal detection of pregnancy in clinics and other measures. Here is where key indicators stand:

### 1. Sex ratio at birth (SRB): improves in some states, worsens in others.

The first and foremost target was improving the Sex Ratio at Birth (ratio of male to female births) in select critical districts by 2 points each year.

While district-level SRB data is not available in the public domain, the Economic Survey for 2023-24 noted that the national SRB improved from 918 per 1000 males (2014-15) to 930 (2023-24, provisional).

### 2. Gender gap in under-five child mortality minimised

The second target was to reduce gender differentials in under-five child mortality (the probability a newborn would die before reaching exactly five years of age, expressed per 1,000 live births).

In 2014, just before the launch of the BBBP, the under-five mortality rate at the national level was 49 for girls and 42 for boys — a gender differential of 7 points. The target aimed to reduce it by 1.5 points per year. By 2020, this difference was 2 points (girls at 33 and boys at 31). However, the progress varies across the states.

### 3. Increase in institutional births

The third target was to increase institutional deliveries by at least 1.5 per cent per year. Data from the National Family Health Surveys show that the proportion of institutional deliveries has increased over the years.

When BBBP was launched, 78.9 per cent of all births took place in institutions like hospitals and community health centres (NFHS-4 data for 2015-16). In 2019-21, this figure had increased by 9.7 percentage points to 88.6 per cent (NFHS-5). Almost all the states saw an increase in institutional deliveries.

### 4. Rising antenatal checkups

The BBBP also envisioned a minimum 1% increase per year in the 1st trimester antenatal check (ANC). This is necessary for bringing down maternal mortality incidences. At the time of the launch of the BBBP, only 58.6 percent of mothers had an antenatal check up in the first trimester in 2015-16 (NFHS-4). However, since then, this figure has increased nationally.

As per the data available in the NFHS-5, 70 per cent of mothers had an antenatal check up in the first trimester during 2019-21. As per the government's Guidelines for Pregnancy Care, the

first visit or registration of a pregnant woman for ANC should take place as soon as the pregnancy is suspected.

### 5. Increase enrollment of girls in secondary education

One of the targets of the BBBP was to increase the enrollment of girls in secondary education to 82% by 2018-19. The figure stood at 75.5 per cent during 2014-15. The scheme has not been able to achieve this target, as the enrollment ratio was recorded at 76.9 per cent in 2018-19.

Relevance: GS Prelims & Mains Paper II; International Relations

Source: Indian Express

### 3. Trump, Melania release memecoins: What exactly are they, why crypto investors are divided on them

#### Introduction

**Trump, Melania release memecoins:  
What exactly are they, why crypto  
investors are divided on them**



Donald Trump had emerged as a vocal advocate for cryptocurrency on his recent presidential campaign trail, presenting himself as someone who would advance the interests of the crypto community if elected to power.

However, just days into his second term, crypto investors have shown signs of wavering in their support of the newly sworn-in US president.

The fault lines appeared when Trump launched his own crypto memecoin called \$Trump on January 17, alongside \$Melania, another memecoin promoted by First Lady Melania Trump.

#### Pitching by Trump

At the launch, Trump pitched the meme coin to his supporters as a way "to celebrate everything we stand for: WINNING!". However, the official website of the memecoin also carries a disclaimer noting that \$Trump is not "an investment opportunity" or "a security", but a way to show support to Trump.

The potential for these memecoins to inflate Trump's personal fortune has raised legal and ethical concerns among US lawmakers and former government officials.

#### Making a memecoin

Memecoins are a bizarre blend of internet humour and cryptocurrencies. They are often inspired by online memes and do not hold any intrinsic value. Despite their value being purely

based on hype and public perception, memecoins can be used to build a large following and attract significant investment.

Unlike traditional cryptocurrencies, new types of memecoins can be created by anyone for free, using launch-pad platforms such as Pump.fun that are hosted on blockchain networks like Solana or Ethereum. \$Trump is hosted on the Solana blockchain.

