Universe

Stars

- Stars are self-lighted whereas the planets shine only when they receive the light from the stars. The planets revolve around the sun.
- The vast unbounded but finite surrounding space is called universe. The universe includes everything that exists: galaxies, stars, planets, satellites, asteroids, comets, meteors and all other heavenly bodies.
- The stars, the sun, the moon, planets and shooting stars are some of the celestial bidies that are a part of our universe.
- The apparent motion of the stars in the sky is due to the rotation of the earth on its own axis.
- The stars appear to move from east to west, because the earth moves from west to east.
- The pole star appears to be stationary and does not change its position with time because it lies on the axis of rotation of the earth which is fixed in space and does not change with time.

Big Bang Theory

The whole of the matter of the universe was concentrated in a very dense and got fire fall about 20 billion years ago, an explosion occurred. The matter was broken into pieces in the form of stars and galaxies. The faster moving galaxies have gone farther than the slower ones. A galaxy situated at 20 billion light years is the boundary of universe.

- One light-year = 30,0000 × 365 × 24 × 60 × 60 km = 9460000000000 kilometres = 9.46×10^{12} kilometres.
- A galaxy is a cluster of millions of stars along with hydrogen gas and dust. There are millions of galaxies in the universe.
  In fact, galaxies are the building bricks of the universe.
- The name of our galaxy is the Milky Way. The Milky Way is one of the millions of galaxies which exist in the universe. It contains about a hundred billion stars (or 10^{11} stars). The view of Milky Way galaxy looks like a disc of stars.
- Milky way is a spiral galaxy. Its mass is 150 solar masses (i.e. 3×10^{41} kg).
- The distance between the sun and the earth is about 15 crore kilometers. The light reaches from the sun to the earth in about 8.3 minutes. The next nearest star from the earth is about 4.3 light-year4s away from it known as Proxima Centaury. The brightest star Sirus is about 8.7 light-years away from the earth.
- A spinning neutron star emits radiowaves and is commonly known as a pulsar.

Cosstellations

- The stars which appear in the form of closed groups and form some recognizable shapes and patterns are known as constellations.
- Some of easily recognizable constellations are Ursa Major (or Great Bear) Ursa Minor or laghu Saptarishi. Orion or Scorpio.
- One of the most famous constellations which you can see in the night sky is Ursa Major. It is also known as the Big Dipper, the Great Bear or the Saptarishi. It is because the Ursa Major constellation consists of seven bright stars which are arranged in a pattern resembling somewhat a big bear.
- Orion is one of the well-known and most impressive constellations. Orion is also known as 'Hunter'. The Indian name of Orion is 'Kalpurush'. The Orion constellation consists of seven bright stars (and several faint stars.) the three middle stars represent the belt of the hunter. You can easily locate this constellation in the sky in the late evenings.
- Cygnus is a group of five stars which forms a cross like a swan.

Plaets

- The 'planet' are those (bright) heavenly bodies that revolve round the sun. They look like stars but they do not twinkle, Their observed brightness is only due to the light of the sun reflected by them. There are eight planets now in our solar system. They move in elliptical shaped paths called orbits around the sun. The eight planets of our solar system, in increasing order of their distances from the sun are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. The planets, relatively nearer to the sun have features that are quite different form those which are 'for off. We can divide the planets into two categories:
  (i) The terrestrial planets, and
  (ii) The Jovian planets.
  Mercury Venus, Earth and Mars are the terrestrial planets. They have solid and rocky surfaces.
  The Jovian planets are Jupiter, Satum, Uranus and Neptune. These planets are very large in size and are made up largely of gasses.

(i) Mercury (Budh) :

Mercury lies closer to the sun than any other planet. It is a dry. Hot and virtually airless planet. It has craters like the moon, but its interior is similar to that of the earth. Like the earth, its interior contains iron and other heavy elements, Mercury is much smaller in size than heavy elements. Mercury is much smaller in size than the earth. It is occasionally visible just before sunrise the earth. It is occasionally visible just before sunrise of immediately after sunset. Hence, it is often known as morning or evening star. Being close to the sun, it takes only **88 earth days** to go once around the sun.

