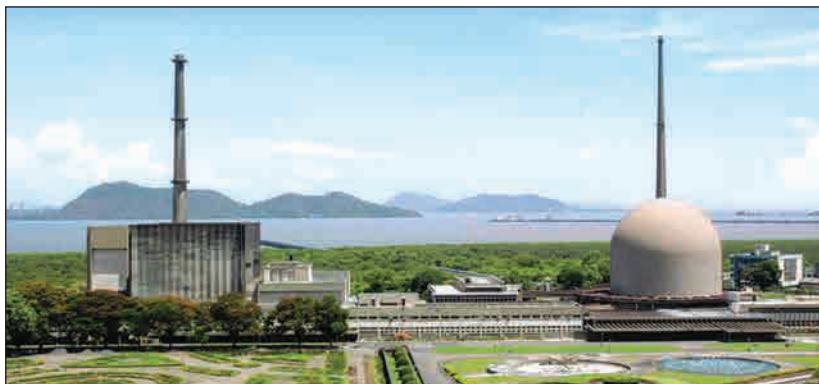


Nuclear Policy



BARC, Trombay

India began its nuclear programme soon after independence. Its nuclear policy came to be formulated around two principles:

- (i) Promotion of research and development of nuclear energy for peaceful purposes and
- (ii) Attainment of self-sufficiency in the nuclear programme. Based on this

India designed a three-stage nuclear strategy. Its main elements included

- (a) natural uranium fueled reactors,
- (b) fast breeder reactors fueled with plutonium from the first phase, and
- (c) a thorium-uranium fuel cycle utilizing the country's large reserves of thorium sands.

Do you know?

Strategy for Nuclear Energy : India's nuclear programme aims at tapping nuclear energy for power generation. This is based on the use of Uranium and Thorium as nuclear fuel.

The estimated deposits of these are as follows :

Natural Uranium deposits: 70,000 tonnes.

Natural Thorium deposits: 3,60 000 tonnes.

India's Three Stage Nuclear programme is as follows :

Stage 1 : Building Pressurised Heavy Water Nuclear Reactors using Uranium Oxide (UO₂) and Heavy Water. This phase also includes building Reprocessing Plants for reprocessing spent fuel.

Stage 2 : Building Fast Breeder Reactors that would use Plutonium 239 generated from the First Stage, along with Thorium to transmute or convert it into Uranium 233 (U²³³)

Stage 3 : Using Fast Breeder Reactors using Uranium 233. It is at this stage that India's vast Thorium deposits would be used to produce electricity and also transmute Thorium to U²³³

(For details see: Bhabha Atomic Research Centre, http://www.barc.gov.in/about/anushakti_sne.html)

In 1956, India commissioned its first research reactor Apsara at Trombay. This was an indigenously constructed reactor. In 1960, the CIRUS (Canada-India-Reactor- United States) was completed and another research reactor Zerlina got underway in 1961. Indian nuclear programme considered reprocessing as an integral part of the nuclear programme. Reprocessing is the extraction of plutonium from the spent reactor fuel. Since India had the world's largest Thorium deposits, it was essential that it be used for power production. The third stage of the Indian nuclear programme planned to use this Thorium. By the end of the decade India's nuclear programme came to the take off stage.

The Sino-Indian war of 1962 and the Chinese nuclear tests of 1964 brought in a rethinking in India's nuclear policy. Until Nehru's death in 1964, India had continued to stick to the 'peaceful purposes' concept. A few months after Nehru's death China conducted its nuclear tests. Initially, Prime Minister Lal Bahadur Shastri was reluctant to change the Nehru policy. But later Shastri changed the Indian stand and he now was willing to consider research in peaceful nuclear explosions. Homi Bhabha argued that India could produce a nuclear bomb within eighteen months. Unfortunately, both Homi Bhabha and Shastri died in 1966. This was also the time when the world was discussing the formulation of the Nuclear Nonproliferation Treaty (NPT). This treaty was eventually signed in 1968. India did not sign the NPT since it believed that it was discriminatory in nature. It put restrictions on non-nuclear

weapon powers of not producing nuclear weapons and thus control horizontal proliferation, but had no restrictions on the nuclear weapon powers regarding the vertical proliferation.

