



Centre's Push for Labour Codes

For Prelims: Labour Codes, Ministry of Labour and Employment, Government related initiatives and regulations

For Mains: Labour Codes and their mandate, Significance of Labour Codes in Indian Economy, Challenges in Labour Codes

Why in News?

Central government is pushing for the implementation of **four labour codes introduced in 2020** (Code of Wage Act in 2019), replacing 29 sets of labour laws.

- **Labour Codes includes 4 versions:** Code of Wages Act 2019, Industrial Relations Code Bill, 2020, Social Security Code Bill, 2020, Occupational Safety, Health and Working Conditions Code Bill, 2020

What do we need to know about Labour Codes?

- **Code of Wages Act 2019:**
 - **About:**
 - The bill aims to **transform the old and obsolete labour laws into more accountable and transparent** ones and seeks to pave the way for the introduction of minimum wages and [labour reforms in the country](#).
 - It regulates the **wages and bonus payments** in all employment areas where any industry, trade, business, or manufacturing is being carried out.
 - The bill subsumes the following four labour laws:
 - **The Payment of Wages Act, 1936**
 - **The Minimum Wages Act, 1948**
 - **The Payment of Bonus Act, 1965**
 - **The Equal Remuneration Act, 1976**
 - It universalizes the provisions of [minimum wages](#) and timely payment of wages to all employees irrespective of the sector and wage ceiling and seeks to ensure **"Right to Sustenance"** for every worker and intends to increase the legislative protection of minimum wage.
 - It has been ensured in the bill that **employees getting monthly salary shall get the salary by 7th of next month**, those working on a **weekly basis shall get the salary on the last day of the week** and **daily wagers should get it on the same day**.
 - **The Central Government is empowered** to fix the floor wages by taking into account the living standards of workers. It may set different floor wages for different geographical areas.
 - The minimum wages decided by the central or state governments must be higher than the floor wage.
- **Industrial Relations Code Bill, 2020:**
 - **Industrial Employment (Standing Orders) Act, 1946** makes it obligatory for

employers of an industrial establishment where **100 or more workers** are employed to **clearly define the conditions of employment and rules of conduct** for workmen, by way of standing orders/services rules and to make them known to the workmen employed.

- The **new provision** for standing order will be applicable for every industrial establishment wherein **300 or more than 300 workers are employed** or were employed on any day of the preceding twelve months.
- It was earlier suggested by the [Standing Committee on Labour](#) which also suggested that the threshold be increased accordingly in the Code itself and the words '**as may be notified by the Appropriate Government**' be removed because reform of labour laws through the executive route is undesirable and should be avoided to the extent possible.
- After becoming a law, **orders will not be dependent on whims and fancies of executives of state governments.**
- It also introduces new conditions for carrying out a **legal strike**. The time period for arbitration proceedings has been included in the conditions for workers before going on a legal strike as against only the time for conciliation at present.
 - No person employed in any industrial establishment shall go on strike **without a 60-day notice** and **during the pendency** of proceedings before a [Tribunal](#) or a National Industrial Tribunal and **sixty days after the conclusion of such proceedings.**
 - At present, a person employed in a **public utility service cannot go on strike** unless they give notice for a strike **within six weeks** before going on strike or **within fourteen days of giving such notice, which the IR Code now proposes to apply for all the industrial establishments.**
 - It has also proposed to set up a **re-skilling fund** for training of retrenched workers with contribution from the employer, of an amount equal to 15 days last drawn by the worker.
- **Social Security Code Bill, 2020:**
 - It proposes a **National Social Security Board** which shall recommend to the central government for formulating suitable schemes for different sections of [unorganized workers](#), [gig workers](#) and [platform workers](#).
 - Also, aggregators employing **gig workers will have to contribute 1-2% of their annual turnover for social security**, with the total contribution not exceeding 5% of the amount payable by the aggregator to gig and platform workers.
- **Occupational Safety, Health and Working Conditions Code Bill, 2020:**
 - It has defined **inter-state migrant workers** as the worker who has come on their own from one state and obtained employment in another state, earning up to Rs. 18,000 a month.
 - The proposed definition makes a **distinction from the present definition of only contractual employment.**
 - It has dropped the earlier provision for temporary accommodation for workers near the worksites and has proposed a **journey allowance, a lump sum amount of fare to be paid by the employer for to and fro journey of the worker to their native place from the place of their employment.**

What are the Benefits of Labour Codes?

