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### 1. All-weather link to Tawang, new Sela Tunnel

#### Why in News?

The Sela Tunnel, which was "dedicated to the nation" by Prime Minister Narendra Modi, is a key border infrastructure project as it connects Guwahati to the strategic Tawang sector round-the-year, thus aiding faster military movement to the Line of Actual Control (LAC).

Constructed by the Border Roads Organisation (BRO) at an altitude of around 13,000 feet and a cost of Rs 825 crore, the construction of the tunnel was aimed at providing all-weather connectivity to Tawang across Sela Pass on the Balipara-Chariduar-Tawang (BCT) Road, which connects Tezpur in Assam to Tawang in Arunachal Pradesh.



Tezpur is the home of the Indian Army's IV Corps which looks after Assam and western Arunachal Pradesh.

#### Need for Sela Tunnel

The Sela Tunnel will thus be a major boost to India's operational preparedness along the LAC, aiding quick military mobilisation to the bordering Tawang sector, saving nearly 10 km of road distance, translating into nearly almost an hour of travel time for convoys. Heavy artillery guns can be

transported through the tunnel.

#### Preceded by similar projects earlier

This comes months after the inauguration of the Nechiphu tunnel by Defence Minister Rajnath Singh last September.

Both the tunnels would provide all-weather connectivity to Tawang, bypassing the foggy stretches on Nechiphu and the snow on Sela passes, together cutting down distance by about 15 km, thus aiding faster military deployment to Tawang.

### **Importance of Tawang**

With China seeking to claim Tawang as part of larger Tibet, while calling Arunachal Pradesh southern Tibet, India has always kept the region militarily fortified.

During the 1962 India-China war, Beijing had captured Tawang within the first few days. Tawang's historical significance lies in it being the birthplace of the sixth Dalai Lama, making it an important seat of Tibetan Buddhism after Lhasa.

From the military and strategic point of view, Tawang provides geographical access up to the Brahmaputra plains and provides the shortest axis to Tezpur in Assam. The lines of communication from Tawang stretch to Guwahati and the extended Siliguri corridor, amplifying its military importance.

Relevance: GS Prelims & Mains Paper III; Internal Security

Source: The Indian Express

## **2. India's indigenous fifth-gen fighter jet Advanced Medium Combat Aircraft (AMCA)**

### **Why in news?**

The Cabinet Committee on Security (CCS) this week cleared a Rs 15,000 crore project to design and develop the Advanced Medium Combat Aircraft (AMCA), India's fifth-generation fighter multirole fighter jet.

The Aeronautical Development Agency (ADA) under the Defence Research and Development Organisation (DRDO) will be the nodal agency for executing the programme and designing the aircraft. It will be manufactured by state-owned Hindustan Aeronautics Limited (HAL).

The aircraft will put India in a select group of nations that have their own fifth-generation fighter aircraft.

### **Features of AMCA**

**STEALTH:** The 25-tonne twin-engine aircraft, which will be bigger than other fighters in the Indian Air Force inventory, will have advanced stealth features to avoid detection by enemy radar.

**FUEL & WEAPONS:** The aircraft will have a large, concealed internal fuel tank of 6.5-tonne capacity, and an internal weapons bay for a range of weapons, including indigenous weapons, to be buried in its belly.

Stealth features such as an internal weapons bay and a bigger internal fuel tank are part of fifth-generation aircraft like AMCA. Up to four long-range air-to-air missiles and multiple precision-guided munitions can be carried in the internal weapons bay, with a payload of 1,500 kg.

External fuel tanks and externally attached weapons leave a huge signature and are easy to detect for radar. The special material that will be used on the aircraft surface will divert the radar signature instead of reflecting it back.

**ENGINE:** The AMCA Mk1 variant will have the US-built GE414 engine of the 90 kilonewton (kN) class, while the more advanced AMCA Mk2 will fly on the more powerful 110kN engine, which will be developed indigenously by DRDO's Gas Turbine Research Establishment (GTRE) in collaboration with a foreign defence major. India has been talking with Safran SA of France, one of the world's largest manufacturers of aircraft engines and related equipment, in order to finalise the roadmap for the development of the combat aircraft engine.

Other features such as a diverterless supersonic inlet for controlling air flow into the engines, and a serpentine air intake duct to shield the engines from radar emissions, are likely to be part of the AMCA.



### Why AMCA is special

Discussions for developing the AMCA started in 2007. The initial plan was to jointly develop the aircraft with Russia under a Fifth Generation Fighter Aircraft (FGFA) programme. However, India withdrew from the FGFA project in 2018.

The AMCA will be India's indigenous fifth-generation fighter aircraft. The indigenous Light Combat Aircraft (LCA) Tejas is a 4.5-generation single-engine multirole aircraft.

What will set the fifth-generation combat aircraft apart from the existing fourth-generation is primarily its stealth features. The aircraft will have a low electro-magnetic signature, which will make it difficult for enemy radar to detect it. At the same time, it will have powerful sensors and new weapons, so it is able to register the signature of enemy aircraft and take them out.

Another important aspect would be to ensure a higher utilisation time and smaller serviceability or maintenance periods for the aircraft. This will be aided by the inclusion of a

comprehensive Integrated Vehicle Health Management (IVHM) system to keep track of multiple structural components, and to assess the condition of the aircraft in real-time.

### **Development timeline**

Following the CCS approval, which had been pending for more than a year and a half, the ADA hopes to have the first flight of the aircraft in four and a half to five years. The full development of the aircraft is expected to take around 10 years from now. Five prototypes will be built before HAL begins manufacturing the aircraft. The private industry is also expected to be involved in the manufacturing of the aircraft.

### **Other fifth-generation fighters**

Only a few countries have built a fifth-generation stealth fighter aircraft. The list of the aircraft currently in service includes the F-22 Raptor and F-35A Lightning II of the US, the Chinese J-20 Mighty Dragon, and the Russian Sukhoi Su-57.

### **IAF's dwindling numbers**

The IAF currently has around 30 fighter squadrons against the sanctioned strength of 42. This number is expected to go down further as squadrons of MiG-21s, MiG-29s, Jaguars, and Mirage 2000s are scheduled to be phased out by the middle of the next decade.

The IAF has indicated that it requires seven squadrons of the AMCA to begin with. Considering the IAF's requirements, the planned inductions of additional squadrons of LCAs and AMCA will not add up to the sanctioned squadron strength in a decade.

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

Source: Indian Express

### **3. Pi, the world's 'friendliest' chatbot**



### **Why in News?**

In less than a week, two Large Language Models (LLMs) have been launched that are closer to or even better at tasks than OpenAI's GPT-4. After Anthropic's Claude 3 captured the attention of the AI community, Inflection AI launched its latest LLM, Inflection 2.5, an upgrade to its model that powers its friendly chatbot Pi personal assistant.

Inflection AI, a California-based AI startup founded by former co-founders of DeepMind and LinkedIn, introduced Pi, their personal AI, in May 2023.

### **About Pi**

Pi has been designed to be "empathetic, helpful, and safe", according to Inflection AI. Following the success of the chatbot, the company introduced its new major foundation model, Inflection 2, in November 2023. At the time of the launch of Inflection 2, the company claimed it to be the best LLM in the world.

Now, the company is back with an upgraded version that is claimed to be as good as GPT-4.

Relevance: GS Prelims; Science & Technology

Source: The Indian Express