India conducted its first nuclear test in 1974 at Pokhran. The test was a demonstration of the Indian capability to be able to produce a nuclear weapon as it had the necessary raw material and the scientific human resources. But India maintained that this was a Peaceful Nuclear Test (PNE) as India did not have the intention of producing a nuclear weapon. In her statement to the Parliament Prime Minister Indira Gandhi stated that the experiment conducted was part of the research and development carried out by the Atomic Energy Agency of India to harness atomic energy for peaceful purposes. She also said that India had not violated any international law or commitment. The United States and Canada were critical of the Indian test; the Soviet Union was non-committal while the French welcomed the test.

It is after the test that India's nuclear doctrine can be called one of 'deliberate ambiguity'. India had demonstrated its capability to produce a nuclear bomb but maintained that it had no intention to produce a nuclear weapon. Simultaneously, India did not join the NPT.

Successive governments headed by Prime Minister Rajiv Gandhi and P.V. Narsimha Rao, respectively, continued with the Indira Gandhi's policy about a deliberately vague nuclear doctrine. It was Prime Minister I.K. Gujral, who sought to end this ambiguity. Gujral toyed

with the idea of keeping the nuclear weapons option open as a security measure.

Several developments took place in the 1990s that changed India's position on nuclear issues. The NPT was given an indefinite extension and the Comprehensive Test Ban Treaty (CTBT) was passed as a resolution in the United Nations General Assembly. The global pressure on a moratorium on testing that was created by the NPT and the CTBT eventually led India to exercise its nuclear test options. In May 1998, 24 years after having detonated its first nuclear device at Pokhran in 1974, India conducted a series of nuclear tests and India announced that it was now a nuclear weapons power; thus, ending the nuclear ambiguity that was in existence since 1974. Prime Minister Atal Behari Vajpayee informed the parliament that the reason for India becoming a nuclear weapons power was that the security situation deteriorated in the 1980s and 1990s because of the spread of nuclear weapons and missiles in India's neighbourhood. Further India realised that there was no evidence on the part of the nuclear-weapon states to take steps in moving towards a nuclear-weapon-free-world. He also argued that India did not intend to use these weapons for aggression; these were weapons of self-defence.

In January 2003, India created a Nuclear Command Authority (NCA), which met for the first time in September 2003. The NCA took steps to operationalize India's nuclear capability as an integrated component of Indian national security.

India formally adopted its official nuclear doctrine in January 2003.

The key features of the nuclear doctrine as announced by the Cabinet Committee on Security were:

- (i) Building and maintaining a credible minimum deterrent;
- (ii) A stand of 'No First Use' Policy meant that nuclear weapons would only be used in retaliation against a nuclear attack on Indian territory or on Indian forces anywhere;
- (iii) Nuclear retaliation to a first strike would be massive and designed to inflict unacceptable damage;
- (iv) Nuclear retaliatory attacks would only be authorised by the civilian political leadership through the Nuclear Command Authority;
- (v) Non-use of nuclear weapons against non-nuclear weapon states;
- (vi) However, in the event of a major attack against India, or Indian forces anywhere, by biological or chemical weapons, India would retain the option of retaliating with nuclear weapons;
- (vii) A continuance of strict controls on export of nuclear and missile-related materials and technologies, participation in the Fissile Material Cut-off Treaty negotiations, and continued observance of the moratorium on nuclear tests;
- (viii) Continued commitment to the goal of a nuclear weapon free world, through global, verifiable and non-discriminatory nuclear disarmament.

Do you know?

