



THE HINDU ANALYSIS

13th March 2024

by saurabh
pandey



THE HINDU



PRELIMS TEST 24

Advanced current affairs

SCHEDULED

Today - 9PM



Link IN description



Detailed Course on Current Affairs

MUST FOR
PRELIMS
2024

CLASS -2 TOPICS

Covered

- Inflation reduction act
- Flue gas desulpharisation
- Red sand dunes
- cheetah population
- GIB
- VIJHIJM port
- parole furough
- BIMSTEC



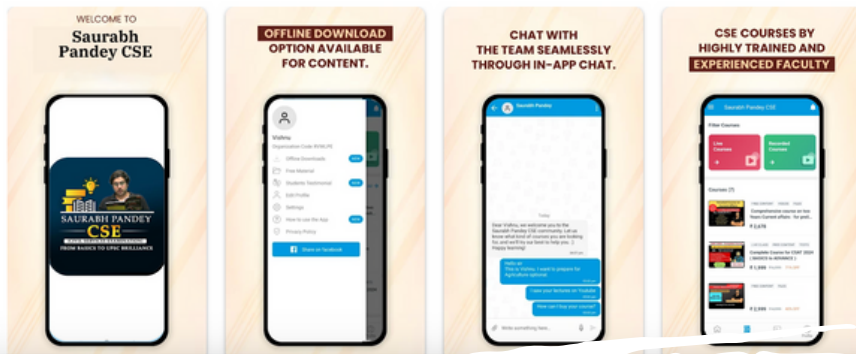
Saurabh Pandey CSE

Saurabh Pandey CSE

4.8★ 73 reviews | 1K+ Downloads | Everyone

Share Add to wishlist

You don't have any devices



App support

For any query msg-
9057921649

Classes on laptop-

<https://web.saurabhpandeyupsc.com/login>

sipri report

'India was the top arms importer in 2019-2023'

Dinakar Peri
NEW DELHI

India was the top arms importer in the world in the period 2019-23, with imports having gone up by 4.7% compared with the period 2014-18, according to Swedish think tank Stockholm International Peace Research Institute (SIPRI).

At the same time, arms imports by European countries increased by 94% between 2014-18 and 2019-23, the report said, which comes against the backdrop of the war in Ukraine.

“Although Russia remained India’s main arms supplier [accounting for 36% of its arms imports], this was the first five-year period since 1960-64 when deliveries from Russia [or the Soviet Union prior to 1991] made up less than half of India’s arms im-



The U.S. has increased its global role as an arms supplier, exporting more arms to more countries than it has ever done. GETTY IMAGES

ports,” as per new data on international arms transfers from SIPRI released on Monday. “Nine of the 10 biggest arms importers in 2019-23, including the top three of India, Saudi Arabia and Qatar, were in Asia and Oceania or the West Asia. Ukraine became the fourth biggest arms importer after it received transfers of major arms in 2022-23.”

In the interim Budget presented in February for financial year 2024-25, the

total allocation for the Defence Ministry was ₹6.2 lakh crore, of which the capital allocation for new procurements was ₹1.72 lakh crore, 5.78% higher than the Budget Estimates of last year. India seems to have come back to the top slot in arms imports after briefly ceding space to Saudi Arabia in the past.

Imports of Pakistan, the fifth largest arms importer in 2019-23, went up by 43%, with China supplying

as much as 82% of all its arms imports.

Arms exports by the world’s largest supplier, the U.S., grew by 17% between 2014-18 and 2019-23, while those by Russia fell by more than half. France emerged as the world’s second largest arms supplier as its exports grew by 47%.

Europe’s capacity

Over half of arms imports by European countries, 55%, in 2019-23 were from the U.S., up from 35% in 2014-18. “Europe is responsible for about a third of global arms exports, including large volumes going outside the region, reflecting Europe’s strong military-industrial capacity,” said SIPRI Director Dan Smith.

In this regard, Mathew George, Director of the SIPRI arms transfers programme, said the U.S. had increased its global role as

an arms supplier – an important aspect of its foreign policy – exporting more arms to more countries than it has ever done in the past.

On France, which is now the second largest arms supplier, the report said 42% of its arms went to states in Asia and Oceania, and 34% to West Asia. “The largest single recipient of French arms exports was India, which accounted for nearly 30%. The increase in French arms exports was largely due to deliveries of combat aircraft to India, Qatar and Egypt,” the report stated.

“With many high-value arms on order – including nearly 800 combat aircraft and combat helicopters – European arms imports are likely to remain at a high level,” said Pieter Wezeman, senior researcher with the SIPRI arms transfers programme.





SIPRI REPORT

- **India was the top arms importer in the world in the period 2019-23, with imports having gone up by 4.7% compared with the period 2014-18, according to Swedish think tank Stockholm International Peace Research Institute (SIPRI).**
- **At the same time, arms imports by European countries increased by 94% between 2014-18 and 2019-23, the report said, which comes against the backdrop of the war in Ukraine.**
- **“Although Russia remained India’s main arms supplier [accounting for 36% of its arms imports], this was the First Five-year period since 1960-64 when deliveries from Russia [or the Soviet Union prior to 1991] made up less than half of India’s arms imports,”**

**The hindu analysis by saurabh
pandey sir**





- “Nine of the 10 biggest arms importers in 2019-23, including the top three of India, Saudi Arabia and Qatar, were in Asia and Oceania or the West Asia.
- Ukraine became the fourth biggest arms importer after it received transfers of major arms in 2022-23.”
- India seems to have come back to the top slot in arms imports after briefly ceding space to Saudi Arabia in the past.
- Imports of Pakistan, the fifth largest arms importer in 2019-23, went up by 43%, with China supplying as much as 82% of all its arms imports.
- Arms exports by the world’s largest supplier, the U.S., grew by 17% between 2014-18 and 2019-23, while those by Russia fell by more than half.
- France emerged as the world’s second largest arms supplier as its exports grew by 47%

The hindu analysis by saurabh
pandey sir





- **Over half of arms imports by European countries, 55%, in 2019-23 were from the U.S., up from 35% in 2014-18.**
- **“Europe is responsible for about a third of global arms exports, including large volumes going outside the region, reflecting Europe’s strong military-industrial capacity,”**
- **U.S. had increased its global role as an arms supplier – an important aspect of its foreign policy – exporting more arms to more countries than it has ever done in the past.**
- **On France, which is now the second largest arms supplier, the report said 42% of its arms went to states in Asia and Oceania, and 34% to West Asia.**

**The hindu analysis by saurabh
pandey sir**





- **The largest single recipient of French arms exports was India, which accounted for nearly 30%.**
- **The increase in French arms exports was largely due to deliveries of combat aircraft to India, Qatar and Egypt**

**The hindu analysis by saurabh
pandey sir**



QUESTION CORNER

What makes the onion a tear-jerker?

