SPACE TECHNOLOGY – MCQ BOOKLET

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1. Introduction to Space Science and Technology

Basic Concepts of Orbital Mechanics and Trajectories

1. Geo stationary satellite revolves at

A. Any height
B. At fixed height
C. Height above pole
D. Height which depends upon its mass

Ans: B

CGPSC Prelims Exam-2018

A geostationary orbit is a circular orbit directly above the Earth's equator, approximately 35,786 kilometers (22,236 miles) above mean sea level. At this specific altitude, the satellite's orbital period matches the Earth's rotational period (one sidereal day), making it appear stationary relative to a point on the ground. This fixed height is crucial for maintaining the synchronous orbit.

2. Which of the following statements is/are correct regarding satellites?

- **1. Geostationary satellites move from West to East**
- **2. Geostationary satellites' period of revolution is 24 hours**

A. Geostationary satellites move from West to East
B. Geostationary satellites' period of revolution is 24 hours
C. Both (A) and (B)
D. Neither (A) nor (B)

Ans: C

GPSC Prelims CSP-2-2021

- Geostationary satellites orbit Earth in the same direction as Earth's rotation (West to East). - Their orbital period is equal to Earth's rotation period (approx. 24 hours). - Geostationary satellites are positioned in an equatorial orbit. - They appear stationary relative to an observer on Earth.

3. Which of the following statements are correct regarding orbits?

- **1. In Intermediate Circular Orbit, the satellites move around Earth from pole to pole**
- **2. It takes approximately 99 minutes to complete an Orbit**
- **3. During one half of the Orbit, the satellite views the daytime and night time side of the Earth.**

A. 1, 2 and 3
B. 2 and 3 only
C. 1 and 3 only
D. 1 and 2 only

Ans: A

GPSC Prelims CSP-2-2021

- Intermediate Circular Orbit is not a standard orbital classification. - Polar orbits cover regions from pole to pole. - Orbital period in LEO is typically around 90-120 minutes. - Non-geostationary satellites orbit over both day and night sides of Earth.

4. A geostationary satellite is positioned at a distance of how many kilometres above mean sea level ?

A. 35,880
B. 37,800
C. 35,786
D. 32,000

Ans: C

HAS Prelims-2019

A geostationary orbit is located at an altitude of approximately 35,786 kilometers (22,236 miles) above the Earth's equator. At this altitude, a satellite orbiting in the same direction as the Earth's rotation with an orbital period equal to the Earth's rotational period appears stationary from the ground.

5. Which of the following describes the Geostationary Orbit (GEO) correctly ?

A. Altitude of 20,000 km above the sea level and the orbital period is 12 hours.
B. Altitude of 36,000 km above the sea level and the orbital period is 24 hours.
C. Altitude of 400 km above the sea level and the orbital period is 90 minutes.
D. None of the above

Ans: B

MPSC CS Prelims-2018

- A geostationary orbit (GEO) is a circular orbit located precisely above the Earth's equator. - A satellite in GEO moves in the same direction as the Earth's rotation and completes one orbit in the same time it takes the Earth to rotate once on its axis (approximately 23 hours, 56 minutes, 4 seconds, often rounded to 24 hours for practical purposes related to the apparent position from Earth). - Because of this matching orbital period and equatorial location, a satellite in GEO appears to remain fixed at a specific point in the sky relative to an observer on the Earth's surface. - The altitude required for a satellite to have an orbital period of approximately 24 hours is approximately 35,786 kilometers above the Earth's mean sea level (often rounded to 36,000 km).

6. Which one of the following statements about a satellite orbiting around the Earth is correct ?

A. Satellite is kept in orbit by remote control from ground station.
B. Satellite is kept in orbit by retro-rocket and solar energy keeps it moving around the Earth.
C. Satellite requires energy from solar panels and solid fuels for orbiting.
D. Satellite does not require any energy for orbiting.

Ans: D

UPSC NDA-2-2017

- Satellites orbit due to the balance between inertia and Earth's gravity. - Orbital motion itself is a form of freefall. - No continuous energy input is needed solely to stay in orbit.

7. The time period of revolution of a geostationary satellite is

A. 12 hrs.
B. 24 hrs.
C. 48 hrs.
D. 6 hrs.

Ans: B

UKPSC CS Prelims-2016

- Geostationary satellites orbit at a specific altitude above the Earth's equator. - Their orbital period matches the Earth's rotation period. - This period is approximately 24 hours.