The various international initiatives taken in the field of nuclear nonproliferation are as follows:

International Atomic Energy Agency (IAEA) (1957) The IAEA is an international organization that seeks to promote the peaceful use of nuclear energy, and to inhibit its use for any military purpose, including nuclear weapons

Nuclear Non-proliferation Treaty (NPT) (1968) The NPT is an international treaty whose objective is to prevent the spread of nuclear weapons and weapons technology, to promote cooperation in the peaceful uses of nuclear energy and to further the goal of achieving nuclear disarmament and general and complete disarmament. This treaty was signed in 1968. India did not join this treaty. The treaty prohibits those countries that do not have nuclear weapons to produce nuclear weapons. But it does not place any restrictions on those countries that have nuclear weapons. This is discriminatory. Therefore, India refused to join the agreement. This Treaty was given an indefinite extension in 1995.

Nuclear Suppliers Group (NSG) NSG is a multilateral export control regime and a group of nuclear supplier countries that seek to prevent

nuclear proliferation by controlling the export of materials, equipment and technology that can be used to manufacture nuclear weapons

Comprehensive Test Ban Treaty (CTBT) (1996) CTBT is the Treaty banning all nuclear explosions for both civilian and military purposes, everywhere, by everyone. The Treaty was negotiated at the Conference on Disarmament in Geneva and adopted by the United Nations General Assembly in 1996.

World Nuclear Forces, 2018

Country	Deployed warheads	Other warheads	Total inventory
USA	1750	4435	6185
Russia	1600	4900	6500
UK	120	80	200
France	280	20	300
China	-	290	290
India	-	130-140	130-140
Pakistan	-	150-160	150-160
Israel	-	80-90	80-90
North	-	(20-30)	(20-30)

-=zero; () = uncertain figure not included in the total.

'Other warheads' includes operational warheads held in storage and retired warheads awaiting dismantlement. The figures for Russia and the USA do not necessarily correspond to those in their 2010 Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms (New START) declarations because of the treaty's counting rules. Total figures include the highest estimate when a range is given. All estimates are approximate and as of Jan. 2019. Source: SIPRI Year Book 2019

Space Science

A coherent and systematic science and technology policy, encompassing diverse activities and institutions, was almost non-existent in India in the early

years. The 1958 Scientific Policy Resolution had attempted to solve this problem. It emphasized on basic research in almost every field of science and on

developing and making available the basic infrastructure for the development of scientific research. The Technology Policy Statement of 1983 went a step further. It focused on achievement of technological competence and self-reliance. Significant progress has been made in the areas of space and electronics during the last decade or so. The Science and Technology Policy of 2003 tried to integrate programmes for the socio-economic sectors with the national research and development system. Science Technology & Innovation Policy 2013 tries to ensure faster, sustainable, and inclusive development of the people. It seeks to create world class infrastructure for R&D for gaining global leadership in some select frontier areas of science.

The Electronics Commission was constituted in 1971 to review the entire field of electronics with regard to research, development and industrial use. In 1984, the government announced changes in its computer policy so as to make the policy adaptable to modern changes.

The Indian Space Research Organisation (ISRO) was set up in 1969. India produced its first indigenous satellite, Aryabhata, in 1975, which was launched by a Soviet launch vehicle. India's first successful space launching programme was accomplished in 1983. Starting with Rohini, ISRO has tested Satellite Launch Vehicles, Augmented Satellite Launch Vehicles, Polar Satellite Launch Vehicles and Geo-synchronous Satellite Launch Vehicles. The ISRO is now looking for commercial application of its success.

The use of the Indian Remote Sensing

Satellite (IRS) for reconnaissance purposes was the first major defence use of the Indian satellite. INSAT-ID was used for communication links during India's peacekeeping operations in Sri Lanka. A computerized system which will be able to identify military targets from satellite pictures is in an advanced stage of development at the Defence Electronics and Applications Laboratory (DEAL). The Private Sector is also keen to enter this arena that is considered to be the exclusive domain of the Electronics Corporation of India Limited.

