

11

SPACE AND NUCLEAR PROGRAMME OF PAKISTAN

In this chapter you will learn:

- Importance of Space Programme
- Communication and Weather Satellites
- Space Programme of Pakistan
- Nuclear Power Programme of Pakistan

11.1 Importance of Space Programme

Travelling in space, sometimes it had been a dream of man, which has now become a reality. Space travel became possible due to the invention of rocket. In rocket, fuel is burnt with the help of liquid oxygen and the gases produced by it are expelled from its back with very high speed and in reaction rocket moves ahead.

In October 4, 1957 Russia launched its first artificial satellite Sputnik-1 into space through rocket, that started space era. Since then thousands of spacecrafts have been launched into space. Most of them are revolving around the Earth. These have wonderfully changed the ideas of man relating to the Earth and universe.

Several space probes have also been launched into space, which have helped us in getting information about astronomical objects of the solar system. These probes have been sent to all other planets of the solar system including the moon and Halley Comet except Pluto. Several useful information have been collected from them. America in 1973 also launched its first space station Skylab-1 into space. With



Fig. 11.1: Departure of space shuttle into space

For Your Information

In 1976, America sent two space probes namely Viking-1 and 2 into space, which collected different samples of soil and rocks after landing on the surface of Mars.

the help of these space stations, the natural resources hidden in the Earth and planets of the solar system have been studied. In 1979, Skylab due to some fault entered back into the atmosphere and broke into pieces.

In 1986, Russia launched space station Mir into space that has been used for space research for several years. On April 24, 1990 Hubble space telescope was launched into space with the help of space shuttle discovery. The size of its mirror is 2.5 metre and its weight is 11 tonnes (Fig.11.2). Space shuttle is a form of a space craft. It can be fired into space upto the height of 300 kilometres with the help of rocket within 15 minutes. It can stay in space only for few days. Its weight is usually 2000 tonnes with full fuel. With the help of it, artificial satellites and space probes can be carried into space. In Fig. 11.1, space shuttle launching into space by rocket has been shown.

The day of 20th July 1969 will always be remembered in the history of mankind. On that day, two American astronauts namely Neil Armstrong and Edwin Aldrine landed on the moon by Apollo - 11 (Fig. 11.3). They collected the samples of soil and rocks from the moon and made their analysis which provided us many new information about the moon. More big projects are in the future plan of the man including landing on the Mars.

To get information regarding weather and climate has always been a desire and need of man. Now the scientists can make correct predictions regarding weather and climate with the help of artificial satellites launched into space. Communication satellites are very important. These facilitate us to a very large extent in television, telephone and radio communication. With the help of some satellites, scientists have come to know a lot about different galaxies, stars, planets, dwarfs, neutron star and black holes etc. present in the universe. Cosmic rays in space are also studied with the help of these. In nutshell, these satellites have brought about revolution in the human life.



Fig. 11.2
Hubble Space Telescope

Interesting Information

In 1986, Russia launched space station 'Mir' into space from Kazakhstan which is the biggest and vital space station. The laboratories of the station were assembled in space. Mir is such a big space station that it looks like a shining planet in space.

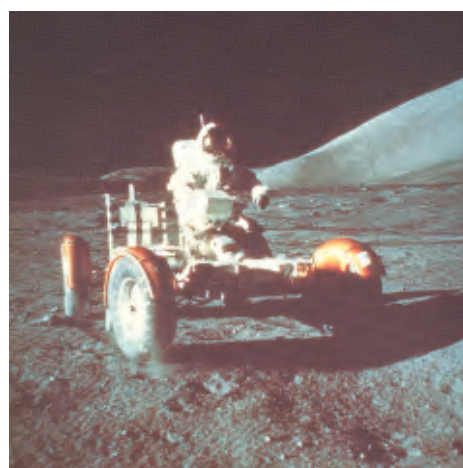
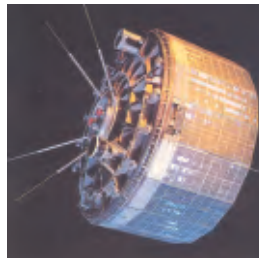


Fig. 11.3

Interesting Information

Through artificial satellite, Metostat, cloud making pictures are taken. The meteorologists predict about the weather through the study of these pictures. They also inform people before time about cyclone and its speed and direction.