8. Geostationary satellite completes its one revolution around the earth in

A. 90 minutes
B. 24 hours
C. 30 days
D. 365 days

Ans: B

UPSC CAPF-2013

A geostationary satellite orbits the Earth at a specific altitude (approximately 35,786 kilometers above the equator) and follows the Earth's rotation. For a satellite to appear stationary from a point on the Earth's surface, its orbital period must be exactly equal to the Earth's sidereal rotation period, which is about 23 hours, 56 minutes, and 4 seconds. For practical purposes and standard options, this is typically rounded to 24 hours. This synchronization allows the satellite to remain over the same geographic location on the equator.

9. A geostationary satellite has a period of

A. 6 hours
B. 12 hours
C. 18 hours
D. 24 hours

Ans: D

UPPSC Upper Mains-2010

A geostationary satellite is placed in a geosynchronous orbit directly above the Earth's equator. Its defining characteristic is that it orbits the Earth at the same rate as the Earth rotates on its axis.

10. Geostationary satellite

A. orbits at any height
B. orbits at constant height
C. does not orbit, remains stationary
D. Height depends on mass of satellite

Ans: B

BJS -2023

Geostationary satellites have a specific orbital characteristic related to their position relative to the Earth.

11. Match list – I with list – II and choose the correct answer using the code given below – List – I (Orbit) (A) Polar Earth Orbit (B) Parking Orbit (C) Sun Synchronous Orbit (D) Geo Synchronous Orbit List – II (Distance above the Equator) (1) 700 – 800 km (2) 35,800 km (3) 500 – 2000 km (4) 35,785 km Code – (a) (A)-3, (B)-4, (C)-1, (D)-2 (b) (A)-2, (B)-3, (C)-4, (D)-1 (c) (A)-4, (B)-1, (C)-3, (D)-2 (d) (A)-3, (B)-4, (C)-2, (D)-1

A. (A)-3, (B)-4, (C)-1, (D)-2
B. (A)-2, (B)-3, (C)-4, (D)-1
C. (A)-4, (B)-1, (C)-3, (D)-2
D. (A)-3, (B)-4, (C)-2, (D)-1

Ans: A

Civil Judge -2022

This question tests knowledge of different types of Earth orbits and their typical altitudes. The most well-defined are Geo Synchronous Orbit and Sun Synchronous Orbit. The distinction between "Polar Earth Orbit" and "Sun Synchronous Orbit" in terms of altitude ranges and the assignment of a high altitude to "Parking Orbit" are points of confusion.

12. As the height of satellite above earth surface increases, the time taken to complete the orbit -

A. Remains same
B. Decreases
C. Increases
D. May increase or decrease

Ans: C

Civil Judge -2022

The time period of a satellite orbiting a celestial body (like Earth) is related to the radius of its orbit. According to Kepler's Third Law and Newtonian gravitation, a larger orbital radius implies a longer orbital period (time to complete one orbit). This is because the satellite has to travel a greater distance, and the gravitational force pulling it towards the

Earth is weaker at higher altitudes, resulting in a slower orbital speed.

Definition and Scope of Space Science and Technology

13. With respect to India's nuclear programme, consider the following statements :

- **(i) ADITYA is the name of India's indigenously developed tokamak.**
- **(ii) ADITYA is a breeder reactor.**
- **(iii) ADITYA is a fusion reactor.**
- **(iv) ADITYA is a fission reactor.**

Select the correct statement(s) using the codes given below.

A. Only (i)
B. Only (i) and (ii)
C. Only (i) and (iii)
D. Only (i) and (iv)

Ans: C

APSC CCE Prelims Exam-2022

ADITYA is indeed the name of India's first indigenously developed tokamak, located at the Institute for Plasma Research (IPR) in Gandhinagar. A tokamak is a machine designed to harness the energy of nuclear fusion. Thus, ADITYA is a device used for fusion research.

14. Which one of the following statements is correct regarding LOFAR (Low Frequency Array) ?

A. It is the world's most powerful radio antenna.
B. It is a space technology launched by NASA to discover exoplanets.
C. It is an arrangement of satellites in space for the purpose of creating Satellite Navigation System.
D. It is a wireless communication technology for 5G services.