India's missile development programme began in the late nineteen fifties. This was a Defence Research and Development Organization (DRDO) project. In 1983, India launched the Integrated Guided Missile Development Programme (IGMDP) that involved the development of strategic and tactical guided missiles. The two missile systems, Prithvi and Agni, were developed under this program. Prithvi was to be a short-range ballistic missile; Agni was to be a medium-range technology demonstrator. Besides these, medium and short-range surface to air missiles (SAMs), the Akash and the Trishul, as well as a third-generation anti-tank guided missile (ATGM), the Nag, were developed.

The Indian Missile Programme has now reached a stage of maturity. India has the capability of making all types of ballistic missiles, including supersonic and submarine cruise missiles and submarine launched missiles. The Army, Navy and Airforce now have a large number of missiles in their armoury.

These are also with conventional or non-conventional warheads. The Nuclear tipped missiles are controlled by the Nuclear Command Authority. These are manned by the Missile Units of the Strategic Forces Command.

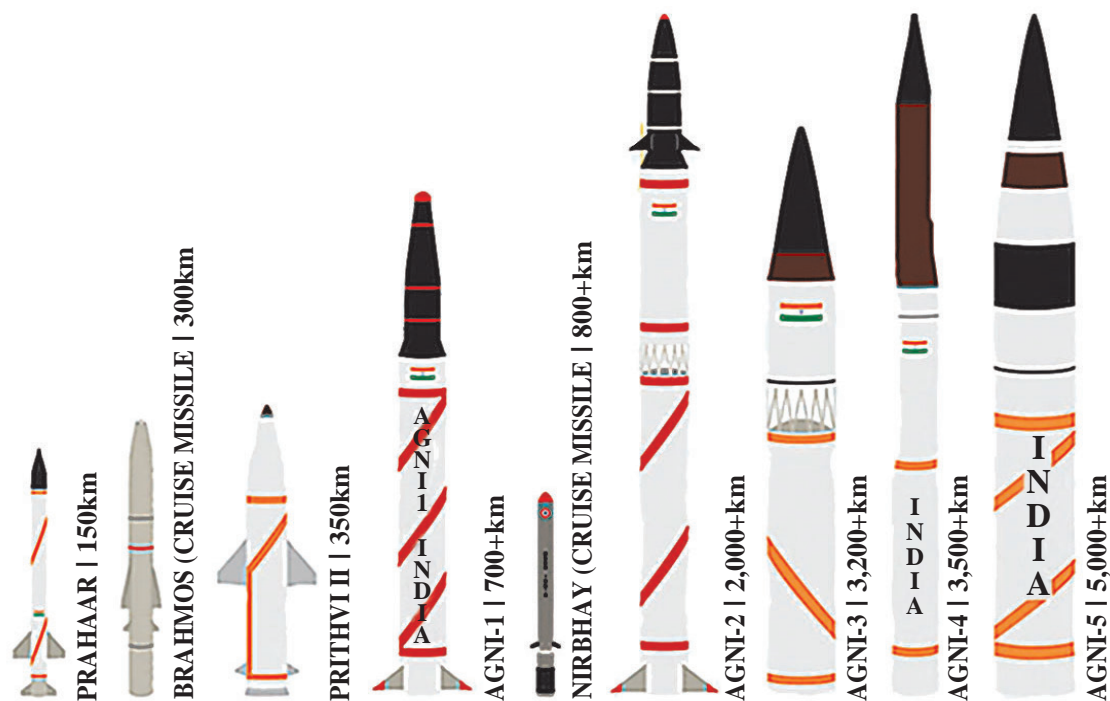
On March 27, 2019 India conducted Mission Shakti, an anti-satellite missile test. This was a technological mission

that successfully demonstrated India's capability to interdict and intercept a satellite in outer space based on complete indigenous technology. The anti-satellite space technology shows India's focus on security challenges, emanating beyond Pakistan. With this test, India joined an exclusive group of space faring nations consisting of USA, Russia and China.

