UNIQUE STUDY POINT

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Class: VI	**Subject:** Science	**Session:** 2025-26
Chapter: 12 - Beyond Earth	**Time:** 1½ Hours	**Max. Marks:** 40

General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five sections A, B, C, D and E.
3. Section A contains 10 MCQs of 1 mark each.
4. Section B contains 4 questions of 2 marks each.
5. Section C contains 3 questions of 3 marks each.
6. Section D contains 1 question of 5 marks.
7. Section E contains 2 Case Study Based questions of 4 marks each.

SECTION A - Multiple Choice Questions (1 mark each)

Q1. Which planet has the most moons?

(a) Earth

(b) Mars

(c) Jupiter

(d) Venus

Q2. The star nearest to us after the Sun is:

(a) Sirius

(b) Proxima Centauri

(c) Betelgeuse

(d) Aldebaran

Q3. The three stars in the middle of Orion constellation represent:

(a) The hunter's sword

(b) The hunter's belt

(c) The hunter's bow

(d) The hunter's shield

Q4. Which of the following planets does NOT have a solid surface?

(a) Mercury

(b) Venus

(c) Mars

(d) Jupiter

Q5. The circular bowl-like structures on the Moon's surface are called:

(a) Valleys

(b) Craters

(c) Mountains
(d) Plains

Q6. Halley's Comet appears every:
(a) 27 years
(b) 50 years
(c) 76 years
(d) 100 years

Q7. In Sanskrit, what is a comet called?
(a) Tārā
(b) Dhūmaketu
(c) Nakṣhatra
(d) Graha

Q8. The Pole Star is also known as:
(a) Sirius
(b) Polaris
(c) Betelgeuse
(d) Vega

Q9. Which planet is known for its prominent ring system?
(a) Mars
(b) Jupiter
(c) Saturn
(d) Uranus

Q10. Galaxies contain:
(a) Thousands of stars
(b) Millions to billions of stars
(c) Only planets
(d) Only one star system

SECTION B - Short Answer Questions (2 marks each)

Q11. Why is it easier to identify Venus in the night sky compared to other planets?

Q12. What is the Indian name for the Pole Star? In which constellation is it located?

Q13. Define the term "satellite". Give one example each of a natural and an artificial satellite.

Q14. Why are there craters on the Moon's surface? Why do they remain for a long time?

SECTION C - Short Answer Questions (3 marks each)

Q15. Explain how to locate the star Sirius using the constellation Orion as a guide.

Q16. What are exoplanets? Why do scientists search for them? What are they looking for?

Q17. Describe the significance of the Sun in our Solar System. Why can't we see other stars during the day?

SECTION D - Long Answer Question (5 marks)

Q18. Write detailed notes on the planets of our Solar System, covering:

(i) The eight planets in order

(ii) Classification into inner and outer planets

(iii) Key characteristics of inner planets

(iv) Key characteristics of outer planets

(v) Special features of at least three planets

SECTION E - Case Study Based Questions (4 marks each)

Q19. Case Study 1: Ancient Navigation using Stars

In ancient times, before the invention of the magnetic compass and modern navigation tools, sailors and travelers depended heavily on celestial navigation. They used stars and constellations to find their way across vast oceans and through unknown lands. The Pole Star was particularly valuable in the Northern hemisphere as it indicated the North direction throughout the night. Sailors memorized star patterns and their positions at different times of the year. Caravans passing through the Nubra region in Ladakh also used stars to find directions during their journeys.

Based on the above passage, answer the following questions:

(a) What is celestial navigation? (1 mark)

(b) Why was the Pole Star particularly useful for navigation? (1 mark)

(c) Who used star-based navigation in ancient times? (1 mark)

(d) Is star-based navigation still relevant today? Explain. (1 mark)

Q20. Case Study 2: Understanding Galaxies

When we observe the night sky from very dark locations, we can see a faint band of light stretching across the sky. This is our home galaxy - the Milky Way Galaxy. A galaxy is a massive collection of stars, gas, dust, and other celestial objects bound together by gravity. Our Solar System is just a tiny part of the Milky Way, which contains hundreds of billions of stars. Beyond the Milky Way, there are countless other galaxies in the Universe. Scientists use powerful telescopes to study these distant galaxies to understand more about the Universe, its origin, and its evolution.