Q

Q: Why does cutting an onion produce tears?

A: Onions and garlic both contain derivatives of sulphur-containing amino acids.

When an onion is sliced, one of these compounds, S-1-propenyl-cysteine sulphoxide, is decomposed by an enzyme to form a volatile compound called propanethial-S-oxide. This is the irritant, or lacrimator (the name for any substance that causes tears to flow).

When the compound comes in contact with water – in this case in your eyes – it hydrolyses to propanal, sulphuric acid, and hydrogen sulphide. A hydrolysis is a chemical reaction in which a water molecule is used to break chemical bonds.

Tearfully, the eyes try to dilute the acid. However, it is these same sulphur compounds that produce the nice aroma when onions are being cooked.



Propanethial-S-oxide is the irritant that causes tears to flow.
GETTY IMAGES

For feedback and suggestions
for 'Science', please write to
science@thehindu.co.in
with the subject 'Daily page'



The hindu analysis by saurabh
pandey sir



What makes the onion a tear-jerker?

- Onions and garlic both contain derivatives of sulphur-containing amino acids.
- When an onion is sliced, one of these compounds, S-1-propenyl-cysteine sulphoxide, is decomposed by an enzyme to form a volatile compound called propanethial-S-oxide.
- This is the irritant, or lacrimator (the name for any substance that causes tears to flow).
- When the compound comes in contact with water – in this case in your eyes – it hydrolyses to propanal, sulphuric acid, and hydrogen sulphide.
- A hydrolysis is a chemical reaction in which a water molecule is used to break chemical bonds

The hindu analysis by saurabh
pandey sir



Urbanisation

A new sense of urbanisation that is dominating

There have been two events in the media glare in the last nine months in India, namely, the inauguration of two very important institutions, i.e., the new Parliament building, which is a political institution, and the Ram temple, a religious institution, which raise pertinent issues. Both of these were inaugurated by the Prime Minister of India. Does this mean that the elected representative of the people can comfortably take over both the roles of democracy and worship? Will our future cities be driven by religion as the core, and not work, industry, and modernism, which have been an essential feature of the last seven decades of urbanisation?

It is estimated that around ₹85,000 crore will be spent in infrastructure building in Ayodhya. Will religious cities be the new paradigm of urban development in India?

Colonial versus new cities

The cities and urban development in the last two centuries draw a rural to urban migration premise for sustaining industrialisation. Metros are colonial cities according to the current discourse and new cities such as Ayodhya, Kashi and Pushkar must be built. The colonial cities were meant for the transport of goods, taxation and then sending them by ship.

Cities also bring in elements of modernism, not just in architecture but also in the entire gamut of culture, literature, human behaviours and the like. There are anecdotes of how this modernist feature was embedded in the development model of the Indian city. Innovative design and modernist features brought in by Le Corbusier, and the influence of Habib Rahman, who was brought in by Jawaharlal Nehru to design some of the important buildings in the national capital, laid an emphasis on modern technology and mass production techniques and material to design and manufacture high quality and cheap goods that are accessible to many.



Tikender Singh Panwar

is former Deputy Mayor, Shimla, and Member, Kerala Urban Commission

The old understanding that cities are considered to be centres of enlightenment, workplace, and habitat is being challenged, also bringing into focus the role of the state

Likewise, almost all modern towns were developed with spaces for theatre, culture, art, and recreation. This was primarily the driving feature in modern cities.

The building of new towns met several needs – from providing jobs and homes for refugees and absorbing excess population from the older urban areas, to generating economic development in the local region and serving as symbols of the new modern India that was emerging, though not completely ideal and commensurate to the needs, but quite inclusive in design and what was built.

In the current phase, a new sense of urbanisation is dominating. And the old understanding that cities are considered to be centres of enlightenment, workplace, and habitat is being challenged. Cities should not just be centres of workplaces but also centres of *yatras*, pilgrimage and so on. Thus, we find big corporates also landing in a small town such as Ayodhya and investing heavily in its infrastructure.

Thus, the new conundrum in India is for a new form of urbanisation; a new revivalism of the faith where the cities and towns and where the system should be aligned to the religion of the majority, and not separate from it.

Investments and random modules

The post-colonial period saw the emergence of new towns, and some of them were industrial as well such as Bhillai, Rourkela, and Chandigarh to name a few. Still, the metros attracted the largest numbers of people and investments.

We know from the ranking of urban centres that if one goes by metro classification of the highest in population and wealth generation, colonial cities emerge in the list. After that the other urban centres are regional in character. There is an effort to try and elevate a regional pilgrimage city to that of a colonial city – the heavy investment in the urban infrastructure of

Ayodhya is a pointer. It is good to spend resources in any regional city be it for production or tourism or otherwise. However, since there is no apparent plan to direct such expenditure according to a justifiable plan of investment in regional cities across India, one wonders what the justification of spending on random modules in a haphazard way is. The new Central Vista. The Sardar Patel statue. The high-speed bullet train project between Ahmedabad and Mumbai. The temple in Ayodhya. What do we understand from this enormous expenditure?

It seems to indicate that the goal of the Indian government is to be a modern nation sitting on an ancient seat and to try to reverse the separation of religion from politics – to signal religion to be a social phenomenon rather than a private one.

The role of the state and social good

This draws one's attention to one of the moot points. And that is to understand what the role of the state is in building cities and creating investments. We know that the accumulation of capital and the generation of surplus in a democratic society should be directed towards social good, and not for religious good, as we have experienced in the early centuries of Hindu revivalism. What does social good mean? In simple terms it means that the surplus generated must be distributed to build modern institutions, education, health, social infrastructure, particularly in a society that screams for social sector investments (the World Bank estimates that India will need to invest \$840 billion over the next 15 years for urban infrastructure), and not for religious good, which is exactly what we are doing now.