Missile Types

Missile	Class	Range	News
Prithvi-3	SRBM	300-350 km	Operational
Prithvi-2	SRBM	250-350 km	Operational
Exocet	ASCM	40-180 km	Operational
Sagarika/ Shaurya	SLBM	700 km / 3500 km	In Development
Prithvi-1	SRBM	150 km	Operational
Prahaar	SRBM	150 km	In Development
Nirbhay	CruiseMissile	800-1000 km	In Development
Dhanush	SRBM	250-400 km	Operational
BrahMos	CruiseMissile	300-500 km	Operational
Agni-5	ICBM	5000-8000 km	In Development
Agni-4	IRBM	3500-4000 km	In Development
Agni-3	IRBM	3000-5000 km	Operational
Agni-2	MRBM	2000-3500 km	Operational
Agni-1	SRBM	700-1200 km	Operational

Source: Missile Defense Project, "Missiles of India," Missile Threat, Center for Strategic and International Studies, June 14, 2018, last modified June 15, 2018, <https://missilethreat.csis.org/country/india/>.



India's Ballistic Missiles

Maritime Policy

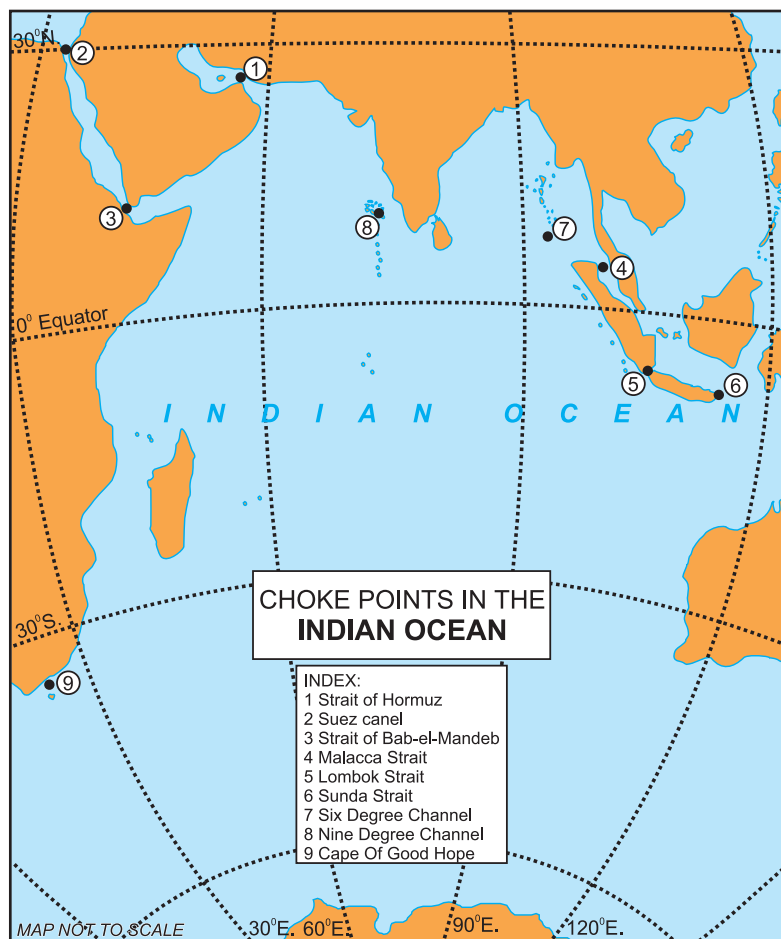
The Indian Ocean appears to be a relatively neglected area in Indian history during the medieval era. Most of India's medieval rulers regularly chose to neglect the seas. When India gained independence, there were hardly any warships or merchant ships. India started improving its ports and ship-building capabilities. At that time, Mazgaon and Scindia were India's only shipyards, with its shipbuilding and repair facilities being very weak.

Earl Mountbatten and Pandit Nehru had together planned the growth of the Indian Navy, with Admiral Parry preparing the perspective plan as early as December 1947. However, financial constraints, the first Indo-Pakistan conflict over Jammu and Kashmir and the Korean War delayed Indian plans. In 1949 India bought its first aircraft carrier, INS Vikrant and a variety of aircraft.

