Universe

Question 1:

Select the proper choice from the given multipule choices :

Question 1.1:

Which of the following is a star ?

Solution :

A. Sun
The celestial self-luminous objects, which produce energy on their own in the form of radiation due to thermonuclear fusion process, are called stars. Example:
Sun.

Question 1.2:

Which of the following is not a member of the solar system ?

Solution :

D. Artificial satellite
Asteroids, shooting star and Sun are the members of the solar system. Artificial satellite is a man-made satellite and not a part of the actual solar system.

Question 1.3:

What is the periodic time of Halley's comet ?

Solution :

B. 76 years
Halley's comet comes close to the Sun every 76 years.

Question 1.4:

Matter in the core region of the sun is in…….. State.

Solution :

D. Plasma
Due to high temperature in the core of the Sun, matter in its core region is in the plasma state.

Question 1.5:

……is the most brilliant planet of the solar system.

Solution :

B. Venus

Question 1.6:

Poles of Mars are covered by…….

Solution :

A. dry-ice

Question 1.7:

…….was the first person to land the moon.

Solution :

D. Neil Armstrong
On 21st July 1969, astronaut Neil Armstrong was the first person to land and step on the moon.

Question 1.8:

Distance of geostationary satellite from the earth's surface is…….Km.

Solution :

C. 35,786
Distance of geostationary satellite from the Earth's surface is kept to be 35,786 km, so that its time period of revolution is 24 hours.

Question 2:

Answers the following questions in brief :

Question 2.1:

Write the two uses of artificial satellites.

Solution :

Two uses of artificial satellites are listed below:

1. For communication: Artificial satellites are widely used for telecommunication, television transmission, radio networks, computer networks etc.
2. Weather forecast: Satellites of INSAT series give information regarding weather by taking pictures of clouds, by providing information about surface temperature of oceans, layers of atmosphere, humidity, etc. They also help predict about the monsoons, storms etc.

Question 2.2:

What are stars and what are they made up of ?

Solution :

The celestial self-luminous objects, which produce energy on their own in the form of radiation due to thermonuclear fusion process, are called stars. Example:
Sun.
Stars are spheres of gases like hydrogen and helium.

Question 2.3:

Give difference between earth-centred and sun-centred models.

Solution :

The ‘Earth-centred’ or ‘geocentric’ model of solar system proposed by Ptolemy suggested that Earth is the centre of the universe and stationary. All celestial objects orbit around it but the ‘Sun-centred’ model of solar system proposed by Copernicus suggested that Sun is the centre of the solar system and is stationary. All other celestial objects including Earth revolve around it.

Question 2.4:

How X-ray astronomy is useful in space exploration ?

Solution :

X-ray astronomy has helped to take pictures or X-rays of distant galaxies and other celestial bodies by the X-ray telescopes. This has helped in deeper understanding of the celestial objects like neutron stars, black holes, etc.

Question 2.5:

Explain the formation of the solar system in brief.

Solution :

Solar System is estimated to have formed 4.568 billion years ago due to the gravitational collapse of a small part of a giant molecular cloud. Most of the collapsing mass assembled in the centre and the sun was formed. Thus, Sun has 99.86% mass of the solar family. Remaining mass was flattened into orbits and planets, moons, asteroids, meteors, comets, etc. The centripetal force required to keep the celestial bodies in their respective orbits is provided by the gravitational force between the sun and the planets.

Question 2.6:

What are terrestrial planets ?

Solution :

Planets which are found inside the orbit of Mars are known as terrestrial planets.
The terrestrial planets are Mercury, Venus, Earth and Mars.

Question 2.7:

What are jovian planets ?

Solution :

Planets which are found outside the orbit of Mars are known as jovian planets.
The jovian planets are Jupiter, Saturn, Uranus and Neptune.

Question 2.8:

Explain equatorial and polar orbits of artificial satellites.