(ii) Venus (Shukra):

Venus is the brightest object in our sky after the sun and the moon. Its bright appearance is cue to its cloudy atmosphere which reflects almost three- fourth of the sunlight falling on it. Venus is almost of the same size as the earth but rotates relatively slowly around its axis. It has no moon or satellite of its own. Venus is even hotter than mercury though it is

relatively farther away from the sun. This is because of the high percentage of carbon dioxide in its atmosphere. This gas traps most of the sun's heat falling on it. This is due to an effect called the greenhouse effect. Venus is also known as incoming or evening star as it is usually visible only during these times.

(iii) Earth (Prithvi):
The earth is a very unique and special planet of our solar system. Like the other planets, the earth not only revolves round the sun but also rotates about an (imaginary) axis of its own. The portion of the earth facing the sun at any time has day, the other portion fading away has night. As the earth rotates on its axis, 'day & light' follow one another. The axis of rotation of the earth is known to be tilted with respect to its orbit. It completes one revolution around the sun in nearly 365% days. When the northern hemisphere is tilted towards the sun, it is summer there. At that time, it is winter in the southern hemisphere. The reverse happens when the northern hemisphere is tilted away from the sun. Autumn and spring occur when the earth is in between these two extreme positions in its orbit.

(iv) Mars (Mangal):
Mars usually appear reddish in colour, hence it is also often known as the red planet. Its surface resembles a cold, high altitude desert. Its atmosphere consists primarily of carbon dioxide, along with small amount of nitrogen, oxygen, water vapour and other gases. Its surface temperature and surface pressure are both very low. These conditions make it unlikely for water to exist in a liquid state on this planet. The diameter of mars is only a little more than half of that of earth. Its mass is, however, only one-tenth of that of earth. Mars, therefore has a low average density as compared to the earth. Mars has two natural satellites or moons named Phobos and Deimos.

(v) Jupiter (Brihaspati):
It is the largest of all planets. Its volume is 1,300 times more than that of the earth. It has its own colourful bands. These are believed to be due to its strong atmospheric currents and the dense cloud cover around it. Jupiter consists mainly of hydrogen and helium in gaseous form. Its cloud cover is made up of methane in gaseous form, with some ammonia in crystalline form. Jupiter is known to have 63 moons or satellites with the maximum number of moons.

(vi) Saturn (Shani):
Saturn is quite similar to Jupiter in size, mass and composition. It is the second largest planet of the solar family. It is distinguished by its very unique and special system of rings. These rings give it a beautiful appearance. There are three distinct rings surrounding this planet. These rings can be seen clearly only with the help of a telescope. Galileo was the first to observe these rings with the telescope. Saturn is known to have 30 natural satellites or moons of its own.

(vii) Uranus (Arun):
This is also a very large planet. It, infact is the third largest planet of the solar system. Its diameter is almost four times than that of the earth. It can contain as many as (vearly) 64 earths in it. Hydrogen and methane have been detected in the atmosphere of this planet. This planet is observed to have blue-green colours. This is believed to be because of the presence of methane gas in its cold, clear atmosphere. Its northern hemisphere remains in a four-decade long period of darkness because of the way the planet rotates. So far 21 satellites or moons of Uranus have been discovered.

(viii) Neptune (Verun):
It is very far away from the sun and is visible only through a telescope. It has been named after the Roman sea god Neptune. Neptune has 8 satellites revolving around it.

Comets

❖ Apart from planets and asteroids there are some other heavenly (or celestial) bodies which revolve around the sun in highly elliptical orbits. These are comets. Comets are very small sized celestial bodies. They become visible from the earth only when they come close to the sun. they are characterized with a small head followed with a long tail.

The length of the tail of a comet grows in size as it approaches the sun. The tail disappears again when the comet moves away from the sun. However. The tail of a comet is always directed away from the sun. Many comets are known to appear again and again after a definite period of time. One such comet is known as Halley's comet, which appears nearly after 76 years. Halley's comet was last seen in early 1986.

Meteors

Meteors are very small stone-like objects that are revolving around the sun. their existence becomes known only when some of them enter by chance into the earth's atmosphere. When a meteor enters the atmosphere of the earth, it gets heated due to the friction of air. The heat produced is so high that the meteor begins to glow and evaporates within a short-time. The path of the meteor, therefore, appears as a streak of light in the night sky. The meteor are commonly known as shooting stars although they are not stars.

