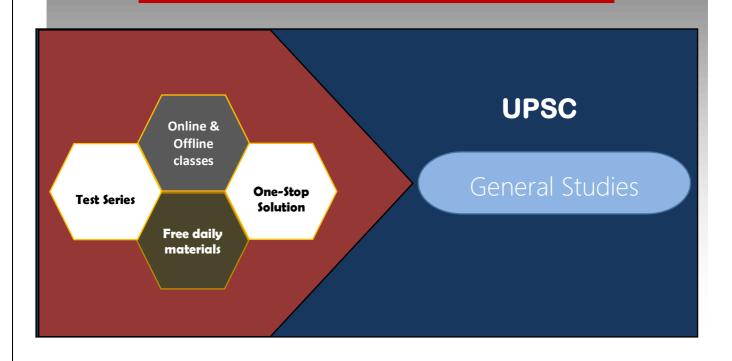# VISHNU I A S

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GS 2 : Polity, Governance, International Relations

1. 9 European nations clear SII jab

Context:

Nine European countries have given **recognition to the Covishield vaccine produced by the Serum Institute of India (SII).**

Details:

- The European Union (EU) has started the "Green Pass" facility, which will allow people vaccinated with an authorised set of vaccines to travel within its zone, covering 26 countries.
- India has raised concerns with the EU for **not recognising Indian vaccines Covishield and Covaxin for the Green Pass.**
- The **nine countries' move is a national move by them** and not by the EU, headquartered in Brussels.
  - The EU member-states that have recognised Covishield include Austria, Germany, Slovenia, Greece, Iceland, Ireland and Spain.
- Estonia has authorised all vaccines approved by GoI.
- Switzerland (Non-EU member) has also approved Covishield.

Note:

The World Health Organization **(WHO)** has said that **any COVID-19 vaccine it has authorised for emergency use should be recognised by countries as they open up their borders to inoculated travellers.**

2. India seeks Maldivian govt. action on 'repeated attacks' in media

Context:

India has sought Maldivian government action on persons behind media reports and social media posts attacking the dignity of its resident diplomats.

Background:

- President Ibrahim Mohamed Solih's government is seen to be a close ally of India, with enhanced development and defence cooperation since 2018.

- However, some government critics are **sceptical of greater military ties with India.**
- In May 2021, an announcement made in India, on the **Cabinet clearing a proposal to set up a second mission in the Maldives, sparked concern among sections.**
- This prompted a renewed **"#Indiaout" campaign on Maldivian social media.**

Details:

- The High Commission of India said the **repeated attacks on resident diplomats were motivated, malicious and increasingly personal.**
- It urged the Foreign Ministry to take steps to ensure **enhanced protection of the Mission and its officials.**
- It urged the authorities to ensure action, in accordance with International Law and Maldivian Law against the perpetrators for **gross violations of the Vienna Convention of Diplomatic Relations.**

Vienna Convention of Diplomatic Relations:

- Vienna Convention of Diplomatic Relations is an international treaty that **defines a framework for diplomatic relations between independent countries.**
- It was **adopted in 1961** by the **United Nations Conference on Diplomatic Intercourse and Immunities held in Vienna, Austria.**
- It specifies the **privileges of a diplomatic mission** that enable diplomats to perform their functions without fear of coercion or harassment by the host country.
  o This forms the **legal basis for diplomatic immunity.**

3. In last academic year, only 22% schools had Internet

Context:

Union Education Minister has released the **Report on Unified Information System for Education Plus (UDISE+) 2019-20** for School Education in India.

(UDISE+) Report:

- UDISE+ report **collates data from more than 15 lakh schools across India.**
- The **Department of School Education and Literacy (DoSEL)** has developed the UDISE+ system.