11.2 Space Programme of Pakistan

For the scientific development of any country, information collected by space research are proved to be very beneficial. The majority of the countries of the world, for getting benefit from this research, have launched their own space programmes. The national space agency of Pakistan realizing this need, in collaboration with Pakistan Atomic Energy Commission established an institute namely SUPARCO in 1961, which is an abbreviation of Space and Upper Atmosphere Research. Its headquarter is in Karachi. The basic objectives of this institute include space research, study of ozone layer, pollution of atmosphere, astronomy, study of radio waves, exploration of natural mineral resources through geographic information technology, establishment of ground stations and launching of space rocket and satellites into space for various purposes etc.

Do You Know?

A branch of science in which the weather is studied for a short time by factors like rain, sunshine, temperature and air pressure is called meteorology whereas the branch which studies the climate for a long time is called climatology.

Do You Know?

The first man went into space on 12 th April 1961 was Russian cosmonaut Yuri Gagarin.

Pakistan launched its first rocket namely Rahber into space on 7th June 1962. With it, the era of space research started in Pakistan. Up till now, more than 200 rockets have been launched into space which are hovering above from the height of 20 kilometres to 550 kilometres. Various scientific and weatheric information are being collected from them. In 1973 three rockets namely Skua were sent into space, which measure the air pressure as well as temperature. SUPARCO has established two earth stations in Karachi and Lahore for getting information from the satellites revolving in the orbits near to Earth.

SUPARCO enjoys the co-operation of renowned space research institutes of the world. The government of Pakistan has established an earth station in collaboration with American space institute NASA for exploration of natural mineral resources, which explore the geological areas of the country. Moreover in 1989, SUPARCO established an earth station at Rawat near Rawalpindi, which explores mineral resources.

SUPARCO has achieved the capability of making satellites and space rockets by day and night efforts of our scientists and engineers. In July 1990, Pakistan launched into space an indigenous artificial satellite Badar-1. Now-a-days SUPARCO is busy in the preparation of next satellite of Badar series. Next satellite of Badar series will be soon launched into space, which will help in getting several useful information. SUPARCO has done tremendous efforts regarding space research.

Do You Know?

Astronauts wear a special kind of dress which is called space suit. It keeps them safe from the effects of extremely low pressure in space. Apart from this, it also keeps them secure from the temperature ranging from 150°C to -185°C .

11.3 Nuclear Power Programme of Pakistan

Pakistan is a developing country. After a short while of its establishment, it decided to use nuclear energy for peaceful purposes. For this purpose, in 1956, Pakistan Atomic Energy Research Council came into being. During 1964-65 and in 1973, it was reorganized and through an act autonomous status was given to Pakistan Atomic Energy Commission.

In 1972, the commission was transferred from Ministry of Science and Technology to President Secretariat. Now Pakistan Atomic Energy Commission is the most dynamic institute of the country in science and technology. In 1965 an institute namely Pakistan Institute of Nuclear Science and Technology (PINSTECH) was established for the achievement of national industrial and scientific infrastructure as well as to make up the deficiency of properly trained manpower (Fig.11.4). This institute facilitates research in nuclear science in order to bring our country among developed countries.



Fig. 11.4 PINSTECH

In this institute, special nuclear materials and highly sophisticated instruments are made on limited scale. In order to make up the requirements of fields of medicine, agriculture and industry, radio isotopes and radio pharmaceuticals are prepared. This institute also provides

technical support to industries as well as other institutes. In PINSTECH, there are also two research reactors namely PARR -1 and PARR -2 whose production is 10 megawatt and 27 kilowatt respectively (Fig.11.5).