Asteroids

There is a large gap in between the orbits of the mars and Jupiter. This gap is occupied by a large number of small bodies that revolve around the sun these are

called asteroids (meaning star like) or minor planets. The largest asteroid Ceres has a diameter of 1000 km while smallest of them may be only one kilometer across.

Satellite

A satellite is a heavenly (or celestial) body that revolves around another heavenly body. The earth has only one natural satellite, the moon. Some planets, like the Jupiter, Satum and Neptune, has more than one natural satellites or moons.

The satellites like Aryabhata or INSAT-3B are example of man-made or artificial satellite. The artificial satellites also revolve around t he earth like its natural satellite, the moon. However, They are much closer to the earth than the moon. Russia was the first to send an artificial satellite around the earth. This was followed by America and other countries including China and India. Aryabhata, Bhaskar, Apple, INSAT, I,II and 3B are some artificial satellites sent around the earth by India.

Remote Sending

Remote sensing means collecting information from a distance. This technology is used to collect information about weather, agriculture, land and ocean features including movement of fishes in oceans.

Sun

The sun is made of different layers of gases. The sun is composed mainly of hydrogen gas (93%), helium (5%) and heavier elements (2%). The surface layer we see is called photosphere. Here, gas swirls and bubbles about, giving the sun a mottled look. Surrounding the photosphere is an unseen layer of gas called the chromosphere. Above this a layer of gas called the corona which means 'crown'.

- ❖ Gravitational pull of the sun is 28 times the gravity of the Earth. A body weighing 1 Kgwt on the Earth will weigh 28 kgwt on the sun.
- ❖ The nearest star from the earth other than sun is Alpha Centaury.

Lunar Eclipse

A lunar eclipse happens when the Earth passes between the sun and the moon. Lunar eclipses can only happen when there is a full moon. As the Moon's orbit takes it behind the earth, a shadow crosses the face of the full Moon. The shadow does not always cover the entire Moon in a total eclipse. There are also partial and penumbral lunar eclipses. There are two or three lunar eclipses each year. The best pictures come from a total lunar eclipse. If you hear about a lunar eclipses, feel free to look up. You are safe to look at.

Solar Eclipse

Solar eclipses are more spectacular than lunar eclipses, but much more dangerous for your eyes. Never look directly at a solar eclipse (or the Sun for that matter). Solar eclipses happen when the Moon passes between the sun and the earth. The moon casts a shadow over a portion of the planet, leaving that area in darkness. If you were watching from space, you could see the shadow pass over the surface. You would also notice that the moon's shadow only covers a part of the planet because the earth is much larger than the moon. A lunar eclipse can put the entire surface of the moon in darkness.

There are one or two solar eclipses each year. The shadow moves across different areas of the planet. Depending on the location of the moon, there are total and annular eclipses. A total solar eclipse happens when the moon blocks the enture sun. An annular eclipse only covers some of the sun. A little ring of the sun can be seen around the moon. There are different eclipse because the moon can be closer or further away from the surface of the earth.

Black hole

The name black hole is given because its gravity is so high that it prevents even light to radiate into space.

EXERCISE

1. The branch of science which deals about the universe and heavenly bodies is called:
(A) astrology (B) astronomy
(C) biology (D) anatomy

2. Phases of moon are observed because:
(A) the moon does not reflect sunlight
(B) the sunlight reflected by some parts of moon reaches the earth
(C) the shadow of Earth falls on the moon
(D) only some part of the moon can emit light

3. Pole Star belongs to the constellation:
(A) Ursa Major (B) Ursa Minor
(C) Orion (D) Jupiter

4. Black hole is:
(A) hole in the ozone layer of atmosphere
(B) hole in earth's centre

(C) highly dense matter available in the atmosphere
(D) hole in troposphere

5. The first step in the formation of a star from gases is :
(A) Protostar (B) Neutron star
(C) Red-giant star (D) Pulsar