- The UDISE+ system of **online data collection** was developed in 2018-19 to overcome the issues related to manual data filling in paper format and subsequent feeding at the block or district level, which was in practice from 2012-13.
- Being an online application, UDISE+ has a number of entry-level checks built in the data entry module at all levels in real-time. That helps to improve data quality and speed up data entry and its verification.
- UDISE+ data is **hosted on the server of the National Informatics Centre (NIC).**

Key Findings:

- **The Gross Enrolment Ratio (GER)** at all levels of school education **has improved in 2019-20** compared to 2018-19.
    - o 98% of students in Classes 1-8 attended school, though the GER for secondary and senior secondary students stood at 78% and 51% respectively.
- Efforts have been made to ensure universal accessibility of education for persons with disabilities.
    - o **The enrolment of Divyang students** has increased by 6.52% (2018-19).
- **Pupil-Teacher Ratio (PTR) has improved** at all levels of school education.
- Between 2012-13 and 2019-20, the **Gender Parity Index (GPI) at both Secondary and Higher Secondary levels have improved.**
    - o At present, the **GPI is 1 or more at all levels of school education**.
- In 2019-20, **more than 90% of schools in India had hand wash facilities** as compared to only 36.3% in 2012-13.
- In the academic year that ended with school closures due to COVID-19, **only 22% of schools in India had Internet facilities**.
- Among **government schools, less than 12% had Internet** in 2019-20, while **less than 30% had functional computer facilities.**
    - o This **affected the kind of digital education options** available to schools **during the pandemic**, as well as **plans for hybrid learning** in the days ahead.
    - o UDISE+ data makes clear the **digital divide. The internet connectivity divide** is even starker.

Gross Enrolment Ratio

- The Gross Enrolment Ratio (GER) compares the enrolment in a specific level of education to the population of the age group which is age-appropriate for that level of education.
- Eg: The GER of primary level is student enrolment in classes 1 to 5 expressed as a percentage of the population in the age group 6-10 years.

- GER greater than 100% might indicate the presence of over or underage children in a particular level of education.

Gender Parity Index

- The Gender Parity Index (GPI) of GER shows whether the representation of females in school education is in line with the representation of girls in the population of the corresponding age group.
- GPI value 1 or more shows that the GPI is favourable to the girls, while a GPI of less than 1 shows relative underrepresentation of girls in that specific level of school education.

Pupil Teacher Ratio

- The Pupil Teacher Ratio (PTR) at different levels of education show the availability of adequate number of teachers for teaching the children enrolled at different levels of education.
- A reduction in the PTR indicates that one teacher has to teach less number of children, resulting in improvement in quality of teaching.

4. Envisioning the post-pandemic smart city

Context:

- The article analyzes the smart cities scheme and suggests necessary changes in approach and implementation in the post-pandemic world.

Background:

Challenges in urban areas:

- India's cities have had to face the challenges of infrastructure deficits, inadequate water supply, waste management, sewerage and transport arrangements, high levels of pollution and, with climate change, frequent extremes of floods and drought.

Smart Cities Mission:

Smart City:

- The traditional understanding of smart cities involves a **technocentric vision,** with sensors everywhere, smart homes, high levels of connectivity, massive

and ubiquitous data collection by various agencies, and a continuous flow of useful information to citizens.

- These will help governments allocate resources optimally and take timely decisions to raise efficiency and improve standards of living.

Progress of the scheme:

- Over the years, Smart Cities Mission projects converged with other infrastructure programmes such as **AMRUT**, the Atal Mission for Rejuvenation and Urban Transformation and **the PMAY (Urban),** the Pradhan Mantri Awas Yojana, for housing.
- The smart cities mission has also got support from international agencies to adopt best practices on mobility and transport, energy and reducing carbon emissions.
- The latest official count shows that 5,924 mission projects worth ₹1,78,500 crore have been tendered under the Smart Cities Mission.

Smart Cities Mission

Recommendations for the post-pandemic phase:

- The experience of the COVID-19 pandemic is a clear indication that the pathway for 'smart cities' needs to change and in this direction, the article suggests the following measures.