- **Code of Wage Act 2019:**
 - It is expected to reduce litigation as it streamlines the definition of wages.
 - It will substantially reduce the number of minimum wages in the country from the existing more than 2000 rates of minimum wages.
 - This would ensure that every worker gets a minimum wage which will also be accompanied by an increase in the [purchasing power](#) of the worker thereby giving a fillip to growth in the economy.
- **Consolidation and simplification of the Complex laws:**
 - The three Codes (IR , SS & OSHW) **simplify labour laws** by subsuming 25 central labour laws that have been on the table for at least 17 years.
 - It will provide a **big boost to industry & employment** and will reduce multiplicity of definition and multiplicity of authority for businesses.
- **Single Licensing Mechanism:**

- The codes provide for a **single licensing mechanism**.
 - It will give fillip to industries by ushering in substantive reform in the licensing mechanism. Currently, industries have to apply for their licence under different laws.
- **Easier Dispute Resolution:**
 - The codes also **simplify archaic laws** dealing with industrial disputes and **revamp the adjudication process**, which will pave the way for early resolution of disputes.
- **Ease of Doing Business:**
 - According to the industry and some economists, such reform shall **boost investment and improve [ease of doing business](#)**.
 - It drastically reduces complexity and internal contradictions, increases flexibility & modernizes regulations on safety/working conditions
- **Other benefits for Labour:**
 - The three codes will promote fixed term employment, reduce influence of trade unions and expand the social security net for informal sector workers.
- **Gender parity:**
 - Women have to be permitted to work in every sector at night, but it has to be ensured that provision for their security is made by the employer and consent of women is taken before they work at night.
 - **The maternity leave is increased from 12 weeks to 26 weeks**. Women were allowed to work in mines under **[Pradhan Mantri Rojgar Protsahan Yojana \(PMRPY\)](#)**.
 - Pay parity to women workers as compared to their male counterparts.

What are the Challenges Labour Codes Facing?

- **Constitutional Challenge:**
 - Labour being a **concurrent subject**, both the **Centre and states have to frame laws and rules**.
 - While Parliament cleared the four labour codes in 2020, and the Centre pre-published the draft rules for all four codes, **some state governments are yet to complete the process**.
- **Industrial Relations Code Bill:**
 - It will **water down the labour rights** for workers in small establishments having less than 300 workers and would enable companies to introduce arbitrary service conditions for workers.
- **Code of Wages Act:**
 - It has been **alleged that the new wage code will push the [starvation wages](#)** further by increasing the income capacity and purchasing power of the informal workers.
- **Concern of Exclusion:**
 - The draft rules **mandate the registration of all workers (with [Aadhaar cards](#)) on the Shram Suvidha Portal** to be able to receive any form of social security benefit.
 - This would **lead to Aadhaar-driven exclusion** and workers will most likely be unable to register on their own due to lack of information.
- **Urban Centric:**
 - The codes **fail to extend any form of social protection to the vast majority of informal sector workers** which is predominant in rural areas including migrant workers, self-employed workers, home-based workers and other vulnerable groups.
- **No-Right Based Framework:**
 - The **Code does not emphasize social security as a right**, nor does it make reference to its provision as stipulated by the Constitution.

Way Forward

- **Looking After Migrant Workforce:**
 - It is important for the draft rules to clearly state how their applicability will unfold with respect to the migrant informal workforce.
 - In this context, the governments' scheme of **[one India one ration card](#)** is a step in the right direction.
- **Skilling Under CSR Expenditure:**

- The **large corporate houses should also take the responsibility of skilling people in the unorganized sectors** under CSR expenditure.
- **Recognizing Invisible Labour:**
 - A national policy for domestic workers needs to be brought in at the earliest to recognize their rights and promote better working conditions.
- **Other Measures:**
 - A very robust, reliable and fairly decent social security package needs to be created for workers of unorganised sectors as well.

[Source: IE](#)

Sri Lanka's Crisis

For Prelims: Sri Lanka, Economic Crises, Foreign Exchange, Imports & Exports, IMF, Public Debt, Organic Farming

For Mains: Effects of Sri Lanka Crises on Indian Economy, India's role in Sri Lanka's crises, Effect of Policies and Politics of Countries on India's interest

Why in News?

Sri Lanka, a country of 22 million people, is **under the grip of an unprecedented economic turmoil**, the worst in seven decades, leaving millions struggling to buy food, medicine, fuel and other essentials.

- Following the **political and economic instability**, hundreds of anti-government protesters stormed into the Sri Lankan President's residence demanding his resignation.



What led to recent Sri Lanka Crisis?