Ans: A

UPSC CDS-1-2022

It is not a single antenna but an array of antennas that work together using advanced data processing to synthesize a large effective aperture, giving it high sensitivity and resolution.

15. The word "Roc" is often seen in news is related to which of the following?

A. Satellite to study stratosphere
B. Largest aircraft
C. Helium balloon to study stratosphere
D. Drone to study upper atmosphere

Ans: B

GPSC Prelims CSP-2-2023

The Stratolaunch Roc is a twin-fuselage aircraft designed primarily to serve as a carrier aircraft for launching air-breathing hypersonic vehicles or rockets from high altitudes.

16. Find out the Indian scientist Dr. Vikram Sarabhai's contributions from the options listed below:

- **1. Founded the Physical Research Laboratory in Ahmedabad.**
- **2. Chairman, Atomic Energy Commission of India.**
- **3. Won Nobel Prize in physiology and medicine.**
- **4. Won Nobel Prize in physics.**

Select the correct answer using the code given below:

A. 1 and 2
B. 1 and 3
C. 1, 2 and 4
D. 1 and 4

Ans: A

GPSC Prelims CSP-2-2023

Vikram Sarabhai is widely regarded as the father of India's space program and was a key figure in establishing several scientific institutions in India.

17. Where is Vikram Sarabhai Space Centre?

A. Bengaluru
B. Sriharikota
C. Baleswar
D. Thiruvananthapuram

Ans: D

WBCS_Main-Paper-4-2019

VSSC is a major space research centre of the Indian Space Research Organisation (ISRO).

18. Which of the following is India's first Nuclear Reactor ? - Jarlina - Bhaskar - Kalpana - Apsara

A. (1) Jarlina
B. (2) Bhaskar
C. (3) Kalpana
D. (4) Apsara

Ans: D

Asst. Engineer Comb. Comp. Exam (Pre) -2024

Apsara is recognized as India's first nuclear reactor, marking a significant milestone in the country's atomic energy program.

19. Which Nuclear Power Plant has maximum gross power (MWe) in India ?

A. Tarapur Atomic Power Plant – 4
B. Rajasthan Atomic Power Plant – 6
C. Kudankulam Nuclear Power Station – 2
D. Kaiga Generating Station – 4

Ans: C

Assistant Conservator of Forest -2025

Kudankulam Nuclear Power Station Unit 2 has the maximum gross power capacity (MWe) among the listed nuclear power plants in India.

20. India's third research station in Antarctica is

A. Gangotri
B. Maitry
C. Shaurya
D. Bharti

Ans: D

Assistant Engineer (AE) Exam -2012

Bharti is the third Indian research station in Antarctica, commissioned after Gangotri (first) and Maitry (second).

21. India's first indigenously developed Remote Sensing Satellite was launched through -

A. Cape Kennedy
B. Baikonur
C. French Guiana
D. Sriharikota

Ans: D

Civil Judge -2022

Sriharikota is a crucial spaceport for India, enabling the country to launch its satellites independently into orbit.

22. Match the following nuclear plants with their location and give correct answer from the code given below –

(A) Kalapakka (1) Gujarat
(B) Narora (2) Maharashtra
(C) Tarapur (3) U.P.
(D) Kakrapara (4) Tamil Nadu

Code - (a) (A)-1, (B)-2, (C)-3, (D)-4 (b) (A)-2, (B)-3, (C)-1, (D)-4 (c) (A)-4, (B)-3, (C)-2, (D)-1 (d) (A)-3, (B)-2, (C)-4, (D)-1

A. (A)-1, (B)-2, (C)-3, (D)-4
B. (A)-2, (B)-3, (C)-1, (D)-4
C. (A)-4, (B)-3, (C)-2, (D)-1
D. (A)-3, (B)-2, (C)-4, (D)-1

Ans: C

Civil Judge -2022

Nuclear power plants in India are located in specific states. Knowing the location of these major plants is important for geography and general knowledge questions.

23. Professor V. K. R. Rao is associated with which of the following fields?

A. Space technology
B. Bullet train project
C. Satellite designing
D. None of the above

Ans: D

FISHERY OFFICER EXTENSION OFFICER (FO EO) -2020

Professor V. K. R. Rao was an economist, not associated with space technology, bullet trains, or satellite designing.

