

1. **come full circle** (phrase) – returning to where one started after gaining experience or exploring other things.
2. **in terms of** (phrase) – with regard to, regarding/concerning, in connection with.
3. **universal constant** (noun) – fundamental physical constant; a physical quantity that is generally believed to be both universal in nature and have constant value in time.
4. **platinum-iridium cylinder** (noun) – used to measure a standard kilogram under protective jars.
5. **abstract** (adjective) – theoretical, conceptual, notional.
6. **universality** (noun) – the standard property which is common/universal for all times, for all people.
7. **unprecedented** (adjective) – not done or experienced before.
8. **common balance** (noun) – weighing balance; a device to measure weight or mass.
9. **prototype** (noun) – model, sample/example/test object, archetype.
10. **Kibble balance** (noun) – watt balance; an electromechanical measuring instrument that measures the weight of a test object very precisely by the electric current and voltage needed to produce a compensating force.
11. **precision** (noun) – exactness, accuracy, correctness.
12. **culmination** (noun) – climax, finale, conclusion.
13. **et al.** (abbreviation) – and others, among others.
14. **hinge** (verb) – depend, be based, be subject to.
15. **artefact** (noun) – historical object, ancient object, antiquity.
16. **do away with** (phrasal verb) – abolish, discard, remove/eliminate.
17. **alloy** (noun) – a combination/mixture of metals; metals combined with other substances to make them stronger, harder, lighter, or better in some other way.
18. **robust** (adjective) – strong, resilient, long-lasting.
19. **relativistic** (adjective) – relating to the theory of relativity (the laws of physics are the same for all non-accelerating observers (frames of reference), and that the speed of light in a vacuum was independent of the motion of all observers).
20. **master** (verb) – learn thoroughly, become proficient in, acquire/grasp.
21. **metrologist** (noun) – a person who studies or practices metrology (the scientific study of measurement).

Eye in the sky: on RISAT-2B

RISAT-2B will enhance India's monitoring capabilities for civil and military purposes

With the **successful pre-dawn launch of RISAT-2B satellite on May 22**, the Indian Space Research Organisation (ISRO) has added another feather to its cap. The satellite will enhance India's capability in crop monitoring during the monsoon season, forestry mapping for forest fires and deforestation, and flood mapping as part of the national disaster management programme. Given that overcast skies are a constant during the monsoon season and during times of flood, the ability to penetrate the cloud cover is essential. While optical remote sensing that relies on visible light for imaging gets

obstructed by clouds, RISAT-2B will not. Much like the RISAT-1 satellite that was launched by ISRO in April 2012, RISAT-2B will also use microwave radiation. Unlike visible light, microwaves have longer wavelength and so will not be susceptible to atmospheric scattering. Microwave radiation can thus easily pass through the cloud cover, haze and dust, and image the ground. Hence, RISAT-2B satellite will be able to image under almost all weather and environmental conditions. Since it does not rely on visible light for imaging, it will be able to image the ground during both day and night. The satellite does not have passive microwave sensors that detect the radiation naturally emitted by the atmosphere or reflected by objects on the ground. Instead, RISAT-2B will be transmitting hundreds of microwave pulses each second towards the ground and receiving the signals reflected by the objects using radar. The moisture and texture of the object will determine the strength of the microwave signal that gets reflected. While the strength of the reflected signal will help determine different targets, the time between the transmitted and reflected signals will help determine the distance to the object.

The RISAT-2B satellite uses X-band synthetic aperture radar for the first time; the synthetic aperture radar was developed indigenously. Unlike the C-band that was used by RISAT-1, the shorter wavelength of the X-band allows for higher resolution imagery for target identification and discrimination. Since it has high resolution, the satellite will be able to detect objects with dimensions of as little as a metre. This capacity to study small objects and also movement could be useful for surveillance. As K. Sivan, ISRO Chairman and Secretary, Department of Space, had said last month, the satellite could be used for civil and strategic purposes. RISAT-2B will have an inclined orbit of 37 degrees, which will allow more frequent observations over the Indian subcontinent. With ISRO planning to launch four more such radar imaging satellites in a year, its ability to monitor crops and floods as well as engage in military surveillance will be greatly enhanced.