



Day 28

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Science and Tech: Space Science and Technology

Following Science and Technology topics based on the Space and related technologies, have been at the forefront of the news headlines, and as UPSC always attempts to test the basics, a basic awareness is required. Questions from this topic are largely asked from the Current Affairs. According to the trend observed, the facts, their contexts, basic background information can be asked by the UPSC from these topics.

ISRO

- **Year End Review 2019: Department of Space**
- **Aditya-L1 Mission**
- **The SuperCam on Mars 2020 Rover**
- **ISRO Plans for 2020-21**
- **Gaganyaan**
- **New Satellites to Help Gaganyaan Crew**
- **Vikram Sarabhai Centenary Programme**
- **Bhuvan Panchayat 3.0**
- **A-SAT and ADTCR**
- **NavIC in Mobiles**
- **Chandrayaan - 3 and Gaganyaan**
- **GSAT-30**
- **ISRO's Astronaut Training Hub in Karnataka**
- **50th PSLV Launch**
- **Cartosat-3**
- **ISRO Loses Connection with Vikram Lander**
- **Chandrayaan 2 and Outer Space Treaty**
- **ISRO: Challenges and Opportunities**
- **India to Set Up its Own Space Station**
- **IndSpaceEx**

- **RISAT-2B Satellite**
- **ISRO's Seven Mega Missions**
- **Mission Shakti, ASAT and India**
- **Universe's First Molecule**
- **In Depth: A-SAT Missile**

Space Related Technologies

- **Geotail**
- **White Dwarfs System**
- **Massive Galaxy Found in Cosmic Dust**
- **Gravitational Lensing**
- **Interstellar Object**
- **Merger of Two Black Holes with Unequal Masses Detected**
- **Types of Orbit**
- **Lithium Production in Stars**
- **Near-Earth Asteroid**
- **Comet**
- **New Super-Earth Planet**
- **Rocket Fuel**
- **Ploonet**
- **Supernova**

International Extra-Territorial Probes

- **Lithium Abundance in Interstellar Space**
- **NASA's InSight Mars Mission**
- **Habitable-Zone Planet Finder**
- **The SuperCam on Mars 2020 Rover**
- **Solar Orbiter Mission**
- **Risk of Interplanetary Contamination on Mars**
- **LCROSS: NASA**
- **Hope: UAE Mars Mission**
- **Tianwen-1: China's Mars Mission**
- **Apollo 11: 50 Years**
- **NASA's Punch Mission**
- **Dragonfly Mission**
- **NASA's Opportunity Rover Mission Ends**

Private Sector Participation in Space Sector

- **New Space Policy for New Space Age**

- Space X Capsule Returns Safely
- Private Sector Participation in Space
- SpaceX Crew Dragon
- First Contract for NSIL
- SpaceX's Falcon Heavy Rocket

Miscellaneous Concept

- Methane: Space Fuel
- Space Internet
- Nobel Prize in Physics 2019
- China Launches BeiDou Navigation Satellite System
- Russia Accused of Testing Anti-Satellite Weapon
- Asteroid 2020 ND
- Kuaizhou-11 Rocket
- Private Sector Participation in Space
- Micius: A Quantum-Enabled Satellite
- Gateway Lunar Orbiting Outpost
- Antarctic Impulsive Transient Antenna: ANITA
- Long March 5B' Rocket by China
- Demo-2 Mission
- Spitzer Space Telescope
- Hayabusa 2

Previous Year Questions

Q. Recently, scientists observed the merger of giant 'blackholes' billions of light-years away from the Earth. What is the significance of this observation?

(a) 'Higgs boson particles' were detected.

(b) 'Gravitational waves' were detected.

(c) Possibility of intergalactic space travel through 'wormhole' was confirmed.

(d) It enabled the scientists to understand 'singularity'.

Q. The term 'Goldilocks Zone' is often seen in the news in the context of (2015)

(a) the limits of habitable zone above the surface of the Earth

(b) regions inside the Earth where shale gas is available

(c) search for the Earth-like planets in outer space

(d) search for meteorites containing precious metals

Q. Consider the following phenomena: (2018)

1. Light is affected by gravity.
2. The Universe is constantly expanding.
3. Matter warps its surrounding space-time.

Which of the above is/are the predictions/ predictions of Albert Einstein's General Theory of Relativity, often discussed in the media?

(a) 1 and 2 only

(b) 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Q. The terms 'Event Horizon', 'Singularity', 'String Theory' and 'Standard Model' are sometimes seen in the news in the context of (2017)

(a) Observation and understanding of the Universe

(b) Study of the solar and the lunar eclipses

(c) Placing satellites in the orbit of the Earth

(d) Origin and evolution of living organisms on the Earth

Q. The efforts to detect the existence of Higgs boson particles have become frequent news in the recent past. What is/are the importance/importances of discovering this particle? (2013)

1. It will enable us to understand as to why elementary particles have mass.
2. It will enable us in the near future to develop the technology of transferring matter from one point to another without traversing the physical space between them.
3. It will enable us to create better fuels for nuclear fission.