- **Background:**
 - When Sri Lanka emerged from a 26-year long [civil war](#) in 2009, **its post-war GDP growth was reasonably high at 8-9% per annum till 2012.**
 - However, its average [GDP growth rate](#) almost **halved** after 2013 as global commodity prices fell, exports slowed down and imports rose.
 - Sri Lanka's [budget deficits](#) were high during the war and the [global financial crisis of 2008](#) drained its [forex reserves](#) which led to the country borrowing a USD2.6 billion loan from the [IMF](#) in 2009.
 - It **again approached the IMF in 2016** for another USD1.5 billion loan, however the conditionalities of the IMF further deteriorated Sri Lanka's economic health.
- **Economic Factors:**
 - [The Easter bomb blasts of April 2019](#) in churches in Colombo resulting in **253 casualties**, consequently, **dropped the number of tourists** sharply leading to a decline in foreign exchange reserves.
 - The **newly led government by Gotabaya Rajapaksa** in 2019 promised lower tax rates and wide-ranging SoPs for farmers during their campaign.
 - The quick implementation of these ill-advised promises further **exacerbated the problem.**
 - The [Covid-19 pandemic](#) in 2020 made the bad situation worse -
 - Exports of **tea, rubber, spices and garments** suffered.
 - **Tourism arrivals and revenues** fell further
 - Due to a rise in government expenditures, the [fiscal deficit](#) exceeded 10% in 2020-21, and the debt to GDP ratio rose from 94% in 2019 to 119% in 2021.
 - The Crisis in Sri Lanka is triggered due to a **shortage of foreign exchange** (forex) reserves, which have dropped by 70% over the last two years to just USD 2 billion by the end of February 2022.
 - Meanwhile, the country has foreign debt obligations of about USD 7 billion for 2022.
- **Sudden Move to Organic Farming:**
 - In 2021, [all fertiliser imports were completely banned](#) and it was declared that Sri Lanka would become a 100% [organic farming](#) nation overnight.
 - This **overnight shift to organic fertilisers** heavily impacted food production.
 - Consequently, the Sri Lankan President declared an **economic emergency** to contain rising food prices, a depreciating currency, and rapidly depleting forex reserves.
- **China's Debt Trap:**
 - Sri Lanka has **borrowed heavily from Beijing** since 2005 for infrastructure projects, many of which became White Elephants (no longer needed/ useful).
 - Sri Lanka also leased its [Hambantota port](#) to a Chinese company in 2017 after it **became unable to service the USD 1.4 billion debt** from Beijing used to build it.
 - **Sri Lanka's total debt to China stands at USD 8 billion**, almost one sixth of its total external debt
- **Current Political Vacuum:**
 - Prime Minister Wickremesinghe and President Gotabaya Rajapaksa **signalled the willingness to resign** making way for an all-party government to take over.

Why should India worry about Sri Lanka Crisis?

- **Challenges:**
 - **Economic:**
 - Sri Lanka's share in India's total exports has **declined** from 2.16% in FY15 to just 1.3 per cent in FY22.
 - **Automotive firms** like Tata Motors and TVS Motors have stopped exports of vehicle kits to Sri Lanka and halted production at their Sri Lankan assembly units due to its unstable forex reserves and fuel shortages.
 - **Refugee:**
 - Whenever a political or social crisis has occurred in Sri Lanka, India has **witnessed a large influx of ethnic Tamil community refugees** from the Sinhala Land to India through the Palk strait and Gulf of Munnar.
 - However, India may find it difficult to handle such an influx and needs a robust

policy in place to handle the crisis.

- The state of Tamil Nadu **has already started feeling the impact of the crisis** with the reported arrival of 16 persons from Sri Lanka through illegal means.

What Opportunities should India look for?

▪ Opportunities:

◦ Tea Market:

- Amid the sudden halt of [tea supply](#) by Sri Lanka to the global tea market, **India is keen to plug the supply gaps.**
- India could **strengthen its footprint in Iran** and as well as new markets such as Turkey, Iraq.
- Big Sri Lankan tea importers from Iran, Turkey, Iraq and Russia are reportedly **visiting India for tea plantations in Assam and Kolkata.**
- As a result, at recent Kolkata auctions, the average price for orthodox leaf saw an increase of up to 41% compared to corresponding sales last year.

◦ Apparel (Clothing) Market:

- Many apparel orders from the United Kingdom, European Union, and Latin American countries **are now being diverted to India.**
- Several orders have been given to companies in Tirupur, the hub of the textile industry in Tamil Nadu.

Why Should India assist in Helping Sri Lanka?

- Sri Lanka has been a **strategically important partner for India.** India can make use of this opportunity to **balance its diplomatic ties with Sri Lanka**, which have been distant owing to **Sri Lanka's proximity with China.**
 - As the disagreement between Sri Lanka and China intensified on the fertiliser issue, **India's fertiliser delivery to Sri Lanka on the latter's request is seen as a positive development in the bilateral relations.**
- Extending diplomatic ties with Sri Lanka will **ease India's effort to keep the Sri Lankan archipelago out of China's 'string of pearls' game in the Indo-Pacific.**
 - To the extent India can extend help to alleviate the hardships of Sri Lankans, it should be done with due care keeping in mind that the optics of its aid matters too.

Way Forward

▪ Implementing Democracy in True Spirit:

- There is a need for **strong political consensus in Sri Lanka** for better crisis-management. Militarisation of Administration can be reduced.
 - Considerations are needed to **help the poor and vulnerable** get back on their feet and prevent long-term scarring.
 - The steps include an **increase in agricultural productivity, increased job opportunities in non-farming sectors, better implementation of reforms and reviving the tourism sector.**

▪ Support from India:

- India, which has followed the **"Neighbourhood First policy"** to cement bonds with its neighbours, can walk that extra mile to help Sri Lanka out of the current crisis and help Sri Lanka towards realising its potential, to reap the rewards of a stable, friendly neighbourhood.