The unique geopolitical position of India in terms of its peninsular contours in the ocean, and its growing military capability, presents an opportunity for India to emerge as a key player in the Indian Ocean region. In geostrategic terms we can identify some important choke points that would be of interest to India:

- In the West are the Strait of Hormuz, Suez Canal and the Red Sea, Strait of Bab-el-Mandeb and the Horn of Africa;
- In the East are Malacca Strait, Lombok Strait, Sunda Strait;
- Along the Indian coast line are the Six Degree Channel and the Nine Degree Channel.

These choke points represent the tactical level area that India can control.



Choke Points

Indian Navy's first Maritime Vision was expressed in the Naval Plans Paper of 1948. The Navy was to consist of cruisers and destroyers, structured around small aircraft carriers, with the objective of protecting India's sea lanes of communication. The first conflict of 1947-48 with Pakistan over Kashmir did not see any naval activity. During the 1965 conflict, the role of the Navy was restricted to the protection of trade routes. It was only in the 1971 conflict that the Navy played a significant role.

Indian Navy's Maritime Strategy, today, speaks of the need to project power as a means of supporting foreign policy objectives. The areas that have been identified by the Indian Navy as areas that need attention include:

- (a) The Arabian Sea and the Bay of Bengal, which largely encompass India's Exclusive Economic Zone, Island Territories and their littoral reaches;
- (b) The choke points leading to and from the Indian Ocean - the Strait of Malacca, Strait of Hormuz, Strait of Bab-el-Mandeb and the Cape of Good Hope;
- (c) The island countries;
- (d) The Persian Gulf as a source of oil supply.
- (e) Principal international sea lanes that cross the Indian Ocean Region.

The secondary areas of interest include:

- (a) The Southern Indian Ocean Region,

- (b) The Red Sea,
- (c) The South China Sea
- (d) The East Pacific Region.

The likely scenarios for the use of military force by the Indian Navy have been outlined in the Indian Maritime Doctrine as follows :

- (i) Conflict with a state in our immediate neighbourhood or a clash of interest with an extra-regional power.
- (ii) Operations in the extended and/or strategic neighbourhood in response to a request for assistance from a friendly nation.
- (iii) Anti-terrorist operations conducted multilaterally or unilaterally.
- (iv) Actions to fulfil international bilateral strategic partnership obligations.
- (v) Operations such as Low Intensity Maritime Operations (LIMO) to combat asymmetric warfare, piracy, and trafficking in arms/drugs.
- (vi) To ensure safety and security of International Sea Lanes through the Indian Ocean.
- (vii) Actions to assist the Indian Diaspora and Indian interests abroad.
- (viii) Peace Keeping operations under the aegis of the United Nations, independently or as part of a multinational force.

Surveying the past years one can cite some examples of Indian Navy's actions in terms of its strategic mission. India acted in the Maldives to restore the democratically elected government in 1998; activities in the context of Sri Lanka, both, as rescue missions and,

tackling threats from across the border; rescue mission to evacuate Indian, Sri Lankan and Nepali citizens from Lebanon in 2006 and the anti-piracy missions taken up since 2008 off the Gulf of Aden.

Do you know?

Operation Rahat

Saudi Arabia intervened in Yemen in 2015. In April 2015 Indian armed forces conducted 'Operation Rahat' to evacuate Indian citizens and foreigners trapped in Yemen. More than 4640 Indian citizens along with 960 foreign nationals of 41 countries were evacuated. INS Sumitra, INS Mumbai and INS Tarkash were the three ships of the Indian Navy, which took part in this operation.

India has sought to become a Builders' Navy and not a Buyers' one. By enhancing this ship-building capacity, India is producing warships, which compare with those of all advanced nations. Even when India purchases a ship from abroad, it has a large amount of Indian-made equipment and sensors. The Indian Submarine Arm started in the mid-sixties. India embarked on a 30-year plan to build submarines, including nuclear ones.