Select the correct answer using the codes given below:

(a) 1 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Q. With reference to the Indian Regional Navigation Satellite System (IRNSS), consider the following statements: (2018)

1. IRNSS has three satellites in geostationary and four satellites in geosynchronous orbits.
2. IRNSS covers the entire India and about 5500 sq. km beyond its borders.
3. India will have its own satellite navigation system with full global coverage by the middle of 2019.

Which of the statements given above is/are correct?

(a) 1 only

(b) 1 and 2 only

(c) 2 and 3 only

(d) None

Q. With reference to India's satellite launch vehicles, consider the following statements: (2018)

1. PSLVs launch the satellites useful for Earth resources monitoring whereas GSLVs are designed mainly to launch communication satellites.
2. Satellites launched by PSLV appear to remain permanently fixed in the same position in the sky, as viewed from a particular location on Earth.
3. GSLV Mk III is a four-staged launch vehicle with the first and third stages using solid rocket motors; and the second and fourth stages using liquid rocket engines.

Which of the statements given above is/are correct?

(a) 1 only

(b) 2 and 3

(c) 1 and 2

(d) 3 only

Q. What is the purpose of the 'evolved Laser Interferometer Space Antenna (eLISA)' project? (2017)

(a) To detect neutrinos

(b) To detect gravitational waves

(c) To detect the effectiveness of missile defence system

(d) To study the effect of solar flares on our communication systems

Q. Consider the following statements: (2016) The Mangalyaan launched by ISRO

1. is also called the Mars Orbiter Mission
2. made India the second country to have a spacecraft orbit the Mars after USA
3. made India the only country to be successful in making its spacecraft orbit the Mars in its very first attempt

Which of the statements given above is/are correct?

(a) 1 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Q. With reference to 'Astrosat', the astronomical observatory launched by India, which of the following statements is/are correct? (2016)

1. Other than the USA and Russia, India is the only country to have launched a similar observatory into space.
2. Astrosat is a 2000 kg satellite placed in an orbit at 1650 km above the surface of the Earth.

Select the correct answer using the code given below:

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Q. In which of the following activities are Indian Remote Sensing (IRS) satellites used? (2015)

1. Assessment of crop productivity
2. Locating groundwater resources
3. Mineral exploration
4. Telecommunications
5. Traffic studies

Select the correct answer using the code given below:

(a) 1, 2 and 3 only

(b) 4 and 5 only

(c) 1 and 2 only

(d) 1, 2, 3, 4 and 5

Q. Which of the following pairs is/are correctly matched? (2014)

Spacecraft	Purpose
1. Cassini-Huygens	: Orbiting the Venus and transmitting data to the Earth
2. Messenger	: Mapping and investigating the Mercury
3. Voyager 1 and 2	: Exploring the outer solar system

Select the correct answer using the code given below:

(a) 1 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Q. Which of the following is/are cited by the scientists as evidence/evidences for the continued expansion of the universe? (2012)

1. Detection of microwaves in space
2. Observation of redshift phenomenon in space
3. Movement of asteroids in space
4. Occurrence of supernova explosions in space

Select the correct answer using the codes given below:

(a) 1 and 2

(b) 2 only

(c) 1, 3 and 4

(d) None of the above can be cited as evidence

Q. Satellites used for telecommunication relay are kept in a geostationary orbit. A satellite is said to be in such an orbit when: (2011)

1. The orbit is geosynchronous.
2. The orbit is circular.
3. The orbit lies in the plane of the Earth's equator.
4. The orbit is at an altitude of 22,236 km.

Select the correct answer using the codes given below:

(a) 1, 2 and 3 only

(b) 1, 3 and 4 only

(c) 2 and 4 only

(d) 1, 2, 3 and 4

Q. In the context of space technology, what is "Bhuvan", recently in the news? (2010)

(a) A mini satellite launched by ISRO for promoting the distance education in India

(b) The name given to the next Moon Impact Probe, for Chandrayaan-II

(c) A geoportal of ISRO with 3D imaging capabilities of India

(d) A space telescope developed by India

Q. Consider the following statements: (2010) The satellite Oceansat-2 launched by India helps in

1. estimating the water vapour content in the atmosphere
2. predicting the onset of monsoons.
3. monitoring the pollution of coastal waters.

Which of the statements given above is/are correct?

(a) 1 and 2 only

(b) 2 only

(c) 1 and 3 only

(d) 1, 2 and 3