▪ Bailout from International Monetary Fund:

- Sri Lanka has approached the IMF for the bailout. The IMF can support Sri Lanka's efforts to overcome the current economic crisis.

▪ Prospects of Circular Economy:

- With reference to economic instability in Sri Lanka, the dependence on imports can be minimised by the circular economy, it will offer a sustainable alternative to aid a recovery.

Q. Elephant Pass, sometimes seen in the news, is mentioned in the context of the affairs of which one of the following? (2009)

- (a) Bangladesh
- (b) India
- (c) Nepal
- (d) Sri Lanka

Ans: (d)

Explanation:

- Elephant Pass, an isthmus, links the northern mainland of Sri Lanka known as Wanni with the Jaffna Peninsula.
- During the Dutch occupation of Sri Lanka, elephants were exported from Karaitivu, one of the islands lying off the Jaffna peninsula and an annual sale of elephants was also held in Jaffna. Elephants caught in other parts of the country were driven into the Jaffna peninsula across this lagoon, which was later bridged and given the name Elephant Pass.
- In the history of the Liberation Tigers of Tamil Eelam (LTTE) and Sri Lanka, fall of Elephant Pass marked, for the first time, that the Tamil Eelam controlled the strategically important link between Sri Lankan mainland and Jaffna peninsula.
- **Therefore, option (d) is the correct answer.**

Source: IE

Youth in India 2022 Report

For Prelims: Demographic Dividend, Mortality Rate, Fertility Rate, Elderly, Social Security

For Mains: Youth in India 2022 Report

Why in News?

Recently, the Ministry of Statistics and Programme Implementation (MoSPI) has released **'Youth in India 2022' Report**, which shows that the population share of the youth is starting to decline whereas the share of the **elderly is expected to increase during 2021-2036**.

- **A sustained drop in fertility has led to an increased concentration of the population at working ages** (between 25 and 64 years) and this shift in the age distribution provides **a time-bound opportunity for accelerated economic growth** known as the **"Demographic Dividend"**.

What are the Findings of the Report?

- **Decline in Youth Population:** The youth population is **expected to increase initially but will start to decline in the latter half of 2011-2036 period**.
 - The total youth population increased from **222.7 million in 1991 to 333.4 million in**

2011 and is projected to reach **371.4 million by 2021** and, thereafter, decrease to **345.5 million by 2036**.

- **Proportion of Youth and Elderly Population: Proportion of youth to the total population** had increased from **26.6% in 1991 to 27.9% in 2016** and then projected to start a **downward trend and to reach 22.7 % by year 2036**.
 - On the contrary, the proportion of elderly population to the total population has increased from 6.8% in 1991 to 9.2% in 2016 and **is projected to reach 14.9% in 2036**.
- **Scenario in the States:** States such as Kerala, Tamil Nadu and Himachal Pradesh **are projected to see a higher elderly population than the youth by 2036**.
 - Bihar and Uttar Pradesh experienced a rise in proportion of youth population to total population till 2021 and then it is expected to start declining.
 - These **two states, along with Maharashtra, Madhya Pradesh and Rajasthan**, are projected to have over half (52%) of the country's youth.

What are the Implications?

- India is **experiencing a demographic window of opportunity, a “youth bulge”**. However, youth come across **various development challenges** viz. access to education, gainful employment, gender inequality, child marriage, youth- friendly health services and adolescent pregnancy.
 - **Youth bulge** refers to a demographic pattern where a large share of the population is comprised of children and young adults.
- A **greater proportion of youth at present will result in a greater proportion of elderly** in the population in future. This will **create a demand for better healthcare facilities and development of [welfare schemes/programmes](#)** for elderly people.
- Rise in the share of **elderly population will put pressure on social security and public welfare systems** and the next 4-5 years need to be utilised well to accelerate productive job creation.
 - People, typically in informal employment, **don't have social security**, it will add burden to the respective state.

What are the Recommendations?

- There is need to **increase share of employment in [manufacturing](#)** because people who in current labour force, when they are retire and the share of elderly starts rising in very populous states, then **it will be like a ticking time bomb (a situation that is likely to become difficult to deal with or control)**.
- In the next 4-5 years, there is a need for active labour market policies to be adopted to accelerate productive job creation.
- There is a need to take steps **to adapt public programmes to the growing proportion of older persons**, including by improving the **[sustainability of social security](#)** and **[pension systems](#)** and by establishing universal health care and long-term care systems.

What are the Schemes Related to Youth?