24. Which one of the following is NOT a satellite?

A. Arya Bhatt
B. Moon
C. Earth
D. Bhaskar

Ans: C

Group B Exam -2012

Satellites orbit larger celestial bodies. The Moon orbits Earth, and Aryabhata and Bhaskar are man-made satellites orbiting Earth. Earth orbits the Sun.

25. Space For Rough Work / रफ कार्य के लिए जगह

A. Option text
B. Option text
C. Option text
D. Option text

Ans: A

Lab Assistant Higher Education (Group C) Exam -2023

This MCQ appears to be a placeholder or an incorrectly formatted question. The options provided are generic "Option text" and there is no actual question content. In such cases, the question itself is not designed to test specific knowledge, but rather the format of the exam. Conventionally, the first option (A) might be selected in the absence of any meaningful content to differentiate the choices.

26. Which space-tech startup has announced the successful space qualification of its P30 Satellite platform?

A. Vikram Lab
B. Pincel Lab
C. Dhruva Space
D. Skyroot Aerospace

Ans: C

GS JE PHE 29 2023 2407-2024

Dhruva Space is the space-tech startup that announced the successful space qualification of its P30 Satellite platform.

27. Which of the following statements is true about India's first prototype fast breeder reactor (FBR) for generation of electricity? - It is situated in Kalpakkam and it uses MOX (mixed oxide) of Plutonium and Uranium as fuel - It is situated in Kudankulam and it uses Uranium-235 as fuel - It is situated in Kaiga and it uses a mixed fuel of Uranium-235 and Thorium-233 as fuel - It is situated in Kota and it uses Thorium-234 as fuel

A. Only 1 is correct
B. 2 and 3 are correct
C. 1, 2 and 3 are correct
D. Only 4 is correct

Ans: A

Paper I Part II General Knowledge AAO AEGCL

India's first prototype fast breeder reactor (PFBR) is located in Kalpakkam and uses MOX fuel.

28. In the context of India's atomic energy programme, which one of the following atomic energy plants uses a 'Fast Breeder Reactor' for generation of electricity?

A. Kudankulam
B. Trombay
C. Kota

D. Kalpakkam

Ans: D

STENO Grade I paper -2025

Knowledge of India's nuclear energy program, including the types of reactors used and their locations, is important for the Science and Technology section of the UPSC exam.

Fundamental Principles of Rocketry and Space Propulsion

29. ISRO has successfully launched GSAT-6A satellite from which rocket vehicle?

A. GSLV-F07
B. GSLV-F09
C. GSLV-F05
D. GSLV-F08

Ans: D

BPSC Prelims Exam-63rd

GSAT-6A was a communication satellite intended to complement GSAT-6, providing mobile communication services.

30. Which of the following space agencies announced that it had successfully used steam to propel its EQUULEUS spacecraft?

A. NASA
B. SUPARCO
C. JAXA
D. More than one of the above

Ans: C

BPSC Prelims Exam-68th

EQUULEUS (Equatorial Lunar Earth point 6U Spacecraft) is a 6U CubeSat that was launched as a secondary payload on NASA's Artemis I mission in November 2022. It used a water-based propulsion system called AQUARIUS (AQUA ResUrses Investigation System) which generates thrust by expelling steam.

31. Consider the following statements regarding Polar Satellite Launch Vehicle (PSLV) and Geo-synchronous Satellite Launch Vehicle (GSLV).

- **GSLV was developed to launch low-Earth Orbit satellites into polar and sun synchronous orbits.**
- **PSLV was developed to launch the heavier INSAT class of geosynchronous satellites into orbit.**

Which of the above statement/s is/are correct?

A. 1 only
B. 2 only
C. Both 1 and 2
D. Neither 1 nor 2

Ans: D

GPSC Prelims CSP-2-2024

- Statement 1 is incorrect: GSLV is for GTO/GEO/MEO launches, while PSLV is primarily for LEO/SSO launches. - Statement 2 is incorrect: PSLV was developed for LEO satellites like IRS, while GSLV was developed to launch the heavier GTO/GEO satellites like INSAT/GSAT that PSLV couldn't carry.