6. The planet farthest from the sun is :
(A) Jupiter (B) Neptune
(C)Mercury (D) Satum

7. How many moons does Satum have :
(A) 5 (B) 28
(C) 30 (D) 12

8. Asteroid are :
(A) small planets
(B) Shooting stars
(C) found in a belt between earth and Venus
(D) none of these

9. Which of the following is a star ?
(A) Alpha Centaury (B) Deimos
(C) Orion (D) Phobos

10. Ursa Major is :
(A) a star
(B) seen only with a telescope
(C) a constellation
(D) a natural satellite of Mars

11. An exploding star may be called :
(A) Nova (B) Supemova
(C) Protostar (D) Neutron star

12. According to the astronomers the Universe is :
(A) expanding (B) contracting
(C) remains same (D) none of these

13. The first artificial satellite was :
(A) Sputnik-I (B) Explorer-I
(C) Aryabhatta (D) Luna-3

14. The Indian name of Scorpio constellation is :
(A) Mangal (B) Shani
(C) Dhruva Matsya (D) Vrishchika

15. Varun is the Indian name of the :
(A) Venus (B) Jupiter
(C) Uranus (D) Neptune

16. Co_2 gas is found in which of the following pairs of the planet ?
(A) Earth and Mercury (B) Mercury and Satum
(C) Venus and Satum (D) Venus and Mars

17. Astronomers currently believe there are…….planets in the solar system :
(A) 6 (B) 8
(C) 11 (D) 13

18. What are the two basic types of planets in the solar system ?
(A) Ice and Gas
(B) Terrestrial and Jovian
(C) Tomaso and Jerrian
(D) None of these

19. Which of these planets have rings?
(A) Satum (B) Neptune
(C) Uranus (D) All of the above

20. he moon's gravity affects the oceans of the Earth as seen in…?
(A) currents (B) waves
(C) tides (D) none of these

21. Out of the following, the only one that is a star, is :
(A) Alpha Centauri (B) Jupiter
(C) Halley's Comet (D) The Milky Way

22. The milky way galaxy is :
(A) an irregular galaxy (B) an elliptical galaxy
(C) a spiral galaxy (D) a ring galaxy

23. Number of stars in our galaxy milky way is about :
(A) 1 billion (B) 100 billion
(C) 2500 (D) 5000

24. The core of an active star contains the matter in :
(A) gaseous form (B) liquid form
(C) solid form (D) none of these

25. The planet having no atmosphere on it is :
(A) Earth (B)Venus
(C) mars (D) Mercury

26. Day and night is caused by :
(A) rotation of the earth
(B) revolution of the earth
(C) both rotation and revolution of the earth
(D) neither rotation nor revolution of the earth

27. A spinning neutron star emitting radio waves is called :
(A) Pulsar (B) Supernova
(C) Quasar (D) Black hole

28. Pole star appears to be stationary in all seasons because:
(A) Pole star does not rotate on its axis.
(B) Pole star happens to lie on the axis of equator.
(C) Pole star happens to lie above the axis of north pole of the earth.
(D) Pole star is most distant of all the stars

Direction (29 to 30): Each question contains Statement-1 (Assertion) and Statement-2 (Reason). Each question has 4 choices (I), (II), (III), and (IV) out of which only one is correct.
(I) Statement-1 is true, statement-2 is true, Statement-2 is a correct explanation for Statement-1.

(II) Statement-1 is true, Statement-2 is true, Statement-2 is Not a correct explanation for Statement-1.
(III) Statement-1 is true, Statement-2 is false.
(IV) Statement-1 is false, Statement-2 is true.

29. **Statement-1:** The stars twinkle while the planets do not.
Statement-2: The stars are much bigger in size than the planets.
(A) I (B) II (C) III (D) IV

30. **Statement-1:** Moon is seen as it partly reflects the sun light falling on it.
Statement-2: Moon is a satellite of earth. It does not emit light of its own.
(A) I (B) II (C) III (D) IV

31. The names of the planets in order of increasing distances from the sun are:
(A) earth, jupiter, mars
(B) jupiter, mars, earth
(C) jupiter, earth, mars
(D) earth, mars, jupiter

32. Space appears as:
(A) Blue (B) Black
(C) Orange (D) White

ANSWER – KEY

UNIVERSE

Q.	1	2	3	4	5	6	7	8	9	10
A.	B	B	A	C	A	B	C	A	A	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	A	A	D	D	D	B	B	D	C
Q.	21	22	23	24	25	26	27	28	29	30
A.	A	C	B	A	D	A	A	C	B	A
Q.	31	32								
A.	D	A								