- **[Pradhan Mantri Kaushal Vikas Yojana](#)**
- **[YUVA: Prime Minister's Scheme For Mentoring Young Authors](#)**
- **[Integrated Child Development Services \(ICDS\) Scheme](#)**
- **[National Health Mission \(NHM\)](#)**
- **[National Youth Policy-2014](#)**
- **[National Skill Development Corporation](#)**
- **[Rashtriya Yuva Sashaktikaran Karyakram Scheme](#)**
- **Weekly Iron Folic Acid Supplementation Programme (WIFSP)**
- **Scheme for Promotion of Menstrual Hygiene among Adolescent Girls.**

NYP-2014: Objectives and Priority Areas

Objectives

Create a productive workforce that can make a sustainable contribution to India's economic development

Develop a strong and healthy generation equipped to take on future challenges

Instil social values and promote community service to build national ownership

Facilitate participation and civic engagement at all levels of governance

Support youth at risk and create equitable opportunity for all disadvantaged and marginalized youth

Priority Areas

- Education
- Employment and skill development
- Entrepreneurship

- Health and healthy lifestyle
- Sports

- Promotion of social values
- Community engagement

- Participation in politics & governance
- Youth engagement

- Inclusion
- Social justice

[Source: IE](#)

Promoting NER as Agri Export Hub

For Prelims: North Eastern Region, Agriculture Export, Horticulture

For Mains: Significance of NER in Agri Exports

Why in News?

[Agricultural and Processed Food Products Development and Authority \(APEDA\)](#) has devised a strategy to promote Export of Agricultural and Horticulture products grown in **North-Eastern (NE) states**.

- **Created a platform in Assam** for the exporters to get the products directly from the producer group and the processors.
 - The **platform will link the producers and processors of Assam and exporters from other parts of the country** that would expand the base of the export pockets in the

[North-Eastern states.](#)

What is the Significance of NER in Agri Exports?

- The NE region is **geopolitically important as it shares international boundaries** with China and Bhutan, Myanmar, Nepal and Bangladesh making it the potential hub for the export of agricultural produce to neighbouring countries as well as other foreign destinations.
- It witnessed an **85.34 % growth in the export of agricultural products** in the last six years as it increased from USD 2.52 million in 2016-17 to USD 17.2 million in 2021-22.
 - The major destination of export has been Bangladesh, Bhutan, the [Middle East](#), the UK and Europe.
- Assam and the other states of North East Region have **a favourable climate condition and the soil type for growing almost all agricultural and horticultural crops.**
- The NER produces huge marketable surplus in a number of perishable commodities, such as banana, pineapple, orange and tomato.

What are the Initiatives to Promote NER as Agri Export Hub?

- **Mission Organic Value Chain Development for North East Region (MOVCD-NER):** It is a Central Sector Scheme, a sub-mission under National Mission for Sustainable Agriculture (NMSA), launched by the Ministry of Agriculture and Farmers Welfare for implementation in the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura, during the 12th plan period.
 - The scheme aims to development of certified organic production in a value chain mode to link growers with consumers and to support the development of entire value chain starting from inputs, seeds, certification, to the creation of facilities for collection, aggregation, processing, marketing and brand building initiative.
- **Training Programmes:**
 - APEDA signs a MoU with Assam Agriculture University, Jorhat to conduct **various training programmes on pre-harvest and post-harvest management** and other research activities for the promotion of export from the region.
- **Virtual Buyer Seller Meet:**
 - During [Covid-19 period](#), APEDA continued to push its export plans through Virtual Buyer Seller Meet in association with the Embassy of India located in different countries with exporters from NER regarding the sourcing of pineapple, ginger, lemon, orange, etc.
- **Trade Fairs:**
 - APEDA also organised **Virtual Trade Fairs** during the pandemic and facilitated the export to foreign countries.
- **Branding Local Products:**
 - APEDA also extended its support for branding and promotion of North East products such as KIWI Wine, processed foods, carrying out a wet sampling of Joha Rice Pulao, Black Rice kheer, etc.
- **Capacity building:**
 - APEDA organised skill development programmes for manufacturers, exporters and entrepreneurs to utilise the local produce for value addition.
- **Workshop on Food Quality and Safety management:**
 - APEDA facilitated **a workshop on Food Quality and Safety Management** for Export of Processed Food Products for boosting exports of agricultural and processed food products from NER through **sustainable food value chain development.**

[Source: PIB](#)

For Prelims: Dark Matter, Dark Energy, Universe, Galaxy, Bullet Cluster

For Mains: Dark Matter and Dark Energy

Why in News?

Recently, a highly sensitive experiment named **LUX-ZEPLIN (LZ)** has been used to detect dark matter in the universe in the U.S.

- Earlier, while investigating how the shape of dark matter affects the motion of stars in the centre of some galaxies (stellar bars), **scientists have found that out-of-plane bending can be explained** through dark matter halos in barred galaxies.

What is Dark Matter?

- Dark matter is made up of particles that do not have a charge.
 - So, these particles are “dark”, namely because they do not emit light, which is an electromagnetic phenomenon, and “matter” because they possess mass like normal matter and interact through gravity.
- The **visible universe** we see is the result of various **interactions among the four Fundamental forces** acting upon the particles, namely-
 - **Strong nuclear force**
 - **Weak nuclear force**
 - **Electromagnetic force**
 - **Gravitation**
- Only 5% of the entire visible universe is made up of all matter and the rest of 95% is dark matter and dark energy.
 - So far gravitational force is less understood as its extremely weak force, and that's why it's not easy to detect any particle which interacts with gravitational force.