Solution :

Equatorial orbit: The orbit which is parallel to the equator is known as an equatorial orbit.
Polar orbit: The orbit which is parallel to meridian is known as a polar orbit.

Question 3:

Write answers to the following questions :

Question 3.1:

Write notes on :

Solution :

1. **Mercury:** It is the smallest planet in the solar system and has no moon. Its outer surface is rocky with craters on it. It contains metals like nickel and iron. Its atmosphere is thin and contains vapours of potassium and sodium. Due to extreme temperature difference between day and night, life is not possible on mercury.
2. **Venus:** It is the second and the brightest planet of the solar system and has no moon. It is the only planet which spins from east to west. Its surface contains large mountains, valleys and volcanoes.
3. **Mars:** It is the fourth planet of the solar system and has two moons. It is reddish in

colour. Its surface has large valleys, mountains and dry rivers. It has negligible atmosphere with gases like carbon-di-oxide, nitrogen and argon. It is believed that its poles are covered by dry ice.

4. **Saturn:** It is the second largest planet of the solar system and has beautiful luminous rings around it. Its largest moon is Titan. Its surface temperature is very high.
5. **Pluto:** As per the classification of the planets, Pluto is known as a dwarf planet. It is very cold, dark and yellowish. Its surface density is similar to that of the Earth. Its core region has silicate rocks surrounded by water, methane etc. in solid form. Its outer layer contains nitrogen, methane, carbon-mono-oxide. Pluto and its moon, Charon form a binary system, and they revolve around their common centre of mass.
6. **Shooting stars:** When meteors enter the Earth's atmosphere, they burn due to friction caused by the earth's gravity and a streak of light is seen. This is called a shooting star. They are not stars in true sense.
7. **Night sky:** If we see the night, we find it covered with stars and moon. The night sky changes every day. The earth takes 23 hours 56 minutes to complete one rotation about its own axis while day is made up of 24 hours, thus, the stars rise four minutes earlier compared to the previous day. During these 4 minutes, stars in the celestial sphere undergo an angular displacement of 1o. Even the shape of the moon in the night sky changes everyday.
8. **Milky way galaxy:** Big cluster of stars is known as galaxy. The name of our galaxy is milky way because when seen during dark and clear sky, it looks like a milky belt stretching from north to south. It is spiral in shape and its diameter is about 1lac light years and thickness of the middle part is about 15 to 20 thousand light years. When viewed sideways, it is seen bulging at the centre and tapering towards the ends.

Question 3.2:

How artificial satellites are useful in communication ?

Solution :

In the field of communication, artificial satellites are used for telecommunication, television transmission, radio networks and computer networks. Country-wide classroom and teleconferencing have enabled spreading of education in remote villages of the country. For this purpose India has launched the INSAT series.

Question 3.3:

What is remote sensing ? How satellites are useful in remote sensing ?

Solution :

Remote sensing is the method by which information about a substance or a phenomenon can be obtained using scientific instruments without direct contact with them.
Satellites are useful in remote sensing. The installation of sensors in the remote sensing satellites covers the area of 10 sq. m to 6400 sq. m, and they send information to earth station. Using satellites, we can carry out geological survey of metallic ores present in the earth's crust, changes in the forest and environment, water resources etc. It also provides information about diseases that can spread in crops. It is used in oceanography and study about movement of fishes etc.

Question 4:

Answer the following questions in detail :

Question 4.1:

Give a detailed note on the program conducted by ISRO.

Solution :

Programs conducted by ISRO are listed below:

1. INSAT (Indian national satellite system) has its series INSAT- 1,2,3 launched in space. The INSAT- 4 launched from Guana (France) will be useful for Direct To Home (DTH) service for TV transmission.
2. IRS (Indian remote sensing) satellites have been launched. IRS – 1, IRS- P series is meant for commercial purpose, whereas METSAT (Meteorological satellite) is meant for weather forecasting.
3. The resource satellites are used for the study of oceanography.
4. Carto sat is used for the geographical survey.
5. Rohini satellite series is used for astronomical observations.
6. PSLV (Ploar satellite launching vehicles) is used for launching 1000-2000 kg class of remote sensing satellite.
7. GSLV (Geo synchronous satellite launch vehicle) launched 'EDUSAT' nearly weighing 2500 kg in space, in Sep 2004.