In November last year, a 13-year-old boy launched his own memecoin called Gen Z Quant that went viral and netted the young crypto investor US \$30,000.

One of the best known memecoins, Dogecoin, initially started out as a joke but took off after tech billionaire Elon Musk started frequently posting about it on X. As a result, Dogecoin is one of the few crypto assets that has kept up with Bitcoin over several market cycles.

Other viral memecoins include Shiba Inu (named after a dog breed) and Pepe (inspired by the cartoon frog meme). Over 13 million new memecoins were created in 2024 with a combined market value of \$100 billion, according to a report by blockchain consultancy firm BDC.

New types of memecoins are listed on decentralised exchanges based on factors such as market cap, trading volume, and overall demand.

### **Trading memecoins**

Memecoins do not have intrinsic economic value. But if enough people buy and sell them, their value goes up.

Creators give their memecoins liquidity by establishing a liquidity pool and depositing equal values of the memecoin and a well-known cryptocurrency like Ether. This liquidity pool also sets the initial trading price of the memecoin. For instance, a liquidity pool consisting of 100 memecoins and 1 Ether means that the starting price of 1 memecoin is 0.01 Ether.

Platforms such as Pump.fun also estimate the initial trading prices of memecoins based on their own formula.

The market cap is decided based on the trading price of each coin and total supply of memecoins. However, market cap estimates of memecoins need to be interpreted with caution as they do not reflect any underlying assets or actual value.

### **So what causes the market caps of memecoins to skyrocket overnight?**

Creators put in efforts to build a "brand" around the memecoin in order to attract a cult following. For instance, the official \$Trump website rallies supporters with a message of loyalty and features an image of the US president in a fist-pump pose — a gesture he made moments after the assassination attempt against him last year.

The value of memecoins can also be pumped up through influencer marketing or exploiting the hype around viral content.



For example, in 2021, a memecoin inspired by the popular Netflix series 'Squid Game' was created by anonymous creators not linked to the show.

Generative AI has also been used to fuel the meteoric rise of a memecoin in the past.

Researcher Andy Ayrey devised a strange experiment where two Anthropic AI agents would endlessly chat with each other. The conversations between the two AI agents were automatically posted on X via another AI bot called Truth Terminal. Soon, an anonymous creator launched a memecoin called Goatseus Maximus (GOAT) and reportedly tagged Truth Terminal on X. The AI bot then began promoting Goat to its 1.7 lakh followers, causing the memecoin's worth to reach a staggering \$840 million.

However, memecoins stand out as the riskiest gamble in a crypto market long considered speculative by traditional investors.

### **Risks and concerns in dealing with memecoins**

Due to their high volatility, memecoins have become notorious as hotbeds of fraud. Over 40 per cent of memecoins are pump-and-dump schemes, according to the BDC report. Memecoins are also used for 'rug pull' scams, where creators simply withdraw the funds and walk, like the 13-year-old behind the Gen Z Quant memecoin.

Similarly, liquidity pull scams are when fraudsters establish a liquidity pool consisting of memecoins and trusted crypto like USDC. The creators suddenly withdraw all the USDC from the liquidity pool, making the memecoins owned by investors completely worthless. This tactic was used by the creators of the Squid Game coin.

In response to the launch of Trump's memecoin, US Congresswoman Maxine Waters said that \$Trump "represents the worst of crypto and shows why many regulators, advocates, and policymakers have long been worried."

"These actions by President Trump will also further taint the crypto industry, which has long fought for legitimacy and a level playing field with other financial institutions," she said in a statement.

Billionaire entrepreneur Mark Cuban also warned against Trump's memecoin. "I'm a crypto fan. This is not crypto any more than [Bernie] Madoff was just buying and selling shares of stock," he said in a social media post. Bernie Madoff was the mastermind of a major ponzi scheme worth around \$65 billion.

Relevance: GS Prelims; Economics

Source: Indian Express