32. Which of the following rocket launchers of ISRO has the heaviest launch capability payload weight wise ?

A. PSLV
B. GSLV
C. ASLV
D. GSLV Mark III

Ans: D

GPSC Prelims CSP-2-2017

GSLV Mark III (now officially named LVM3 - Launch Vehicle Mark 3) is ISRO's heaviest rocket, designed to carry the largest payloads to geostationary transfer orbit (GTO) and the largest satellites into low Earth orbit (LEO).

33. Which of the following pairs is/are correctly matched?

- **1. PSLV- this has four stages that alternate between solid and liquid fuels**
- **2. GSLV- this has three stages, all the three stages use only solid fuels**
- **3. Reusable Launch Vehicle (RLV) - ISRO successfully launched it for three times.**

A. 1, 2 and 3
B. 1 only
C. 2 and 3 only
D. 1 and 2 only

Ans: B

GPSC Prelims CSP-2-2021

- PSLV uses alternating solid and liquid fuel stages. - GSLV stages use a combination of solid, liquid, and cryogenic fuels. - India's Reusable Launch Vehicle program is currently in the technology demonstration phase, not operational flights.

34. Hindustan Aeronautics Limited delivered C32-LH2 to ISRO recently, this is _____ .

A. Biggest Ever Cryogenic Propellant Tank
B. Biggest Ever Launch pad for GSLVs
C. Nano Radar System which tracks the orbit of Satellites
D. None of the above

Ans: A

GPSC Prelims CSP-2-2021

The C32-LH2 is a liquid hydrogen (LH2) tank designed for the cryogenic upper stage of the Geosynchronous Satellite Launch Vehicle Mark III (GSLV Mk III), India's heaviest launch vehicle.

35. _____ is the first private Indian company which successfully testfired a solid propulsion rocket engine named _____ .

A. Skyroot Aerospace, Kalam-5
B. Skyspace Aero systems, Vijay-1
C. SSRY, Vikaram-5
D. None of the above

Ans: A

GPSC Prelims CSP-2-2021

Skyroot Aerospace, a Hyderabad-based space startup, achieved this milestone in December 2020. Kalam-5 is a smaller, subscale model of the solid motor engine they plan to use in their Vikram launch vehicles.

36. The "LOx methane" is recently in news is related to which of the following?

A. Space rocket engine fuel
B. High speed diesel variant
C. Bio-diesel
D. None of the above

Ans: A

GPSC Prelims CSP-2-2023

Liquid oxygen/liquid methane is becoming increasingly popular as a rocket propellant combination due to its performance, relatively low cost, ease of handling, and potential for in-situ resource utilization (particularly methane) for future missions, like those to Mars.

37. Cryogenic engines find applications in :

A. Submarine propulsion
B. Frost-free refrigerators
C. Rocket technology
D. Researches in super-conductivity

Ans: C

HPPSC HPAS Prelims-2013

Cryogenic engines are high-efficiency rocket engines that use extremely cold propellants like liquid hydrogen and liquid oxygen, making them ideal for space launch vehicles.

38. निम्न तापकारी इंजन किसमें प्रयुक्त होते हैं ?

A. पनडुब्बी प्रणोदन
B. तुषाररहित प्रशीतित्र
C. रॉकेट तकनीक

D. अतिचालकता शोध में

Ans: C

HPPSC HPAS Prelims-2013

निम्न तापकारी इंजन (Cryogenic engines) रॉकेट प्रौद्योगिकी में उपयोग किए जाते हैं। ये इंजन प्रणोदक (ईंधन और ऑक्सीकारक) का उपयोग करते हैं जिन्हें बहुत कम तापमान पर तरल अवस्था में संग्रहित किया जाता है। उदाहरण के लिए, तरल हाइड्रोजन और तरल ऑक्सीजन।

39. Rockets are designed to carry :

A. Payloads
B. Scientific instruments
C. Satellites
D. All of the above

Ans: D

OPSC CS Prelims-2016 OPSC CS Prelims-2019

The payload is the cargo that a rocket transports. Scientific instruments and satellites are specific types of payloads.