What is Dark Energy?

- Dark Energy is a theorized type of energy that **exerts a negative, repulsive force, acting in the opposite direction of gravity.**
 - It has been proposed to explain the observed features of distant types of supernovae, which **reveal the universe expanding at an accelerated rate.**
 - Dark Energy, like Dark Matter, is inferred from measurements of gravitational interactions between celestial objects rather than explicitly observed.

What is the difference between Dark Matter and Dark Energy?

- **Dark matter acts as an attractive force**, a kind of cosmic mortar that holds our world together.
 - This is because dark matter interacts with gravity yet does not reflect, absorb, or emit light. Meanwhile, dark energy is a **repulsive force**, a kind of anti-gravity that **slows down the expansion of the universe.**
- **Dark energy** is by far the most powerful of the two, accounting for **around 68% of the universe's total mass and energy.**
 - Dark matter accounts for 27% of the total. The rest a meagre 5%, is all the ordinary matter we see and interact with on a daily basis.
 - This also helps in **speeding up the universe's expansion.**

What is the Proof of Dark Matter?

- There is **strong indirect evidence**, as reflected in various levels like **distance scales**, for example:

- For example, as you move from the centre of the galaxy to its periphery, there is a significant disparity between the observed plot of star speeds and their estimated figure.
- This implies that the galaxy has a significant amount of dark matter.
- Other distance scale evidence:
 - There are **many levels to observe the universe** like the level of **electrons and nuclei of atoms, galaxies, galaxy clusters**, or even larger distances where the entire universe can be mapped and studied.
 - There are **Bullet clusters of galaxies** that are formed through the **merging of two galaxies**, as per scientists their merger could only be explained through the presence of some dark matter.

What are the particles used to observe dark matter?

- **Neutrino** would have been very helpful in detecting dark matter but they are too light and hence would not be useful.
- There are **several other proposed entities** which include the **Z boson's supersymmetric companion**, a particle that **mediates the electro-weak interaction**.
- But still, no proper particle had been found which can interact with gravity and is also detectable using present technology on earth.

UPSC Civil Services Examination Previous Year Question (PYQ)

Q. In the context of modern scientific research, consider the following statements about 'IceCube', a particle detector located at South Pole, which was recently in the news: (2015)

1. It is the world's largest neutrino detector, encompassing a cubic kilometre of ice.
2. It is a powerful telescope to search for dark matter.
3. It is buried deep in the ice

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (d)

Exp:

- **IceCube Neutrino Observatory is buried deep inside Antarctic ice and is spread over a cubic kilometre. Hence, statements 1 and 3 are correct.**
- **Weakly Interacting Massive Particle (WIMP) dark matter could be gravitationally captured by massive objects like the Sun and accumulate in the core of the Sun.**
- **With such high density of these particles, they annihilate each other at a significant rate. The products of this annihilation decay into neutrinos, which could be observed by IceCube as an excess of neutrinos from the direction of the Sun.**
- IceCube was built specifically to identify and track high-energy neutrinos. Hence, statement 2 is correct.
- The National Science Foundation (a US agency that supports fundamental research) provided the primary funding for the IceCube Neutrino Observatory, with assistance from partner funding agencies around the world. Therefore, option (d) is the correct answer.

Source: TH

New Insights in Geology

For Prelims: Fundamentals of Physical Geography, Geology, Volcano, Composition of Earth, Tectonic Plates

For Mains: Role of magma in creation of Volcano, Different layers in earth composition, Effects of tectonic plates movement, Important Geophysical Phenomena

Why in News?

A recent study by a team of scientists at Goa-based [National Centre for Polar and Ocean Research \(NCPOR\)](#) has brought new insights into the critical processes involved in the **movement of the earth's tectonic plates**.

What is NCPOR?

- NCPOR was established as an **autonomous Research and Development Institution** of the **Ministry of Earth Sciences** (formerly Department of Ocean Development) on the 25th May 1998.
- It is designated as the **nodal organization** for the co-ordination and implementation of the [Indian Antarctic Programme](#), including the maintenance of India's permanent station in Antarctica.
- Year-round maintenance of the two Indian stations ([Maitri & Bharati](#)) **in Antarctica** is the primary responsibility of the Centre.
 - Maitri (1989) and Bharati (2011) were established, for carrying out research by the Indian scientists in all disciplines of polar research.

What do we need to know about the Study by NCPOR?

