

UNIT IV- SPACE TREK

SPECIFIC TERMS:

1. Space craft: a vehicle used for travelling in space
2. Optical system: combinations of lenses, mirrors and prisms that constitutes the optical part of an optical instrument.
3. TDRS satellites: Tracking And Data Relay Satellite
4. Graphite epoxy:
5. Gyroscope: Rotating mechanism in the form of a universally mounted spinning wheel that offers resistance to turns in any direction.
6. Microprocessors: integrated circuit semi conductor chip that performs the bulk of the processing and controls the parts of a system.
7. Genesis: A coming into being
8. Oceansat: It was launched in 1999, monitors the chlorophyll content and the sea surface temperature which identifies the areas of concentrations of fish.
9. EDUSAT: It is world's first satellite which is completely dedicated for education purposes.
10. Telemedicine: It is the remote diagnosis and treatment of patients by means of telecommunications technology
11. Decade: A period of ten years.
12. Lander: a space vehicle that is designed to land on moon or any heavenly body.
13. Havoc: violent and needless disturbance
14. Onslaught: a sudden and severe onset of trouble.
15. Bloated face: muscle mass accumulation due to under metabolism during travel in space.
16. Choking: suffocation caused by blockage in the wind pipe
17. Launcher: armament in the form of the device capable of launching a rocket
18. Aviation: the operation of air craft to provide transportation
19. Space shuttle: a reusable space craft with wings for a controlled descent through the earth's atmosphere.
20. Velcro pads: pads made of nylon fabric used for fastening in a space craft during travel in space.

CONCEPTS :

Hubble telescope:

The Hubble Telescope is a space telescope that was launched into low Earth orbit on April 24, 1990, and remains in operation. With a 2.4-meter (7.9 ft) mirror, Hubble's four main instruments observe in the near ultraviolet, visible, and near infrared spectra. The telescope is named after the astronomer Edwin Hubble. It takes pictures of planets, stars & galaxies. Hubble has additional requirements because it is flown into space as spacecraft. Therefore several spacecraft systems encircle the body of the telescope.

Hubble is one of NASA's most successful and long-lasting science missions. It has beamed hundreds of thousands of images back to Earth, shedding light on many of the great mysteries of astronomy.

Communication and automation system:

The communications antennae allows for communication between Hubble and astronomers and technicians here on Earth. They are essential because they are the primary means in which astronomers can instruct and command the telescope. There are four antennas which receive and send information between the telescope and the Flight Operations Team at Goddard Space Flight Centre in Greenbelt, Maryland. Scientists communicate with the telescope through Tracking Data Relay Satellite (TDRS) which are five in number.

Power supply and protection:

The telescope has two thin solar arrays consisting of solar cell “blanket” which allow for the conversion of sunlight into electricity. This electricity becomes necessary in order to operate the telescope’s scientific instruments, computers, and radio transmitters. Hubble is able to operate without power from the sun as the energy is stored in onboard batteries so that the telescope can operate while it is in Earth’s shadow.

The telescope is protected from temperature extremes by a ‘skin’ or blanket of multilayered insulation. During Servicing Mission 4 in 2009, astronauts also added panels of insulation called New Outer Blanket Layers (NOBLs), which replaced sections of blanket that had broken down due to harsh conditions of space. The lightweight aluminium shell beneath the Hubble’s insulation provides an external structure to the spacecraft and houses its optical system and science instruments. Hubble’s optical system is held together by a truss measuring 210 inches in length and 115 inches in diameter which is made of graphite epoxy that is used in golf clubs, tennis racquets and bicycles. Graphite epoxy is a stiff, strong and lightweight material that resists expanding and contracting in extremes of temperature.

Chandrayaan-1 was India's first lunar probe. It was launched by the Indian Space Research Organization in October 2008, and operated until August 2009. It was weighed 34 kg at the time of its on-board launch and carried a video imaging system, a radar altimeter, and a mass spectrometer. The video imaging system was designed to take pictures of the Moon's surface. Whereas, the radar altimeter measured the rate of descent of the probe while the mass spectrometer made a detailed study of the extremely thin lunar atmosphere. Chandrayaan finds water on Moon.

Chandrayaan-2: It is India's second lunar exploration mission after Chandrayaan-1. Developed by the Indian Space Research Organization (ISRO), the mission is planned to be launched to the Moon by a Geosynchronous Satellite Launch Vehicle (GSLV), includes a lunar orbiter, a lander and a lunar rover, all developed by India. India is planning to launch Chandrayaan-2 by the end

of 2017 or beginning of 2018. It weighs about 2650 kg at lift-off, of which the orbiter weight is about 1400 kg and lander weight is about 1250 kg.

International Space Station (ISS): is a space station, or a habitable artificial satellite, in low Earth orbit. Its first component launched into orbit in 1998, and the ISS is now the largest artificial body in orbit and can often be seen with the naked eye from Earth. The ISS consists of pressurized modules, external trusses, solar arrays and other components. ISS components have been launched by Russian Proton and Soyuz rockets as well as American Space Shuttles. It serves as a home where crews of astronauts and cosmonauts live. The space station is also a unique science laboratory. Several nations worked together to build and use the space station. On Earth, the space station would weigh almost a million pounds. Measured from the edges of its solar arrays, the station covers the area of a football field including the end zones. It includes laboratory modules from the United States, Russia, Japan and Europe.