This revivalism is based on an acute form of centralisation of finances and a ghettoisation of urban spaces on a religious basis. An answer to this is decentralisation, democratisation and a more dynamic coexistence of citizens, with access to equal rights and obligation.





New Phase of Urbanisation

Colonial versus new cities

- The cities and urban development in the last two centuries draw a rural to urban migration premise for sustaining industrialisation.**
- Metros are colonial cities according to the current discourse and new cities such as Ayodhya, Kashi and Pushkar must be built.**
- The colonial cities were meant for the transport of goods, taxation and then sending them by ship.**
- Cities also bring in elements of modernism, not just in architecture but also in the entire gamut of culture, literature, human behaviours and the like.**
- There are anecdotes of how this modernist feature was embedded in the development model of the Indian city**

**The hindu analysis by saurabh
pandey sir**



URBANISATION

Saurabhpandeyupsc.com



The building of new towns met several needs – from providing jobs and homes for refugees and absorbing excess population from the older urban areas, to generating economic development in the local region and serving as symbols of the new modern India that was emerging, though not completely ideal and commensurate to the needs, but quite inclusive in design and what was built.



the new conundrum in India is for a new form of urbanisation; a new revivalism of the faith where the cities and towns and where the system should be aligned to the religion of the majority, and not separate from it.

In the current phase, a new sense of urbanisation is dominating. And the old understanding that cities are considered to be centres of enlightenment, workplace, and habitat is being challenged

Cities should not just be centres of workplaces but also centres of yatras, pilgrimage and so on. Thus, we find big corporates also landing in a small town such as Ayodhya and investing heavily in its infrastructure

The post-colonial period saw the emergence of new towns, and some of them were industrial as well such as Bhilai, Rourkela, and Chandigarh to name a few. Still, the metros attracted the largest numbers of people and investments.

DOWNLOAD SAURABH PANDEY CSE APP



Nuclear Waste

How is nuclear waste generated?

Why is the spent fuel from nuclear power plants dangerous? How can they be stored safely with minimum human contact? How are countries with major nuclear power programmes storing nuclear waste? Does India have nuclear waste reprocessing plants?

EXPLAINER

Vasudevan Mukunth

The story so far:

Recently, India loaded the core of its long-delayed Prototype Fast Breeder Reactor (PFBR) vessel, bringing the country to the cusp of stage II – powered by uranium and plutonium – of its three-stage nuclear programme. By stage III, India hopes to be able to use its vast reserves of thorium to produce nuclear power and gain some energy independence. But the large-scale use of nuclear power is accompanied by a difficult problem: waste management.

What is nuclear waste?

In a fission reactor, neutrons bombard the nuclei of atoms of certain elements. When one such nucleus absorbs a neutron, it destabilises and breaks up, yielding some energy and the nuclei of different elements. For example, when the uranium-235 (U-235) nucleus absorbs a neutron, it can fission to barium-144, krypton-89, and three neutrons. If the 'debris' (barium-144 and krypton-89) constitute elements that can't undergo fission, they become nuclear waste.

An important source of nuclear waste is the fuel itself. "The spent fuel contains all the radioactive fission products that are produced when each nucleus ... breaks apart to produce energy, as well as those radioactive elements, ... produced when uranium is converted into heavier elements following the absorption of neutrons and subsequent radioactive decays," M.V. Ramana, the Simons Chair in Disarmament, Global and Human Security at the School of Public Policy and Global Affairs, University of British Columbia, wrote in a 2018 paper.

Nuclear waste is highly radioactive and needs to be stored in facilities reinforced to prevent leakage and/or contamination of the local environment.

How do we handle nuclear waste?

Handling the spent fuel is the main challenge – it is hot and radioactive, and needs to be kept underwater for up to a few decades. Once it has cooled, it can be transferred to dry casks for longer-term storage. All countries with long-standing nuclear power programmes have accumulated a considerable inventory of spent fuel. For example, the U.S. had 69,682 tonnes (as of 2015), Canada 54,000 tonnes (2016), and Russia 21,362 tonnes (2014). Depending on radioactivity levels, the storage period can run up to many millennia, meaning "they have to be isolated from human contact for periods of time that are longer than anatomically modern *Homo sapiens* have been around on the planet," Dr. Ramana wrote.

Nuclear power plants also have liquid waste treatment facilities. "Small quantities of aqueous wastes containing short-lived radionuclides may be discharged into the environment," International Agency for Atomic Energy (IAEA) scientist V. Tsypelenkov wrote in a 1993 feature. Japan is currently discharging, after treatment, such water from the Fukushima nuclear power plant into the Pacific Ocean. Other such waste, depending on their hazard, can be evaporated or "chemically precipitated" to yield a sludge to be treated and stored, "adsorbed on solid materials" or incinerated.

Liquid high-level waste contains "almost all of the fission products produced in the fuel". It is vitrified to form a storable glass. "The vast majority of the radioactivity in the waste from pressurised heavy-water reactors of stage



Treating nuclear waste: The Power Reactor Fuel Reprocessing plant (PFBR) and Advanced Fuel Fabrication Facility (AFFF) at Tarapur. FILE PHOTO

II ... can't be used to fuel the PFBR," Dr. Ramana said of India's situation in an email to *The Hindu*. "Only uranium and plutonium can be used as fuel. Because India reprocesses its spent fuel, these fission products will have to be stored, at least for a while, in the form of liquid waste, which poses accident hazards."

How is nuclear waste dealt with?

Once spent fuel has been cooled in the spent-fuel pool for at least a year, it can be moved to dry-cask storage. It is placed inside large steel cylinders and surrounded by an inert gas. The cylinders are sealed shut and placed inside larger steel or concrete chambers.

Some experts have also mooted for geological disposal: the waste is sealed in "special containers", to quote Dr. Ramana's paper, and buried underground in granite or clay. The upside here is long-term storage away from human activity, although some studies have pointed to the risk of radioactive material becoming exposed to humans if the containers are disturbed, such as by nearby digging activity.

