Spinoff technologies

Why in news?

The space exploration spinoff technologies have significant impact on various industries and sectors.

What are the NASA's spin off technologies in space exploration?

> *Spinoff technologies refer to the unintended or unexpected benefits and applications that arise from the development of a particular technology or innovation.*

- **CMOS image sensor**- Complementary Metal-Oxide-Semiconductor (CMOS) technology enables *digital cameras* to be small, high-quality and low power, which is used in mobile phones and GoPro cameras.
- **Aquaspace filter-** Aerospace compound developed by NASA removes chlorine and other contaminants from drinking water, it is used in industrial, commercial, residential and recreational applications across the globe.
- **Memory foam**- It was created by NASA to *absorb shock* and provide comfort on airplane seats which is now widely used in mattresses, pillows, insoles, and medical applications.
- **Smoke detector-** It uses a sensor developed by NASA to detect combustion particles in the air, it can *reduce false alarms* by distinguishing between smoke and dust.
- **Wireless headset**- It is based on the headset used by astronauts to communicate with mission control, it is lightweight, comfortable and hands-free.
- **Solar cells**- It is used to develop an *unmanned aircraft* capable of flying at high altitudes for extended durations, harnessing solar energy for power. This is widely now used in buildings, calculators etc.,
- **Medical imaging technology**- NASA's *space borne imaging devices* has contributed to the development of medical imaging devices, such as the digital mammography system.
- **Microencapsulation**- It delivers *cancer-fighting drugs* within a patient's body more safely than before, it also provides means to *remove oil pollution* from water.

> *Microencapsulation" is the process of enclosing liquids or small particles with a coating to create tiny capsules on a micro metric scale (smaller than millimeters).*

What are the spinoff technologies made by ISRO?

- **Low-cost artificial heart pump** - A lightweight Left Ventricular Assist Device that can help a *weak heart to pump blood* it is made from a biocompatible titanium alloy, it is used in rockets.
- **Artificial foot-** It is made of a composite material used in rocket motors, this poly-urethane foot is lighter and more durable than traditional prosthetics like the Jaipur Foot.
- **Microprocessor controlled smart knee**- Intelligent artificial limbs with sensor data capabilities which is more affordable and comfortable than passive limbs.
- **Non-invasive ventilator SVASTA-**ISRO has developed a gas powered ventilator Space Ventilator Aided System for Trauma Assistance (SVASTA) designed for emergency and first line treatments, its simple design allows for easy mass production, particularly useful in *pandemic*-like situations.
- **Artificial denture material (ACRAMID)-** It is a polyamide reinforced plastic used in launch vehicles, also applicable as a *cost-effective denture implant material* for orthodontic restoration.
- **Fire-extinguishing powder**- *OLFEX* can extinguish various types of fires, including flammable, liquid, and gas fires, while *TEC* (Ternary Eutectic Chloride) is designed specifically for metal fires.
- **Endoscopic catheter mounted impedance probe**- It aids in identifying inflammation or malignancy in the gut mucosa, it is more cost effective than traditional biopsies.
- **Flame retardant coating**- A chemical with flame-retardant, waterproofing, and thermal-control properties, based on technology used for spacecraft thermal protection. It can be applied to various surfaces and materials.
- **Hydrophobic silica aerogel**- It is a type of *porous material* that is water-resistant and has wider applications in construction materials, personal care products, drug delivery etc.,
- **Adhesives-** ISRO has developed various *structural* (Epoxy resins, phenol based and rubber based adhesives) and *non-structural* (silicon based, polyurethane elastomers and acrylic based adhesives) adhesives which can be used in automobiles and engineering industries.

To know about the brief history of ISRO click here

ISRO's institutional support for spin off technologies
• **SpaceTech Innovation Network (SpIN)-** It is India's first dedicated platform for innovation curation and venture development for the burgeoning space entrepreneurial ecosystem. • **Antrix Corporation**- It was launched in *1992* to commercialize space products, such as launch services, satellite services, and space-based applications. • **NewSpace India Limited-** It is a company set up by ISRO in *2019* to market spin-off technologies and products and services both in India and abroad, as well as to facilitate technology transfer and innovation.

References

1. Indian Express- NASA’s spin off technologies
2. NASA- Spin off technologies
3. ISRO- SpaceTech Innovation Network