Fig. 11.5 PARR - 1

Pakistan is one of the few countries of Islamic world, which are using nuclear energy for the production of electricity. For the achievement of this purpose, first nuclear power plant was established in Karachi in collaboration with Canada in 1972 whose name is Karachi Nuclear Power Plant (KANUPP). Its total production capacity is 137 mega watt. In this plant recycled Uranium is utilized as fuel. In 1992, in collaboration with China, another nuclear plant called Chashma Nuclear Power Plant (CHASNUPP) was established on river Indus near Mianwali. Its total production capacity is 300 mega watt. Also in this plant Uranium is used as fuel. Nuclear energy is playing a vital role in fulfilling the ever increasing demand of electricity of the country. It does not damage atmosphere too.

Pakistan Atomic Energy Commission keeping in view the national demands lays stress on importance of the achievement of nuclear energy for peaceful purposes. For this purpose, research institutes have been established across the country in agriculture, industry, biotechnology and other scientific disciplines, which are playing a dynamic role in the national development.

In the field of agriculture, by using nuclear technology, such agricultural species have been prepared whose production is comparatively more and which can fight the different diseases more effectively. In Nuclear Institute of Food and Agriculture (NIFA), a research work is carried on for exploring the diseases of crops and their remedy. In this institute the work is also conducted for the preservation of food for a long time.

In the field of medicine the use of nuclear radiations is increasing day by day. In the centres of nuclear medicines working under Atomic Energy Commission in Pakistan, through nuclear radiations the facility of diagnosing and treatment of several other diseases, apart from blood cancer and cancer of different organs is also available. In the field of industry, faults are explored in the material through different methods without breaking them.

In 1995, Pakistan Atomic Energy Commission realizing the need and utility of welding in power generation boilers, thermal and nuclear power plants, chemical, petroleum and ship

Do You Know?

Pakistan by making atomic explosion on 28 th May, 1998 joined the countries of the world bearing nuclear capability. Moreover, the scientists and engineers of Pakistan Atomic Energy Commission, for strengthening the defence of the country, have played a vital role by making the series of Shaheen and Ghauri indigenous missiles.

making industries of the country, established Pakistan Welding Institute (PWI) whose purpose was to provide the facility of high quality welding to the industries.

In nutshell, the scientists and engineers of Pakistan have made marvelous achievements in the field of atomic energy despite of limited resources. There is bright hope that Atomic Energy Commission will play an important role in the national economic development.

IMPORTANT POINTS

- Artificial satellites are launched into space through rockets. The information collected through these satellites have changed dramatically the vision of man regarding universe and Earth.
- With the help of artificial satellites, scientists can now make absolutely correct predictions about weather and climate. Through these satellites several facilities have been made available in television, telephone and radio communication.
- Scientists through artificial satellites and space probes have come to know a lot of information about different galaxies, stars, planets, dwarfs, neutron star and black holes in the universe.
- SUPARCO looks after the space programme of Pakistan. The basic objectives of this institute include space research, study of ozone profile, pollution of atmosphere, astronomy, study of radio waves, exploration of mineral resources, establishment of ground stations and launching of rocket and satellites into space.
- Pakistan Atomic Energy Commission is helping in national development. This commission has established different institutes and power plants across the country for the achievement of scientific research, agriculture, medicine, industry, biotechnology and nuclear energy which are playing a vital role in the national economic development.

GLOSSARY

SPACE PROBES :	Vehicles launched into space for research.
SUPARCO :	An institute for running the space programme of Pakistan.
NASA :	Space institute of America.
BADAR-1 :	First Pakistani artificial satellite.
PINSTECH :	A research institute of Pakistan in the field of nuclear science.
KANUPP :	First nuclear power plant of Pakistan.
CHASNUPP :	The biggest nuclear power plant of Pakistan.

QUESTIONS

Q. 1. Fill in the blanks.

- (i) Space era started with the launch of _____ Russian artificial satellite.
- (ii) By the help of _____ satellites, lot of facilities has been made available in television, telephone and radio communication.
- (iii) _____ institute looks after the space programme of Pakistan.
- (iv) The name of first artificial satellite of Pakistan is _____.
- (v) In 1972 the first nuclear power plant was established in _____.