PHYSICAL AND BIOLOGICAL ADJUSTMENTS FOR LIFE IN SPACE:

FOOD: They can eat meals just like we do on Earth. At the beginning of the 1960's, space food was bite-sized or placed in aluminum tubes. The food was prepared this way so that they wouldn't be too heavy or take up too much space. From the 1970's, during the Apollo period, the number of space food items began to increase. Currently, there are about 150 different types of food. The meals are very similar to the meals we eat on Earth.

CLOTHES: The astronauts wear the same types of clothes that we usually wear on Earth. Inside the Space Shuttle, the air pressure is kept at 1 atmosphere, which is the same level as on earth. The temperature and humidity are controlled, so those, the astronauts can live comfortably. Therefore, except for the orange flight suits that are worn during launch and reentry, the astronauts do not need any special clothes. The astronauts dress in the same manner that we on Earth do. When the astronauts venture outside the space shuttle to work in space, they wear spacesuits.

BATH: The astronauts wipe their body clean by using a wet towel, and wash their hair by using waterless shampoo. Since water does not flow in a zero-gravity environment, the astronauts cannot wash their hands under a faucet as you do on Earth. So, there are no sinks or showers inside the space shuttle.

SLEEP: The astronauts sleep in small sleeping compartments by using sleeping bags. They strap their bodies loosely so that their bodies will not float around. In the zero-gravity world, there are no "ups" or "downs". The astronauts can sleep anywhere facing any direction. But it's not good to be floating away somewhere while sleeping. So the astronauts use small sleeping compartments and sleeping bags. They will strap their bodies loosely so that their bodies will not float around while they sleep in the Space Shuttle.

EXERCISE: Astronauts need the proper amount of exercise in order to keep their bones and muscles strong. The treadmill is a machine on which, the astronauts do running exercises with their bodies strapped to it. The Ergometer is a machine similar to a bicycle without wheels. The amount of exercise can be adjusted by changing the pedal's pressure.

CLEANING: The astronauts do some cleaning between their duties. As people live there, it becomes messy after meals and there's also garbage to be disposed of. Between their duties, the astronauts clean the meal area, change the air purification system's filters, collect the garbage, and clean the walls and floors. They use liquid detergent, disposable plastic gloves, multi-purpose wiping cloths and a vacuum cleaner for cleaning.

SICKNESS: The astronaut in charge of medical treatments will take care of the sick. Each astronaut in the Space Shuttle has a specific assigned role, and as such, each has received intensive training required for that specialized task. For medical emergencies, the Crew Medical Officer is the person in charge.

ENTERTAINMENT: The astronauts spend their leisure time by reading their favorite books, listening to music, and looking at the Earth.

Grammar:

Adverbs: the word that modifies (or adds to) the meaning of a verb, or an adjective or another adverb is called an adverb. Adverb modifies verb by giving the following information –

How the action occurs?

Where the action occurs?

How many times the actions occur?

At which time the action occurs.

Kind of adverbs:

Adverbs of manner: this refers to how something happens or how an action is done. these adverbs tell us that in which manner the action occurs or how the action occurs or occurred or will occur.

Ex: she speaks loudly.

Adverbs of time: this states when something happens or when it is done. These adverbs tell us about the time of action. E.g. now, soon, tomorrow, yesterday, today, tonight, again, early.

Ex: The guest came yesterday.

Adverbs of place: This tells something about where something happens or where something is done.

E.g. here, there, near, somewhere, outside, ahead, at some place.

Ex: God is everywhere.

Adverbs of Degree or Quantity: This states the intensity or the degree to which a specific thing happens or is done. Ex: The child is very talented.

Adverbs of Frequency or Number: Adverbs of frequency tell us how many times the action occurs or occurred or will occur.

Daily, sometimes, often, seldom, usually, frequently,
always. Ex: He goes to school daily.

Adverbs of reason: This adverb indicates reason

Ex: Thus, your charge is proved.

Adverbs of comparison: This indicates comparison.

Ex: She works more quickly than I do.

Interrogative Adverbs: They are used at the begging of a question.

Ex: Why are you so late?

IMPORTANT QUESTIONS:

1. Where is the Hubble telescope placed?
2. How do the astronomers communicate with the telescope?
3. How is the Hubble able to operate without power from the sun?
4. How are the optical system and science instruments protected?
5. What are the benefits of the Indian space program?
6. Write an account on the genesis of ISRO.
7. Why is the arrival of new faces a cause of celebration in ISS?
8. What was the experience of a shuttle pilot?
9. Write an account of life in the space.
10. Write about Chandrayan 1 and Chandrayan 2?
11. Questions on vocabulary, group discussion, debate, book/ film review future tense and adverbs.