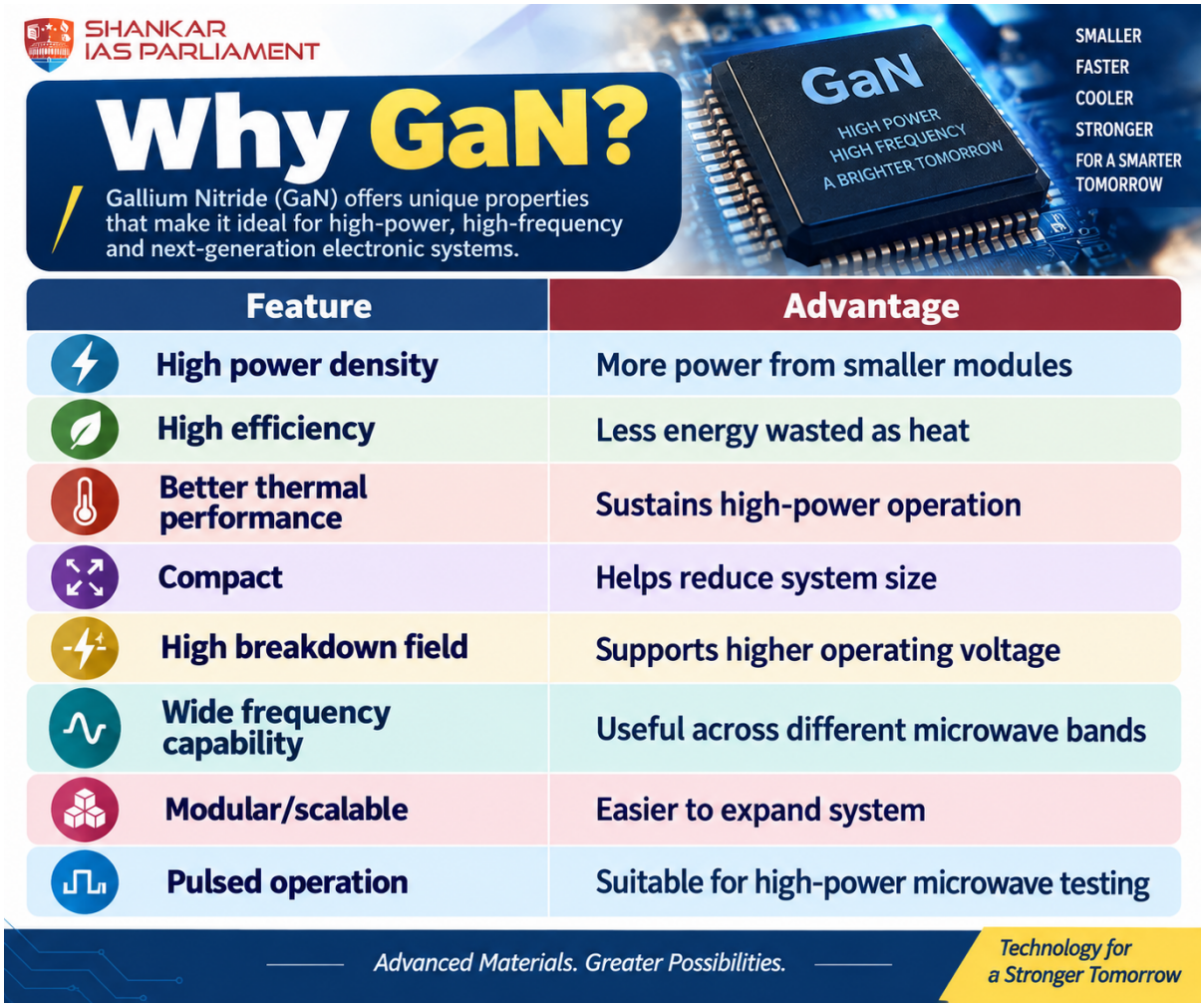
SHIELD Programme

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

Why in News?

Recently, DRDO has invited private companies to participate in the SHIELD programme to develop high-power microwave systems for testing drone vulnerabilities.

- **SHIELD –** S-band High-Power Microwave Integrated Evaluation System for Lethality and Damage
- **Nodal agency –** Defence Research and Development Organisation (DRDO).
- **Scheme –** Technology Development Fund (TDF).
- **Nature –** This is currently a test and evaluation infrastructure, not a battlefield weapon.
- **Objective –** To study and quantify the lethality and damage caused by high-power microwave (HPM) radiation on electronic systems, including drones, sensors, radars, communication nodes, and command links, under controlled conditions.
- **Mechanism –** Intense electromagnetic (EM) energy is employed to disrupt or damage electronic systems.
- **Distinction from Conventional Weapons –** These systems are non-kinetic and do not rely on explosives or physical impact.
- **Effects –** Potential outcomes include temporary disruption, system reset, or permanent damage to targeted electronics.
- **Applications –** These technologies are utilized for counter-drone operations and enhancing electronic warfare capabilities.
- **Technological feature –** Integration of domestically produced Gallium Nitride (GaN) solid-state power amplifiers.
- Comparison of Gallium Nitride (GaN) with Traditional Technologies (Silicon and Gallium Arsenide)
- **Power density –** Gallium Nitride (GaN) devices achieve approximately five to ten times the power density of Gallium Arsenide (GaAs), resulting in higher microwave output within more compact and lightweight packages.
- **Efficiency –** GaN amplifiers can achieve a power-added efficiency (PAE) of 70 to 80 percent, enabling greater conversion of direct current (DC) power to radio frequency (RF) output and reducing heat dissipation.



- **Significance**
- **Counter-drone warfare –** It employs non-kinetic directed-energy systems to defend against drone swarms originating from China, Pakistan, and non-state actors.
- **Electronic hardening –** It involves mapping failure modes and implementing shielding for radars, avionics, communications, and drones.
- **Indigenisation –** It strengthens domestic directed-energy and electronic warfare technologies, supporting the Atmanirbhar Bharat initiative.
- **SHIELD data –** It informs the development and deployment of future high-power microwave and electronic warfare platforms.

Reference

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