40. Arrange in the sequence, the ISRO rockets in order of their payload (low to high) :

- **I. Satellite Launch Vehicle (SLV-3)**
- **II. Geosynchronous Satellite Launch Vehicle (GSLV)**
- **III. Polar Satellite Launch Vehicle (PSLV-XL)**
- **IV. Augmented Satellite Launch Vehicle (ASLV)**

Choose the correct answer :

A. I, IV, III, II
B. I, III, IV, II
C. I, II, III, IV
D. I, III, II, IV

Ans: A

TSPSC Group 1 Prelims-2024

ISRO's rocket development followed a progression in payload capacity: - SLV-3 (first successful launch 1980): Designed to carry payloads up to ~40 kg to Low Earth Orbit (LEO). - ASLV (first successful launch 1992): An augmentation of SLV-3, designed to carry payloads up to ~150 kg to LEO. - PSLV (first successful launch 1994): Capable of carrying payloads up to ~1750 kg to Sun-Synchronous Polar Orbit (SSPO) and much higher to LEO. The XL version has enhanced capability. - GSLV (first successful launch 2001): Designed primarily to launch satellites into Geosynchronous Transfer Orbit (GTO) with payload capacity of ~2500 kg (GSLV Mk II) and up to ~4000 kg (GSLV Mk III) to GTO, and even higher to LEO.

41. With reference to "PraVaHa" software developed by ISRO, which of the following statements is/are correct?

- **1. It is a path-breaking feat by Vikram Sarabhai Space Centre.**
- **2. Initial aerodynamic design of space vehicles requires evaluation of large number of configurations.**

Select the correct answer from the codes given below:

A. Only 2
B. Neither 1 nor 2
C. Only 1
D. Both 1 and 2

Ans: D

UPPCS Prelims-2024

- PraVaHa is a computational fluid dynamics (CFD) software tool. - Developed by VSSC, ISRO. - Used for aerodynamic analysis and design of launch vehicles and space vehicles. - Aiding in the efficient evaluation of diverse vehicle configurations during the design phase.

42. Consider the following statements:

- **1. Aluminium powder is used as a solid fuel for rocket engines.**
- **2. Compared to liquid fuel propelled rocket engines, the thrust per amount of fuel burned is higher in solid fuel propelled rocket engines.**

Which of the statements given above is/are correct?

A. 1 only
B. 2 only
C. Both 1 and 2
D. Neither 1 nor 2

Ans: A

UPSC CAPF-2022

- Aluminium powder is a common ingredient in solid rocket propellants, acting as a fuel. - Specific impulse (Isp) is a measure of rocket engine efficiency, representing thrust per unit weight flow rate of propellant, or exhaust velocity. - Liquid propellants, especially cryogenic ones like LH2/LOX, generally achieve higher specific impulse than solid propellants. - Higher specific impulse means more thrust generated per amount of fuel burned (by mass).

43. Which one of the following aerospace companies designed and manufactured 'Falcon 9', a reusable rocket?

A. Blue Origin
B. Boeing
C. Lockheed Martin
D. SpaceX

Ans: D

UPSC CAPF-2022

SpaceX is a prominent American aerospace manufacturer and space transportation services company founded by Elon Musk. It is known for developing reusable rocket technology, including the Falcon 9 and Falcon Heavy launch vehicles, and the Starship spacecraft.

44. What is 'Greased Lightning-10 (GL-10)', recently in the news?

A. Electric plane tested by NASA
B. Solar-powered two-seater aircraft designed by Japan
C. Space observatory launched by China
D. Reusable rocket designed by ISRO

Ans: A

UPSC IAS-2016

GL-10 is a drone prototype developed by NASA, known for its electric propulsion and VTOL capabilities.

45. With reference to radioisotope thermoelectric generators (RTGs), consider the following statements :

- **RTGs are miniature fission reactors.**
- **RTGs are used for powering the onboard systems of spacecrafts.**
- **RTGs can use Plutonium-238, which is a by-product of weapons development.**

Which of the statements given above are correct ?

A. 1 and 2 only
B. 2 and 3 only
C. 1 and 3 only
D. 1, 2 and 3

Ans: B

UPSC IAS-2024

RTGs are reliable, long-lasting power sources suitable for applications where maintenance is impossible and solar power is not viable. They convert heat from radioactive decay into electricity using thermoelectric converters, with no moving parts, making them highly durable.

46. Which one of the following organizations successfully conducted the first Pre-Burner Ignition trial for a semi-cryogenic engine (SCE)-200 ?

A. ISRO