Based on the above passage, answer the following questions:

(a) What is a galaxy? (1 mark)

(b) What is the name of our home galaxy? (1 mark)

(c) Where is our Solar System located in relation to galaxies? (1 mark)

(d) Why do scientists study other galaxies? (1 mark)

DETAILED ANSWER KEY - PAPER 03

SECTION A - Answers to MCQs

Ans 1. (c) Jupiter

Jupiter has the largest number of moons among all planets in our Solar System, with more than 90 known moons discovered so far.

Ans 2. (b) Proxima Centauri

Proxima Centauri is the star nearest to us after the Sun, located at a distance of about 269,000 astronomical units.

Ans 3. (b) The hunter's belt

The three bright stars in the middle of Orion form a short straight line that represents the belt of the hunter.

Ans 4. (d) Jupiter

Jupiter is a giant gaseous planet and does not have a solid surface. Mercury, Venus, and Mars all have solid rocky surfaces.

Ans 5. (b) Craters

The circular bowl-like structures on the Moon's surface are called craters, formed mainly due to asteroid and rock impacts.

Ans 6. (c) 76 years

Halley's Comet appears approximately every 76 years. Its last appearance was in 1986.

Ans 7. (b) Dhūmaketu

In Sanskrit and several other Indian languages, a comet is called Dhūmaketu, meaning an object with smoke or tail.

Ans 8. (b) Polaris

The Pole Star is also known as Polaris. In India, it is known as Dhruva tārā.

Ans 9. (c) Saturn

Saturn is particularly famous for its prominent and extensive ring system, though all outer planets have rings.

Ans 10. (b) Millions to billions of stars

A galaxy contains millions to billions of stars along with gas, dust, and other celestial objects.

SECTION B - Answers to Short Answer Questions

Ans 11. Why is it easier to identify Venus in the night sky compared to other planets?

Venus is easier to identify in the night sky because:

(i) **Exceptional Brightness:** After the Sun and the Moon, Venus is the brightest object in the sky, making it easily noticeable

(ii) **Predictable Timing:** Venus is typically visible either at dawn (as the Morning Star) or at dusk (as the Evening Star), which makes it easy to know when and where to look
(iii) **Steady Light:** Unlike stars, Venus does not twinkle, which helps distinguish it from surrounding stars

Ans 12. What is the Indian name for the Pole Star? In which constellation is it located?

Indian Name: The Pole Star is known as **Dhruva tārā** in India.

Constellation: It is located in the constellation **Ursa Minor**, which is also called the Little Dipper.

Note: The Pole Star (Polaris) appears stationary in the northern sky and always points towards the North direction.

Ans 13. Define the term "satellite". Give one example each of a natural and an artificial satellite.

Definition: A satellite is any object that moves around (orbits) a larger object in space. In general, any object that revolves around a much larger object can be called a satellite.

Examples:

(i) **Natural Satellite:** The Moon - Earth's natural satellite that has been orbiting our planet for billions of years
(ii) **Artificial Satellite:** Communication satellites, GPS satellites, or the International Space Station (ISS) - human-made objects launched into orbit for specific purposes

Ans 14. Why are there craters on the Moon's surface? Why do they remain for a long time?

Formation of Craters: Most craters on the Moon's surface have been formed due to the impact of asteroids or rocks from space hitting the Moon's surface at high speeds.

Why they remain for a long time:

(i) The Moon has no atmosphere, so there is no wind or weather to erode the craters
(ii) There is no water on the Moon to cause weathering
(iii) There is no geological activity or life to alter the surface features
(iv) Therefore, these impact features remain preserved on the Moon's surface for millions or even billions of years

SECTION C - Answers to Short Answer Questions

Ans 15. Explain how to locate the star Sirius using the constellation Orion as a guide.

Method to locate Sirius using Orion:

Step 1: First, identify the constellation Orion in the night sky. Orion is best viewed in India from December to April after sunset.

Step 2: Look for the three bright stars that form a short straight line in the middle of Orion. These three stars represent the hunter's belt and are the easiest feature to identify in Orion.

Step 3: Once you have located the three belt stars, imagine a straight line passing through all three of them.

Step 4: Extend this imaginary line towards the East (left side if facing south).

Step 5: Follow this line, and it will lead you to an extremely bright star. This is Sirius, the brightest star in the night sky.