Q. 2. Mark(✓) against the right and (×) against the wrong statement.

- (i) With the help of space stations, the natural resources hidden in the Earth and the planets of the solar system are explored. ☐
- (ii) The man landed on the moon on 20 th July 1969. ☐
- (iii) The total production capacity of Pakistan's first nuclear power plant is 300 mega watt. ☐
- (iv) Cancer can be cured by nuclear radiations. ☐
- (v) Skua is the first space rocket of Pakistan. ☐

Q. 3. Four answers have been given for the following statements. Encircle the right answer.

- (i) The country, which launched its artificial satellite into space for the first time is:

- | | |
|-------------|--------------|
| (a) America | (b) France |
| (c) Russia | (d) Pakistan |

- (ii) SUPARCO came into being:

- | | |
|-------------|-------------|
| (a) in 1956 | (b) in 1961 |
| (c) in 1973 | (d) in 1990 |

- (iii) The name of Pakistan's first artificial satellite is:

- | | |
|---------------|------------|
| (a) Badar-1 | (b) Rahbar |
| (c) Sputink-1 | (d) Skua |

- (iv) The total production capacity of Pakistan's first nuclear power plant is:

- | | |
|-------------------|-------------------|
| (a) 10 mega watt | (b) 137 mega watt |
| (c) 300 mega watt | (d) 400 mega watt |

Q. 4. Give brief answers of the following questions:

- (i) Which space probes did collect the samples of soil and rocks from the surface of Mars?
- (ii) What is meant by Hubble telescope?
- (iii) Write down some advantages of artificial satellites.
- (iv) What are the basic objectives of SUPARCO?
- (v) Where are the nuclear power plants of Pakistan located? What is there total production capacity?

Q. 5. Write a brief note on the importance of space programme. Also describe the utility of artificial satellites.

Q. 6. Write a comprehensive note on the space programme of Pakistan.

Q. 7. What are the services of Pakistan Atomic Energy Commission for the achievement of nuclear energy for peaceful purposes?

DENGUE FEVER

Dengue fever is caused by the bite of a female *Aedes aegypti* mosquito infected with dengue virus. The mosquito becomes infected when it bites a person with dengue virus in his/her blood. Dengue virus can not be spread directly from one person to another person. The risk of being bitten is the highest during the early morning and in the late afternoon before sunset. However, mosquitoes may feed at any time during the day.



The mosquito *Aedes aegypti* feeding off a human host

Causes and symptoms

Symptoms usually begin four to six days after infection and last for up to 10 days. Symptoms of dengue fever are sudden high fever, pain behind the eyes, severe joints and muscles pain, nausea, vomiting and swollen glands.

Dengue fever can occur when a mosquito, carrying the virus, bites a human. Once in the body, the virus travels to various organs (liver, spleen etc.), where it multiplies. In severe infection, the virus production inside the body is greatly increased, and many more organs (lymph tissues, bone marrow etc.) can be affected. The viruses enter the blood stream. The cells lining the blood vessels become damaged and fluid from the blood stream leaks through the wall of blood vessels into body cavities. As a result, less blood circulates in the blood vessels and the blood pressure becomes so low that it cannot supply sufficient blood to vital organs. This state of low blood pressure is called **shock**. Shock can result in damage to the body's organs (heart, kidneys etc.) because low blood flow deprives them of oxygen. Rashes appear on skin, bleeding from nose, gums etc., also occurs in severe cases. This is called **Dengue Hemorrhagic Fever (DHF)** or **Dengue Shock Syndrome (DSS)**. Furthermore, dysfunction of the bone marrow leads to reduction in numbers of platelets. This increases the risk of bleeding.

Treatment

Visit your doctor immediately. Doctor can diagnose dengue infection with blood test. There is no specific medicine to treat dengue fever. Medicines can be given to lower the fever and decrease the pain. Use Paracetamol and avoid medicines with Aspirin and Brufen which could worsen the bleeding. Blood transfusions may be necessary if severe hemorrhaging occurs. Oxygen should be administered to patients in shock. Patient should take rest and drink plenty of fluids.

Prevention

Properly cover the pots having water. Do not let water stand on floor, flower vases and pots etc. Use coils, mats and sprays to kill mosquitoes. The prevention of dengue fever requires control or eradication of the mosquitoes carrying the virus that causes dengue.