China's Historic Reusable Rocket Breakthrough (Long March 10B)

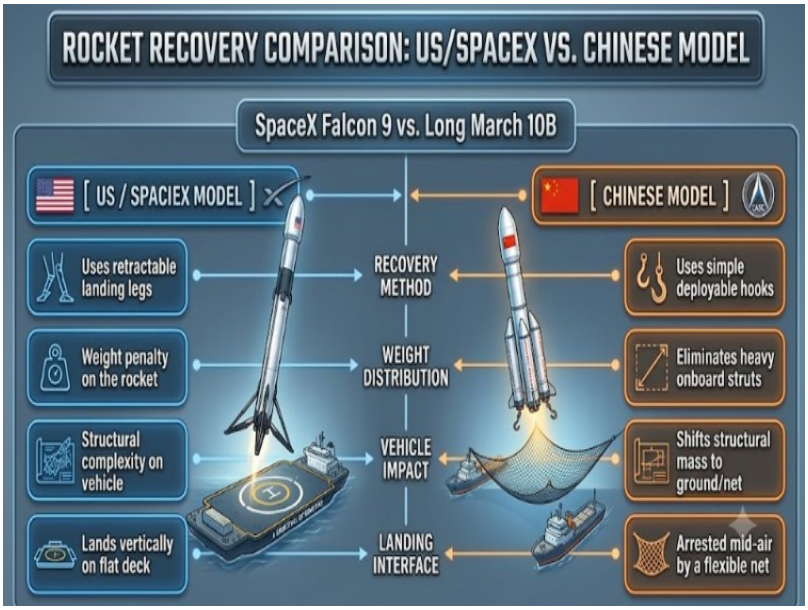
Prelims: *Current events of national and international importance | Science and Technology*

Why in News?

Recently, China has successfully executed its first-ever controlled recovery of an orbital-class rocket booster.

- **China** launched its new ***Long March 10B carrier rocket*** from the Hainan Commercial Space Launch Site.
- **Stages -** The 2-stage rocket successfully deployed its satellite payload into target orbit.
- **Milestone -** With this landing, China becomes ***only the 2nd nation in the world*** after the United States to successfully recover an orbital launch vehicle booster.
- **Long March 10B Technical Specs –** It is a ***liquid-fueled carrier rocket*** with a 5-meter core diameter.
- Its first stage is powered by seven YF-100K engines burning a *kerosene-liquid oxygen (LOX) mix*, while the upper stage utilizes *liquid methane-LOX.*
- It can carry up to ***16,000 kg to LEO*** in its reusable configuration.

Comparison of U.S. and China Models



- **Working -** As the 63-metre-tall booster descended under its own thrust toward the recovery vessel *Linghangzhe,* it deployed 4 specialised landing hooks.
- These hooks engaged tensioned cables strung across a flexible, hydraulic-damped net platform, arresting the rocket mid-air and neutralising the remaining kinetic energy.
- Landing legs add deadweight, reducing the total mass a rocket can ferry to space.
- By shifting the structural engineering burden from the vehicle to the sea-based platform, the rocket can maximize its fuel efficiency and payload capacity.
- **Significance**
  - The Gateway to China's Moon Program
  - Unjamming the Satellite Megaconstellation Bottleneck
  - Accelerated Reflight Ambitions

Quick Facts

Global Reusability Landscape
• **USA -** Leading globally with SpaceX's operational Falcon 9 / Falcon Heavy (vertical landing struts) and Starship (mechanical "chopstick" arm catches). • **India (ISRO) -** Actively developing the ***Next Generation Launch Vehicle (NGLV)***, designed as a reusable vertical-landing rocket for the commercial market. • **Europe (ESA) -** Conducting pad-testing of its *Themis* reusable rocket prototype.

Reference

[Reuters | China tests sea-based rocket booster recovery system]