Additional Information:

Sirius is located in the constellation Canis Major (the Greater Dog), which is imagined to be the hunter Orion's dog. Sirius is so bright that it is hard to miss once you know where to look for it.

Ans 16. What are exoplanets? Why do scientists search for them? What are they looking for?

What are Exoplanets:

Exoplanets (or extrasolar planets) are planets that exist outside our Solar System. These are planets that revolve around other stars in our galaxy or in other galaxies.

Why scientists search for them:

(i) To understand how common planetary systems are in the Universe
(ii) To study the formation and evolution of planets
(iii) To search for conditions that might support life
(iv) To expand our knowledge about the diversity of planetary systems

What scientists are looking for:

• Scientists are primarily searching for evidence of life beyond Earth
• They look for exoplanets in the "habitable zone" - the region around a star where conditions might be suitable for liquid water to exist
• They search for planets with Earth-like characteristics (size, atmosphere, temperature)
• They analyze the atmospheres of exoplanets for biosignatures - chemical indicators that might suggest the presence of life

Till now, thousands of exoplanets have been discovered, but scientists have not found any definitive evidence of life. However, the search continues and is one of the most exciting areas of modern astronomy.

Ans 17. Describe the significance of the Sun in our Solar System. Why can't we see other stars during the day?

Significance of the Sun in our Solar System:

1. **Central Position:** The Sun is at the center of our Solar System, and all planets, asteroids, comets, and other objects revolve around it.

2. **Largest and Heaviest:** The Sun is the largest and heaviest object in the Solar System, containing more than 99% of the Solar System's mass.

3. **Source of Energy:** The Sun produces almost all the energy in our Solar System through nuclear fusion reactions in its core.

4. **Source of Light:** All objects in the Solar System shine by reflecting sunlight from their surfaces. Without the Sun, everything would be in complete darkness.

5. **Gravitational Control:** The Sun's immense gravitational pull keeps all objects in their orbits around it.

Why we can't see other stars during the day:

We cannot see other stars during daytime because of the extreme brightness of the Sun. The Sun is much closer to Earth than any other star, making it appear extraordinarily bright. During the day, sunlight illuminates Earth's atmosphere, creating a bright blue sky. This intense brightness completely overwhelms the much dimmer light from distant stars, making them invisible to our eyes. The stars are still present in the sky during the day, but we simply cannot see them due to the Sun's overwhelming brightness.

This is similar to how a candle flame is invisible when viewed next to a powerful searchlight - the brightness of one overwhelms the other.

SECTION D - Answer to Long Answer Question

Ans 18. Write detailed notes on the planets of our Solar System.

PLANETS OF OUR SOLAR SYSTEM

(i) The Eight Planets in Order:

The eight planets in order of their increasing distance from the Sun are:

1. Mercury - Closest to the Sun
2. Venus - Hottest planet
3. Earth - Our home planet
4. Mars - The Red Planet
5. Jupiter - Largest planet
6. Saturn - Planet with prominent rings
7. Uranus - Ice giant that rotates on its side
8. Neptune - Farthest from the Sun

(ii) Classification into Inner and Outer Planets:

Inner Planets (Terrestrial Planets): Mercury, Venus, Earth, and Mars

These four planets are nearest to the Sun and are smaller in size.

Outer Planets (Gas Giants/Ice Giants): Jupiter, Saturn, Uranus, and Neptune

These four planets are farther from the Sun and are much larger in size.

(iii) Key Characteristics of Inner Planets:

- **Size:** Smaller in size compared to outer planets
- **Composition:** Have solid surfaces made of rocks and metals
- **Density:** Higher density due to rocky composition
- **Moons:** Have few or no moons (Earth has 1, Mars has 2, Mercury and Venus have none)
- **Rings:** Do not have ring systems
- **Atmosphere:** Thin atmospheres or no atmosphere (Mercury)
- **Surface Features:** Show craters, mountains, valleys, and other geological features

(iv) Key Characteristics of Outer Planets:

- **Size:** Much larger than inner planets (called "giant planets")
- **Composition:** Mostly made of gases like hydrogen and helium, with possible rocky cores
- **Density:** Lower density; some could even float on water
- **Moons:** Have numerous moons (Jupiter has over 90)
- **Rings:** All have ring systems made of dust particles and rocky material

- **Atmosphere:** Thick gaseous atmospheres
- **No Solid Surface:** Cannot land on them as they don't have solid surfaces
- **Temperature:** Much colder as they are farther from the Sun