Reprocessing – the name for technologies that separate fissile from non-fissile material in spent fuel – is another way to deal with the spent fuel. Here, the material is chemically treated to separate fissile material left behind from the non-fissile material. Because spent fuel is so hazardous, reprocessing facilities need specialised protections and personnel of their own. Such facilities present the advantage of higher fuel efficiency but are also expensive.

Importantly, reprocessing also yields weapons-usable (different from weapons-grade) plutonium. The IAEA has specified eight kilograms of plutonium in which plutonium-239 accounts for more than 95% to be the threshold for "safeguards significance". It tightly regulates the setting up and operation of these facilities as a result.

What are the issues associated with nuclear waste?

In 2013, *Der Spiegel* reported on

engineers' years' long effort to access the Asse II mine, where "thousands of drums filled with nuclear waste" had been kept for "over three decades". The effort – a decontamination project – was prompted by mounting public concerns that the waste may have contaminated water resources (including groundwater) in the area. The newspaper said it was likely to cost "somewhere between €5 billion and €10 billion" and around 30 years, to decontaminate the waste. Dr. Ramana also used the case of the Waste Isolation Pilot Plant (WIPP) in the U.S. to illustrate the issue of "unknown unknowns". The facility has been operational since March 1999 with a licence to store waste for a few millennia. "For long, WIPP had been held up as a model for how radioactive wastes should be dealt with," Dr. Ramana wrote. But in 2014, an accident at the site released small quantities of radioactive materials to the environment, revealing serious failures in its maintenance.

He expressed concerns to *The Hindu* about uncertainties with treating liquid waste: "How well have the vitrification plants at reprocessing plants functioned? How much liquid waste – high level and intermediate level – is yet to be vitrified?" "Almost all countries that have tried to site repositories have experienced one or more failures," he wrote. He also highlighted "normative problems with the idea of exporting nuclear waste, including the environmental injustice inherent in the exports of such hazardous materials, and the ethical argument that those enjoying the benefits of nuclear power should also incur the costs".

What does waste-handling cost nuclear power? In the 1993 feature, Dr. Tsypelenkov considered a nuclear power plant of 1,000 MWe capacity "operating at a capacity factor of 70% for 30 years". They estimated "the waste management at the front end of the cycle leads to about 10% of the total waste management cost. Of this, about one-third is due to the management of

depleted uranium as a waste. The management of wastes from power plant operation accounts for about 24% of the costs and 15% is due to power plant decommissioning. The remaining 50% of costs is associated with the back end of the fuel cycle."

In the final estimate, they added, waste management imposed a cost of \$1.6-7.1 per MWh of nuclear energy.

How does India handle nuclear waste?

According to a 2015 report of the International Panel on Fissile Materials (IPFM), India has reprocessing plants in Trombay, Tarapur, and Kalpakkam. The Trombay facility reprocesses 50 tonnes of heavy metal per year (tHM/y) as spent fuel from two research reactors to produce plutonium for stage II reactors as well as nuclear weapons. Of the two in Tarapur, one is used to reprocess 100 tHM/y of fuel from some pressurised heavy water reactors (stage I) and the other, commissioned in 2011, has a capacity of 100 tHM/y. The third facility in Kalpakkam processes 100 tHM/y.

Also in 2015, Jitendra Singh, the Minister of State for the Prime Minister's Office (among other portfolios), said in the Rajya Sabha: "The wastes generated at the nuclear power stations during the operation are of low and intermediate activity level and are managed at the site itself."

He added they are treated and stored in on-site facilities, that "such facilities are located at all nuclear power stations", and that the surrounding area "is monitored for radioactivity".

The IPFM report also said the PFBR's delays suggested the Tarapur and Kalpakkam facilities "must have operated quite poorly, with a combined average capacity factor of around 15%".

Dr. Ramana also said in his email, "If and when the PFBR starts functioning and spent fuel from it is discharged, that will bring its own complications because it will have a different distribution of fission products and transuranic elements."

THE GIST

In a fission reactor, neutrons bombard the nuclei of atoms of certain elements. When one such nucleus absorbs a neutron, it destabilises and breaks up, yielding some energy and the nuclei of different elements. If the 'debris' constitute elements that can't undergo fission, they become nuclear waste.

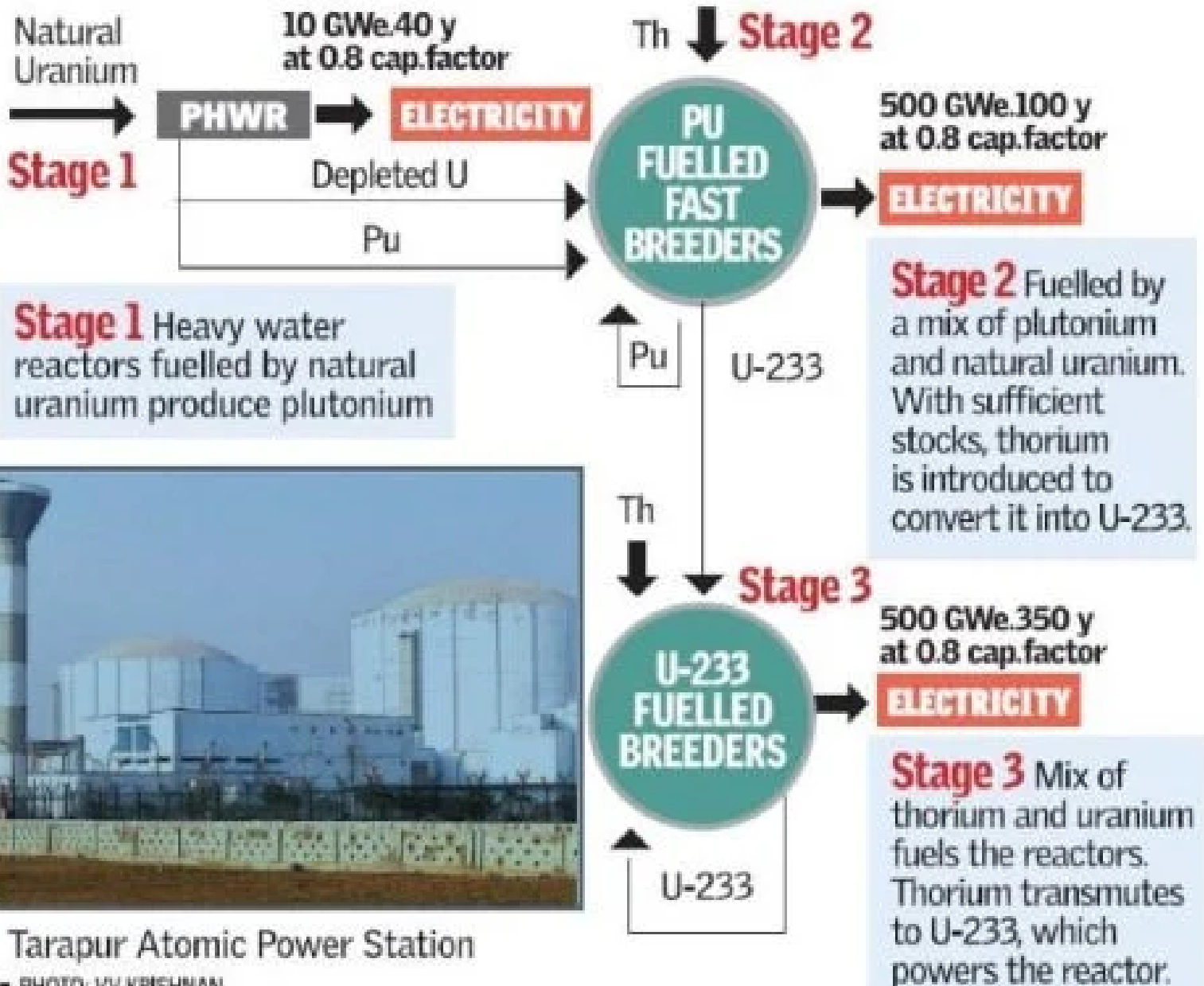
Nuclear waste is often highly radioactive and needs to be stored in facilities reinforced to prevent leakage and/or contamination of the local environment.