Question 4.2:

Write a note on the blackholes.

Solution :

A black hole is a region of space from which nothing can escape, not even light. It is formed when gravitational collapse occurs when outward internal pressure is insufficient to resist the star's own gravity. Massive stars at the end of their life collapse in a supernova and eventually turn into black hole. Once it is formed, it grows in mass by absorbing mass from its surroundings and becomes super massive. Black holes are found at the centre of most galaxies.

Question 4.3:

Write a note on the Earth.

Solution :

Earth is the third planet in the solar system with one satellite, the Moon. It is the only planet which supports life. Earth has a thin layer of atmosphere which protects it from meteors and produces green-house effect, which maintains suitable temperature necessary to sustain life. It also has a layer of ozone which absorbs the UV rays of the sun and reduces its harmful effect on living organisms. Outer layer of Earth is made up of mud and rocky stones. Here, silicon dioxide is very large. Its core region contains semi-liquid molten iron, magnesium and silicate like substances.

Question 4.4:

Write a note on Nakshatra.

Solution :

An imaginary sphere covering the sky with the earth at its centre is known as the celestial sphere. The ecliptic of the celestial sphere is divided into 27 equal parts, which are known as Nakshatras.
Their angular region is thirteen degree twenty minutes, the same time in which moon undergoes angular displacement every day along the elliptical path.
Moon remains in one nakshatra for a day, while the Sun remains in one nakshatra for 13.5 days.
Nakshatras are the names given on the basis of imaginary figures formed by joining stars belonging to the nakshatra. Pushya, Swati, Ardra etc. are some of the well known nakshatras.

Question 5:

Answer the following questions pointwise :

Question 5.1:

Write a detailed note on comets.

Solution :

Comets are celestial bodies made up of water, carbon dioxide, ammonia and other frozen gases along with dust particles. Far from Pluto, there is a group of about 10 billion comets known as cloud of Urt. They move towards the sun due to its gravitational pull. Being spheres of dust and icy rocks, as they near the sun, ice vapourizes and a long bright tail is formed. When comet is nearest to the sun, its luminous tail is the longest and points opposite to the sun. As it moves away from the sun, its tail becomes shorter and eventually vanishes. Uptil now, orbits of 750 comets have been discovered.

Question 5.2:

What are galaxies ? Give detailed account of different types of galaxies.

Solution :

Big cluster of stars is known as a galaxy. There are about 10^{11} galaxies and each galaxy contains about 10^{11} stars. Galaxies are of different shapes, of which two main types are:

1. Spiral galaxy: Stars in this galaxy are bluish and young. In the Universe, there are more number of spiral galaxies.
2. Elliptical galaxies: Stars in this galaxy are very old and red in colour.

Question 5.3:

Write a note on Space shuttle.

Solution :

A space shuttle carries different payloads to low earth orbits, provides crew rotation for ISS and performs servicing missions.

A space shuttle is composed of three main parts: the reusable orbiter vehicle (OV), the expandable external tank (ET), and the two reusable solid rocket boosters (SRBs).

It is launched like conventional rockets. It revolves around the Earth, does its job and returns to the Earth, like an airplane. Then it is re-polished for reuse. During the flight, the SRBs are dropped at a pre-decided location in the ocean. During the descent, the orbiter passes through different layers of atmosphere and slows down by aero braking but the shuttle remains at very high speed. Thus, air friction generates large amount of heat energy. To protect the shuttle from heat, its outer surface is made up of special alloy. Once it comes to very low altitudes, pilot takes over the control of space shuttle and it lands like an airplane.