(v) Special Features of Specific Planets:

1. Venus:

- Known as the "Morning Star" or "Evening Star" (though it's a planet, not a star)
- After the Sun and Moon, it is the brightest object in the sky
- Hottest planet in the Solar System despite not being closest to the Sun
- Has a thick atmosphere that traps heat through greenhouse effect
- Surface temperature can reach 470°C
- In Indian astronomy, it is known as Śhukra

2. Mars:

- Called the "Red Planet" because its soil is reddish in color
- Has two small moons named Phobos and Deimos
- Shows evidence of ancient river valleys and polar ice caps
- Target of many space missions to search for signs of past or present life
- In Indian astronomy, it is known as Mangala

3. Saturn:

- Most famous for its spectacular and extensive ring system
- Rings are made of countless particles of ice and rock
- Second largest planet in the Solar System
- Has more than 80 known moons
- So low in density that it could theoretically float on water
- In Indian astronomy, it is known as Śhani

Additional Important Points:

- Earth is unique as it is the only known planet to support life
- Earth is also called the "Blue Planet" due to large water coverage
- All planets revolve around the Sun and also rotate on their own axes
- The farther a planet is from the Sun, generally the longer it takes to complete one revolution

SECTION E - Answers to Case Study Based Questions

Ans 19. Case Study 1: Ancient Navigation using Stars

(a) What is celestial navigation?

Celestial navigation is the practice of using celestial bodies (stars, the Sun, the Moon, and planets) to determine one's position and direction. It involves observing the positions of these objects in the sky to navigate across oceans and land, especially when there are no landmarks available.

(b) Why was the Pole Star particularly useful for navigation?

The Pole Star was particularly useful for navigation because:

(i) It appears stationary in the North direction throughout the night
(ii) It doesn't move like other stars, making it a reliable fixed point of reference

(iii) By locating the Pole Star, navigators could always determine which direction was North
(iv) Once North was known, all other directions (South, East, West) could be easily determined

(c) Who used star-based navigation in ancient times?

Star-based navigation was used by:

(i) Sailors and mariners who traveled across vast oceans
(ii) Travelers and explorers journeying through unknown lands
(iii) Caravans passing through deserts and mountain regions like Nubra in Ladakh
(iv) Merchants traveling along trade routes
(v) Nomadic tribes moving across large territories

(d) Is star-based navigation still relevant today? Explain.

Yes, star-based navigation is still relevant today, though not as the primary method. Here's why:

(i) It is taught as a backup navigation method in case modern technology (GPS, electronic instruments) fails
(ii) Military and emergency services train personnel in celestial navigation for survival situations
(iii) Some traditional sailors and enthusiasts still practice it to maintain the skill
(iv) It is useful in remote areas where modern navigation equipment might not work
(v) Understanding celestial navigation enhances our connection with nature and astronomical knowledge

Ans 20. Case Study 2: Understanding Galaxies

(a) What is a galaxy?

A galaxy is a massive collection of stars, gas, dust, and other celestial objects bound together by gravity. Galaxies contain millions to billions of stars along with planetary systems, nebulae, and other cosmic matter.

(b) What is the name of our home galaxy?

Our home galaxy is called the **Milky Way Galaxy**. In India, it is also known as **Ākāśha Gangā**.

(c) Where is our Solar System located in relation to galaxies?

Our Solar System is located within the Milky Way Galaxy. It is just a tiny part of this vast galaxy, which contains hundreds of billions of stars. The Solar System is positioned in one of the spiral arms of the Milky Way, relatively far from the galactic center. Beyond the Milky Way, there are countless other galaxies in the Universe.

(d) Why do scientists study other galaxies?

Scientists study other galaxies to:

(i) **Understand the Universe:** Learn about the structure, composition, and vastness of the Universe
(ii) **Study Origins:** Understand how galaxies form, evolve, and change over billions of years
(iii) **Cosmic History:** Study the origin and evolution of the Universe itself (cosmology)
(iv) **Dark Matter and Energy:** Investigate mysterious phenomena like dark matter and dark energy
(v) **Star Formation:** Study how stars and planetary systems form in different galactic environments

(vi) **Comparative Study:** Compare other galaxies with the Milky Way to understand our galaxy better

(vii) **Search for Life:** Understand the conditions across the Universe that might support life

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