According to a 2015 report of the International Panel on Fissile Materials (IPFM), India has reprocessing plants in Trombay, Tarapur, and Kalpakkam.



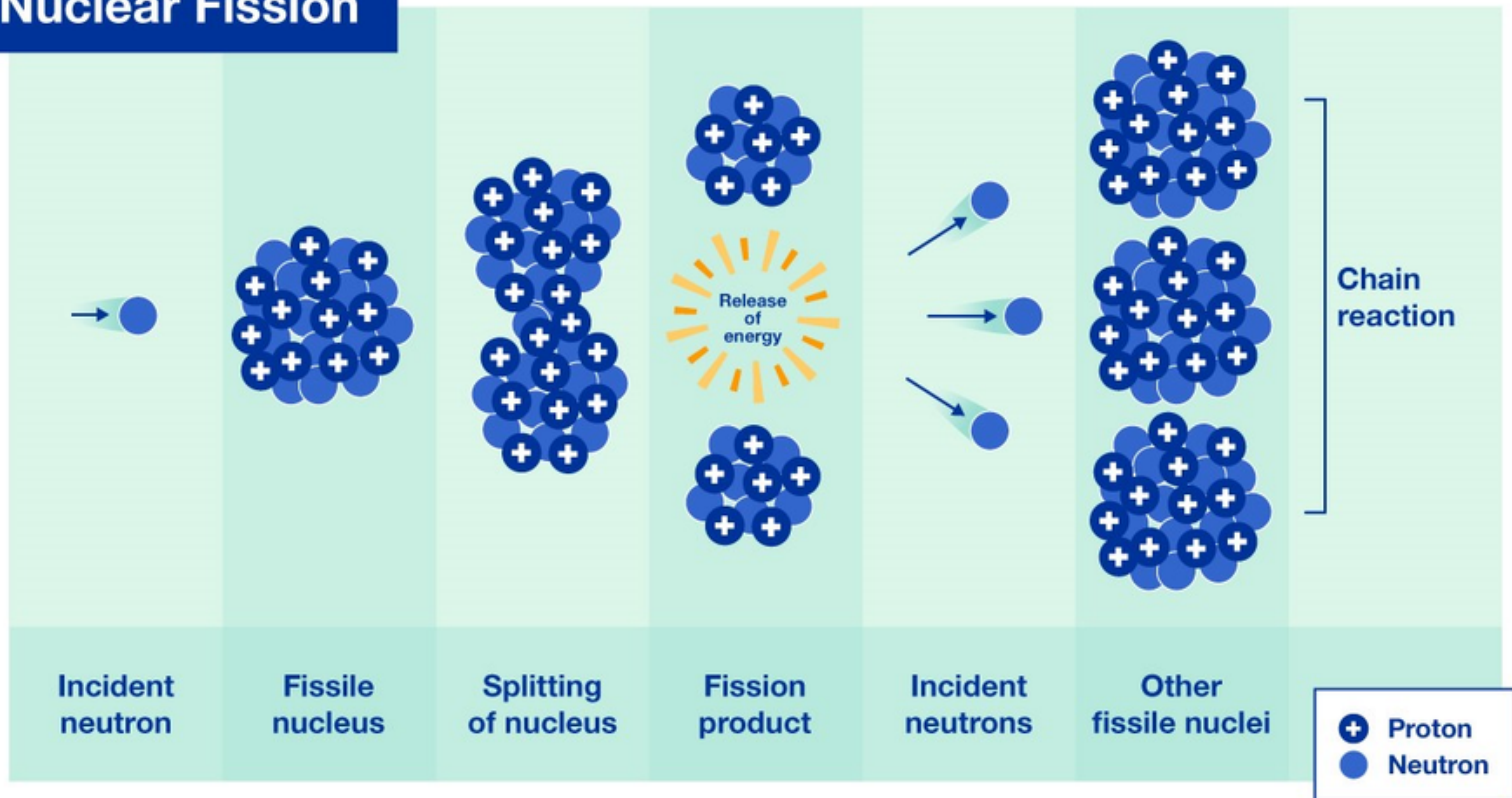
INDIA'S THREE-STAGE NUCLEAR PROGRAMME

Homi Bhabha envisioned India's nuclear power programme in three stages to suit the country's low uranium resource profile