- **Background:**
 - The buoyant rising of **hot and low-density magma or plumes** from the Earth's interior towards the surface **leads to extensive volcanism** and the **creation of seamounts and volcanic chains above** the ocean floor.
 - However, many times, the magma's buoyant force is **not sufficient to pierce through the lithosphere**.
 - In such cases, plumes tend to dump the material at **sub-lithospheric depths**. When the tectonic plates that lie over the lithosphere move, **they tend to drag the ponded materials along with them**.
 - A fundamental question that remains outstanding in understanding earth's processes is **how far a tectonic plate can drag the plume material** at its base after its initial impact with the plume.
- **About Study:**
 - Scientists studied samples of **igneous rocks collected from near the Ninety East Ridge** in the [Indian Ocean](#) during an expedition under the [International Ocean Discovery Program \(IODP\)](#).
 - The Ninety East Ridge is an **aseismic ridge located almost parallel** to 90 degrees east longitude in the Indian Ocean. It is approximately 5,000 km in length and has an average width of 200 km.
 - Igneous rock, or magmatic rock, is one of the three main rock types, the others being sedimentary and metamorphic.

- It is formed through the cooling and solidification of magma or lava.
- Investigation revealed that some **basaltic samples were highly alkaline** and had very **similar composition to those released by the Kerguelen hotspot** (volcanic hotspot at the Kerguelen Plateau in the Southern Indian Ocean).
 - In addition, **the minimum age of alkaline samples was about 58 million years**, much younger than the adjacent oceanic crust surrounding Ninety East Ridge (around 82-78 million years old)
- This study proposes that the Indian Tectonic Plate, which was **contemporaneously moving northward at a very high speed**, had dragged a considerable amount of Kerguelen plume material **for more than 2,000 km underneath the Indian lithosphere**.
- **Subsequent reactivation of deep fractures** may have triggered decompression melting of the underlying plume material and emplaced as **magmatic sills** and lava flows near the Ninety East Region around 58 million years ago.

What do we know about Earth's Crust?

▪ Crust:

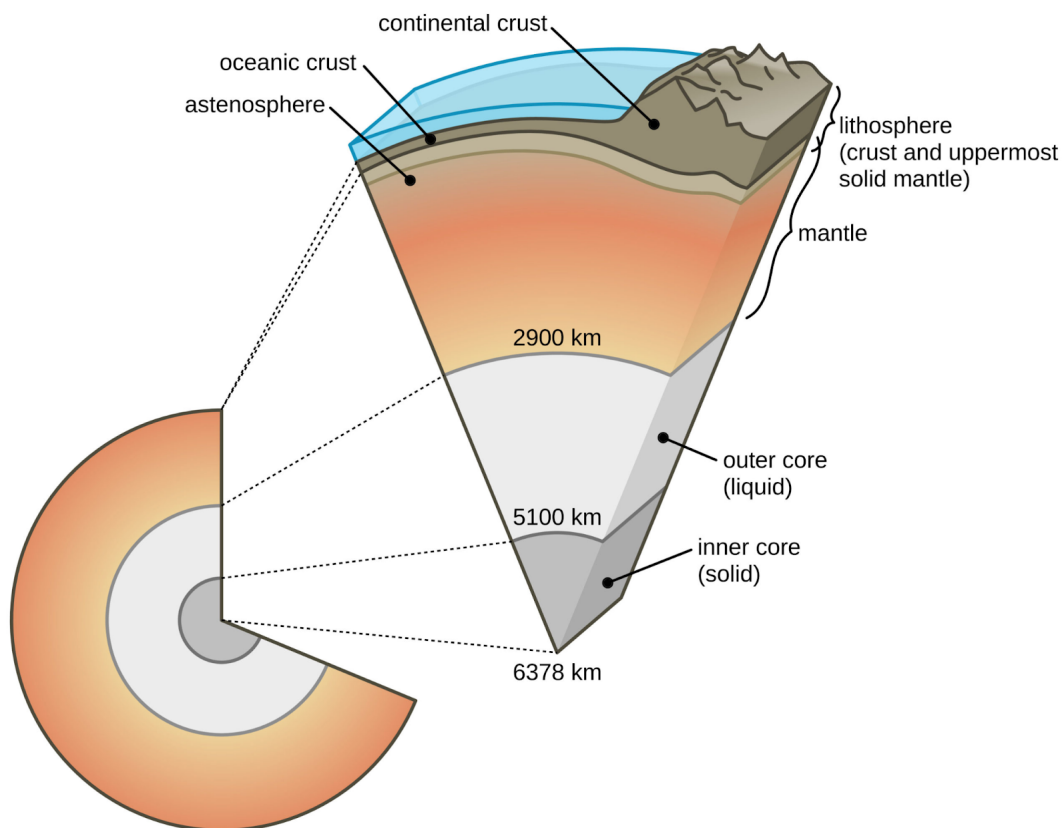
- The **outer superficial layer of the earth is called the "crust"**. In continental regions, the crust can be **divided into two layers**.
 - The **upper layer** which is less dense and granitic in character, is known as "**sial**", while the **lower layer** which is basaltic in character is known as "**sima**".
- It extends down to **30 or 40 kilometer beneath continents and to about 10 km beneath ocean basins**

▪ Mantle:

- The **mantle** is located **beneath the earth's crust** and has a thickness of about 2900 km.
- It has been divided into two layers: **(i) upper mantle, and (ii) lower mantle**.
- The boundary between these is at about 700 km depth.
- The upper mantle contains a most important zone called the "**asthenosphere**". It is located at depths between 50 to 100 km.
- This zone **provides lava for volcanic eruptions**.