Do you know?

Navies are generally classified either as Blue Water or as Brown Water, depending on their ability to remain, operate and fight either in the Open Seas or in Coastal waters. Because India had very few ships in the sixties and most had inadequate endurance, it was considered a Brown Water navy.

Do you know?

The Indian Ocean Naval Symposium (IONS)

The Indian Ocean Naval Symposium (IONS) is a voluntary initiative that brings together navies of littoral states of the Indian Ocean Region. It was launched in 2008 under the leadership of the Indian Navy. The aim was to increase maritime cooperation and enhance regional security. The forum helps to preserve peaceful relations between nations, and thus is critical to building an effective maritime security architecture in the Indian Ocean Region. It is a forum for discussion, policy formulation as well as numerous aspects of naval operations,

all of which are crucial elements of a cooperative mechanism. IONS has 23 member nations and 9 observer nations.

See the following website for additional details.

Technology Areas: Missiles, DRDO, India.

https://www.drdo.gov.in/drdo/English/index.jsp?pg=tech_missiles.jsp

Indian Navy: Indian Maritime Doctrine - 2015 Version

<https://www.indiannavy.nic.in/content/indian-maritime-doctrine-2015-version>

EXERCISE

Q1 (A) Choose the correct alternative and complete the following statements:

- (i) The NPT is an international treaty whose objective is
 - a. to promote the development of safe nuclear testing sites
 - b. prevent the spread of nuclear weapons
 - c. prevent the spread of missile technology
 - d. facilitate a dialogue between nuclear weapon states and non-weapon states.
- (ii) The following choke point of the Indian Ocean region is located along the Indian coastline; as follows:
 - a. The Six Degree Channel
 - b. Suez Canal
 - c. Sunda Strait
 - d. Malacca Strait

(B) Complete the following sentence by using an appropriate reason:

- (i) India's nuclear doctrine after the 1974 nuclear test can be called one of 'deliberate ambiguity'.
- (ii) India wants to become a 'Builders' Navy'.

(C) State the appropriate concept for the given statement:

- (i) Navies that have the ability to remain, operate and fight either in the Open Seas

(D) Find the odd word from the given set:

- (i) CIRUS, Agni, Prithvi, BrahMos.

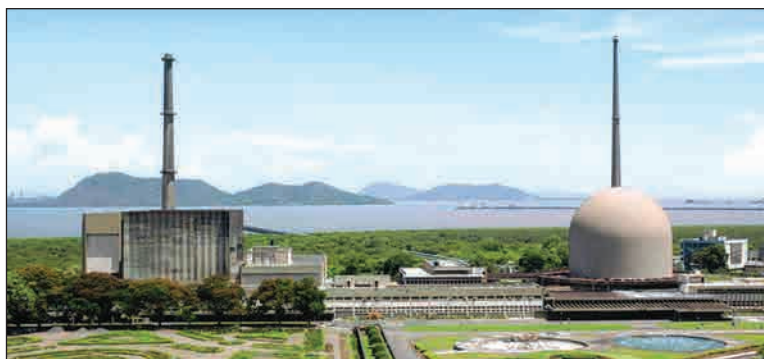
Q.2. State whether the following statements are true or false with reasons:

- (i) India's nuclear energy programme is based on the use of Uranium and Thorium as nuclear fuel.
- (ii) NPT is the Treaty banning all nuclear explosions for both civilian and military purposes, everywhere, by everyone.

Q.3. Explain the correlation between the following:

- (i) NPT and CTBT
- (ii) Blue Water Navy and Brown Water Navy

Q.4. Observe the given image and write about it in brief



Q.5. Answer the following:

- (i) What is the Indian Navy's Maritime strategy today?
- (ii) What are the main features of India's nuclear doctrine?

Activity

Collect information about Mission Shakti, an anti-satellite missile test. Discuss its importance in the classroom.