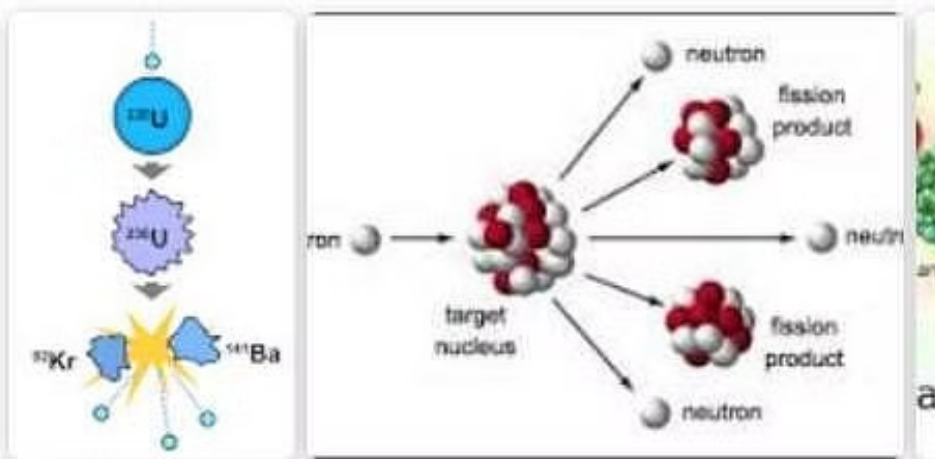


The hindu analysis by saurabh
pandey sir

Nuclear Fission

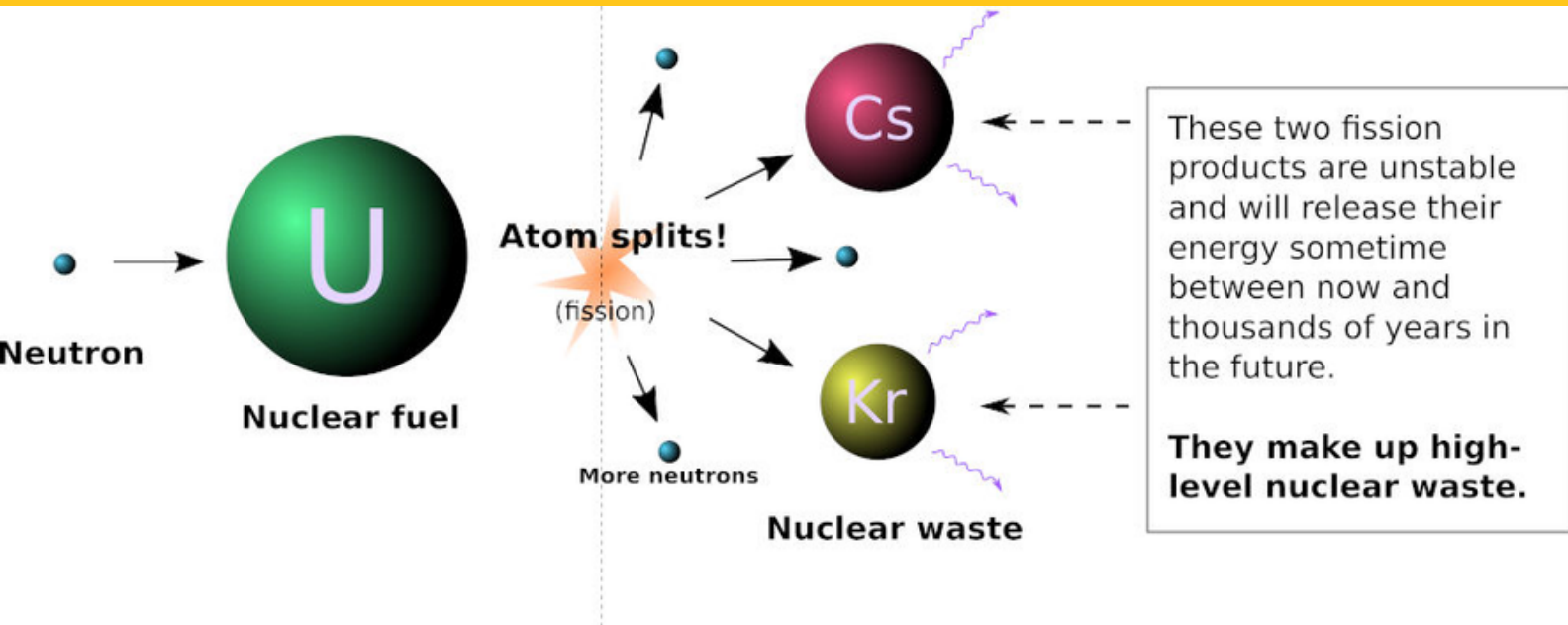


Nuclear fission



Nuclear fission is a process in **nuclear** physics in which the nucleus of an atom splits into two or more smaller nuclei as **fission** products, and usually some by-product particles. Hence, **fission** is a form of elemental transmutation.

Nuclear waste





Recently, India loaded the core of its long-delayed Prototype Fast Breeder Reactor (PFBR) vessel, bringing the country to the cusp of stage II — powered by uranium and plutonium — of its three-stage nuclear programme.

By stage III, India hopes to be able to use its vast reserves of thorium to produce nuclear power and gain some energy independence.

In a fission reactor, neutrons bombard the nuclei of atoms of certain elements.

When one such nucleus absorbs a neutron, it destabilises and breaks up, yielding some energy and the nuclei of different elements.

If the 'debris' constitute elements that can't undergo fission, they become nuclear waste.

Nuclear waste is often highly radioactive and needs to be stored in facilities reinforced to prevent leakage and/or contamination of the local environment

- According to a 2015 report of the International Panel on Fissile Materials (IPFM), India has reprocessing plants in Trombay, Tarapur, and Kalpakkam.

NUCLEAR WASTE GENERATED

NUCLEAR WASTE AND ITS DISPOSAL

NUCLEAR POWER



435 NUCLEAR PLANTS WORLDWIDE
10,500 TONNES OF SPENT FUEL PER YEAR

As of 2019, nuclear power plants operate in 30 countries. Six countries have outright bans on use of nuclear reactors to generate electricity.