▪ Core:

- The **core** (inner core and the outer core) accounts for just about **16%** of the earth's volume but **33% of earth's mass**.
- Like Mantle, core can also be distinguished into two layers namely **outer core and inner core**.
- The outer core is composed of **iron** mixed with **nickel** and trace amounts of lighter elements.
- The outer core is **not under enough pressure to be solid**, so it is **liquid** even though it has a composition similar to the inner core.



UPSC Civil Services Previous Year Question (PYQ)

Q. Consider the following statements: (2018)

1. The Barren Island volcano is an active volcano located in the Indian territory.
2. Barren Island lies about 140 km east of Great Nicobar.
3. The last time the Barren Island volcano erupted was in 1991 and it has remained inactive since then.

Which of the statements given above is/are correct?

- (a) 1 only
 (b) 2 and 3
 (c) 3 only
 (d) 1 and 3

Ans: (a)

Explanation:

- Barren Island is India's only active volcano which is located in the Andaman and Nicobar Islands. **Hence, statement 1 is correct.**
- It is located at about 140 km from Port Blair, southern part of Andaman Island in Andaman Sea. The distance between Barren Island to Great Nicobar is more than the given distance. **Hence, statement 2 is not correct.**
- First recorded eruption of the volcano dates back to 1787. In the past 100 years, it has erupted at least five times. Then for the next 100 years, it remained silent. It re-erupted massively in 1991. Since then, the eruption has been recorded every two-three years, the latest in the series was February 2016. **Hence, statement 3 is not correct.**

- Therefore, option (a) is the correct answer.

[Source: DTE](#)

Approved Fuels for NCR: CAQM

For Prelims: Air Pollution, Piped Natural Gas, Stubble Burning, CPCB

For Mains: Commission for Air Quality Management, Standard list of approved fuels

Why in News?

Recently, the [Commission for Air Quality Management \(CAQM\)](#) has directed **NCR (National Capital Region)** states to adopt a **standard list of approved fuels** to reduce [air pollution](#).

- The standard list of fuels approved by the CAQM includes [petrol, diesel, hydrogen/methane, natural gas, Liquefied Petroleum Gas \(LPG\) and electricity](#).
- Many industries shifted to cleaner fuels such as **PNG (Piped Natural gas)** and biomass and many other industrial sectors such as **food processing, distilleries and chemicals are already in the process of shifting to cleaner fuels**.
- Shifting to cleaner fuels such as biomass and PNG in the industries of NCR region greatly contributes to reducing the load of pollution (e.g. industries of Alwar and Bhiwadi in Rajasthan).

What is CAQM?

- **About:**
 - CAQM is a **statutory body formed under the Commission for Air Quality Management in National Capital Region and Adjoining Areas, Act 2021**.
 - Earlier, the commission was formed through the promulgation of the **Commission for Air Quality Management in National Capital Region and Adjoining Areas Ordinance, 2021**.
 - The Commission for Air Quality Management in National Capital Region and Adjoining Areas, Act 2021 also dissolved the Environment Pollution Prevention and Control Authority (EPCA) established in the NCR in 1998.
- **Objectives:**
 - To ensure **better coordination, research, identification and resolution of problems surrounding the air quality index** and for matters connected therewith or incidental thereto.
- **Scope:**
 - Adjoining areas have been defined as areas in the states of Haryana, Punjab, Rajasthan, and Uttar Pradesh adjoining the NCR where any source of pollution may cause an adverse impact on air quality in the NCR.
- **Composition:**
 - The Commission will be headed by a full-time chairperson who has been a Secretary to the Government of India, or a [Chief Secretary to a State government](#).
 - The chairperson will hold the post for three years or until s/he attains the age of 70 years.
 - It will have members from several Ministries as well as representatives from the stakeholder States.

- It will have experts from the [Central Pollution Control Board \(CPCB\)](#), [Indian Space Research Organisation \(ISRO\)](#) and [Civil Society](#).

▪ **Functions:**

- Coordinating **actions taken by concerned state governments** (Delhi, Haryana, Punjab, Rajasthan, and Uttar Pradesh).
- **Planning and executing plans** to prevent and control air pollution in the NCR.
- Providing **a framework for identification of air pollutants**.
- Conducting **research and development through networking** with technical institutions.
- Training and creating **a special workforce to deal with issues** related to air pollution.
- Preparing various action plans such **as increasing plantation and addressing [stubble burning](#)**.

[Source: DTE](#)

PDF Reference URL: <https://www.drishtiias.com/current-affairs-news-analysis-editorials/news-analysis/13-07-2022/print>