● Operating nuclear power plants ● Ban in place

10% OF THE WORLD'S ELECTRICITY

Nuclear fuel releases many times more energy per gram than fossil fuels. Nuclear plants don't release carbon dioxide while they are operating.

WHAT IS NUCLEAR WASTE?

About 3% of spent nuclear fuel consists of radioactive fission products. In some countries, the spent fuel is reprocessed to separate the waste from uranium and plutonium.

SPENT FUEL COMPOSITION



Radioactive waste contains unstable isotopes of elements which decay and emit alpha, beta or gamma radiation. Eventually they decay into non-radioactive elements.

HALF LIVES: UP TO 32 YEARS

Cs-137 Sr-90 Cm-243 Cm-244 Co-60

HALF LIVES: 460-24,000 YEARS

Th-229 Pu-239 Pu-240 Am-241 Am-243

HALF LIVES: 77,000-16,000,000 YEARS

Nb-94 I-129 Cs-135 Tc-99 Th-230 Np-237

As well as the radioactivity produced by nuclear waste, it also produces heat as isotopes decay. This poses issues for storage and disposal.

TYPES OF NUCLEAR WASTE

LOW LEVEL WASTE (LLW)

90% of all radioactive waste (by volume)
1% of the total radioactivity of all waste

LLW is defined as not exceeding 4 gigabecquerels per tonne (GBq/t) of alpha activity or 12 GBq/t of beta-gamma activity.

INTERMEDIATE LEVEL WASTE (ILW)

7% of all radioactive waste (by volume)
4% of the total radioactivity of all waste

ILW produces more radiation than LLW, but doesn't generate as much heat as HLW. It includes metal fuel cladding.

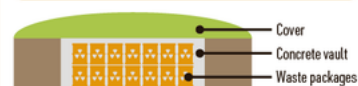
HIGH LEVEL WASTE (HLW)

3% of all radioactive waste (by volume)
95% of the total radioactivity of all waste

HLW is defined as producing more than 2 kilowatts per metre cubed of heat due to its radioactivity. It requires shielding during transport and cooling before permanent disposal. It includes used fuel and separated waste.

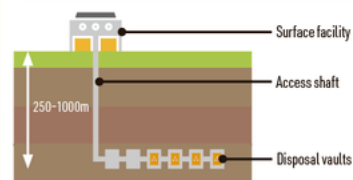
WASTE STORAGE & DISPOSAL

NEAR-SURFACE DISPOSAL



Low level waste's radioactivity is usually compacted into steel canisters and stored in concrete vaults underground. When full, vaults are sealed, covered and left. They ensure no significant radiation reaches the surface.

DEEP GEOLOGICAL DISPOSAL



Intermediate and high level waste generate heat and greater levels of radioactivity. Most countries plan to use deep geological disposal. The rock and soil acts as a barrier to the radiation. Before this, high level waste is incorporated into glass and stored for up to fifty years to allow heat to dissipate.

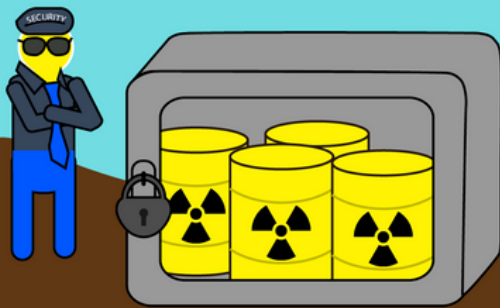


© Andy Brunning/Compound Interest 2020 - www.compoundchem.com | Twitter: @compoundchem | FB: www.facebook.com/compoundchem
This graphic is shared under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 licence.



How do we dispose of nuclear waste?

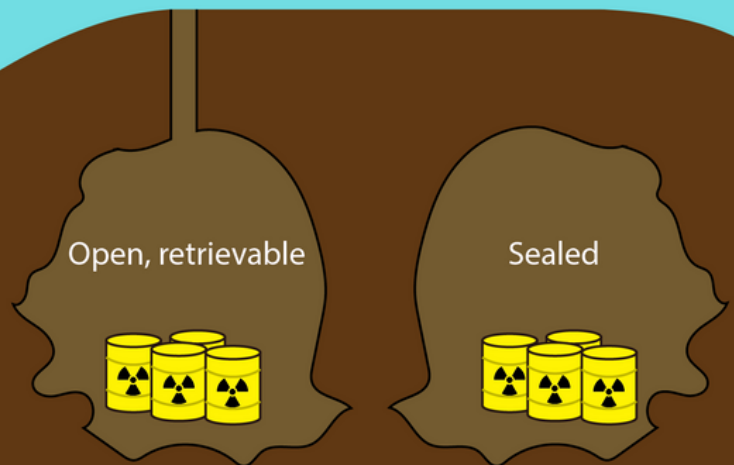
At or near surface



Centralized Distributed

Safe if resources are continually committed

Geological repositories



= Geological disposition

= Geological disposal

Safe with reduced active measures



How does India handle nuclear waste?

- According to a 2015 report of the International Panel on Fissile Materials (IPFM), India has reprocessing plants in Trombay, Tarapur, and Kalpakkam.
- The Trombay facility reprocesses 50 tonnes of heavy metal per year (tHM/y) as spent fuel from two research reactors to produce plutonium for stage II reactors as well as nuclear weapons.
- Of the two in Tarapur, one is used to reprocess 100 tHM/y of fuel from some pressurised heavy water reactors (stage I) and the other, commissioned in 2011, has a capacity of 100 tHM/y.
- The third facility in Kalpakkam processes 100 tHM/y.

The hindu analysis by saurabh
pandey sir

Iran, Russia and China show off naval strength with joint exercise in the Gulf of Oman

Associated Press

DUBAI

China, Iran and Russia have begun a joint naval drill in the Gulf of Oman, a crucial waterway, officials said on Tuesday.

Footage aired by Chinese state television and a video released by the Russian navy showed the ongoing drill, known as “Marine Security Belt 2024.”

China sent the guided-missile destroyer *Urumqi* and the guided-missile frigate *Linyi* to the exercise. Russia’s forces are being led by the *Varyag*, a Slava-class cruiser. More than 20 ships, support vessels and combat boats from the three countries, as well as naval helicopters, are involved in the exercise. A re-



An Islamic Revolutionary Guard Corps Navy missile corvette at sea in the Gulf of Oman. AFP

port by Iranian state television quoted the drill’s spokesperson, Admiral Mostafa Tajaddini, as saying the drill will take place in 17,000 square kilometers of water.

Adm. Tajaddini added that the three nations’ drill – their fourth since 2019 –

was also meant to improve trade, confront “piracy and terrorism, support to humanitarian activities and the exchange of information in the field of rescue,” among other goals.

Stepping up ties

Iran has stepped up its military cooperation with Beijing and Moscow in response to regional tensions with the U.S., including the supply of military drones to Russia now being used in Moscow’s war on Ukraine.

Azerbaijan, Kazakhstan, Oman, Pakistan and South Africa are observers of the drill.

The Gulf of Oman has seen a series of attacks since 2019 that the U.S. has blamed on Iran.





- **China, Iran and Russia have begun a joint naval drill in the Gulf of Oman, a crucial waterway ,**
- **Footage aired by Chinese state television and a video released by the Russian navy showed the ongoing drill, known as “Marine Security Belt 2024.” China sent the guided missile destroyer Urumqi and the guided-missile frigate Linyi to the exercise. Russia’s forces are being led by the Varyag, a Slava class cruiser.**
- **Iran has stepped up its military cooperation with Beijing and Moscow in response to regional tensions with the U.S., including the supply of military drones to Russia now being used in Moscow’s war on Ukraine. Azerbaijan, Kazakhstan, Oman, Pakistan and South Africa are observers of the drill.**
- **The Gulf of Oman has seen a series of attacks since 2019 that the U.S. has blamed on Iran.**

**The hindu analysis by saurabh
pandey sir**



The hindu analysis by saurabh
pandey sir

Detailed Course on Current Affairs

**MUST FOR
PRELIMS
2024**

CLASS -2 TOPICS

Covered

- Inflation reduction act
- Flue gas desulpharisation
- Red sand dunes
- cheetah population
- GIB
- VIJHIJM port
- parole furough
- BIMSTEC



visit -saurabhpandeyupsc.com

For any query msg- 9057921649

mail-

saurabhpandey456321@gmail.com

International Relations

LAUNCHED

Target Prelims 2024

Basics and current affairs

International
Relations

BY Saurabh pandey sir

LINK IN DESCRIPTION

Agriculture for GS

LAUNCHED

Target Prelims 2024

Basics and current affairs

Agriculture for
General studies

BY Saurabh pandey sir



Basic and advance Topics

Launched

Target Prelims 2024

Course on Advance
Topics of Science &
technology

Topics from last 2 yrs
Special focus on
newspapers especially
the hindu



BY Saurabh pandey sir



International Relations

LAUNCHED

Target Prelims 2024

Basics and current affairs

International
Relations

BY Saurabh pandey sir



Link in description

How to watch classes ??

1- Download Saurabh
pandey cse app

2- visit

web.saurabhpandeyupsc.com

For any query msg- [9057921649](tel:9057921649)



Target Mains 2024

Q What role nuclear energy can play in limiting energy poverty in india??

Q भारत में ऊर्जा गरीबी को सीमित करने में परमाणु ऊर्जा क्या भूमिका निभा सकती है??

**SEND ANSWER- SAURABH PANDEY UPSC
Telegram channel**

For any query msg-

9057921649

mail-

**saurabhpandey456321@gmail.
com**

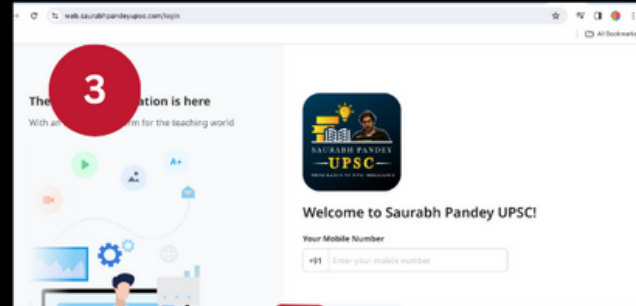
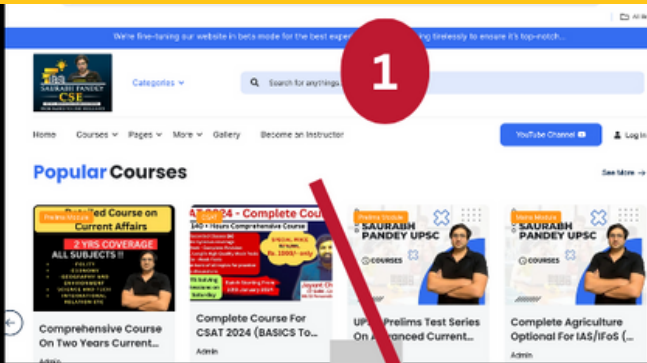
Courses Active

**Prelims test series on advanced
current affairs (total 50 tests)Saurabh
Pandey UPSC: Home (Every Thursday
and saturday)**

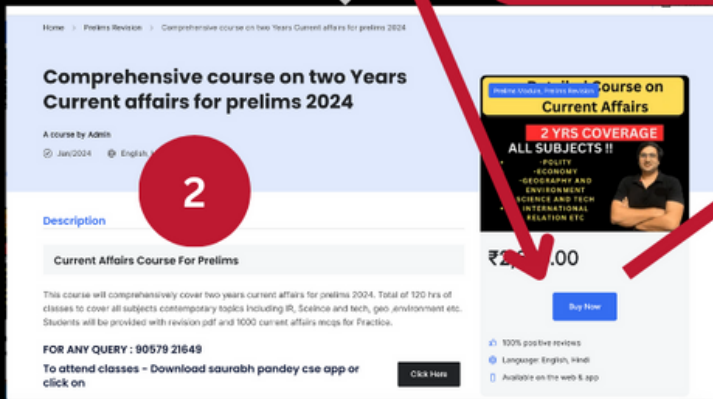
visit saurabhpandeyupsc.com

**For any query msg- 9057921649
mail-
saurabhpandey456321@gmail.com**

HOW TO JOIN??



saurabhpandeyupsc.com



How to join???

For any query msg- 9057921649
mail-
saurabhpandey456321@gmail.com