Focus on health:

- The COVID-19 pandemic has exposed the lack of adequate health facilities in urban areas.
- One component of the smart cities mission scheme, **the Integrated Command and Control Centres (ICCCs)**, is a good example worth considering. These centres functioned as "war rooms" for COVID-19, and helped cities in fighting the pandemic through information dissemination, improving communication, predictive analysis and supporting effective management.
- Such a system should be replicated and expanded further to ensure that citizens have access to useful information like health alerts, vaccinations, hospital beds and topical advice.

Mobility related:

- The article suggests that **pedestrianisation should be encouraged** over motorisation where the **priority should be to move people rather than vehicles**.

- The available road spaces should be appropriately apportioned for bicycles as they are relatively safe and is capable of complementing public transport for last-mile connectivity.

Environmental sustainability:

- The development of the cities should appropriately **consider the environmental impact (climate change audit) and take remedial measures.**
- Additionally, there should also be an emphasis on **preserving existing wetlands, lakes while also creating new urban gardens and water bodies.**
- Such a "**green and blue" city** would mean less destructive flooding, more water to harvest and lower peak temperatures.

Making it more democratic:

- Democratising smart cities planning has to **ensure every section of society has a voice in the process** of selection and monitoring of projects undertaken in the mission.
- Given the ground-level awareness of the situation, the people will be able to better articulate their needs and this will help ensure better utilization of funds for the scheme.

Social aspects of a smart city:

- As against the traditional techno-centric vision of a smart city, the article also recommends a **social dimension to such smart cities** wherein there should be ample common spaces that allow for the people to intermingle.

Conclusion:

- The pandemic has come as a remarkable opportunity to review the paradigm of smart cities.
- Going forward the mission will have to **frame the plans around people and nature and avoid expensive technological solutionism.**

GS 3 : Economy, Science and Technology,Environment

5. 'Army working to deal with drone threat'

Context:

Army Chief said that capabilities were being developed to deal with the drone threat.

Issue:

- His comments come in the backdrop of recent **explosions at the Jammu Air Force station.**
- With the easy availability of drones, drones would be increasingly used in all sorts of combat, both by state and non-state actors.

Concerns:

Technology backed terrorism:

- The use of drones represents a new mode of terrorism characterized by the increasing use of technology. This helps **reduce costs and the risk of identification for terrorists while increasing their efficacy**. The exponential proliferation of new technologies and Artificial Intelligence will only make the threat posed by drones increase exponentially.

Redundancy of available tools to counter drones:

- The conventionally available tools would be redundant in combating the threat posed by drones. **Since drones fly very low it is extremely difficult to detect them using radars and they also leave little by way of reaction time** once detected.

Easy accessibility:

- The fact that drones are **available in open markets for very cheap prices** makes them easily accessible for terrorists to procure. This could enable even individuals with sufficient motivation and skills to carry out drone attacks without the threat of being identified by intelligence agencies.
- Thus drones offer the non-state actors **cheap and affordable ways of targeting the security agencies.**

Increased capacity of drones:

- Drones have developed significantly and acquired massive leaps in capability. **The increased speed, range, manoeuvrability and load-carrying capacity** have turned them into potential weapons that could be used to target adversaries. Such drones can hit strategic targets and cause huge damage.
- **Small size, stealth drones pose a lethal threat to strategic installations.**

No comprehensive regulation:

- The existing international framework for controlling the proliferation of technology that can be weaponized, such as the **Wassenaar Arrangement and Missile Technology Control Regime**, may be termed ineffective in addressing the threat posed by drones.
- The Wassenaar Arrangement aims to **promote transparency and greater responsibility in transfers of conventional arms and dual-use goods and technologies**. The aim is also to prevent the acquisition of these items by terrorists.

Recommendations:

- Requisite measures in terms of **anti-drone capabilities**, as well as **policy measures**, should be put in place to counter the threat posed by drones.
- Requisite Counter-Unmanned Aircraft Systems capability must be developed and made available. There is an urgent need for an **anti-drone system shielding critical installations in the country**. This could involve anti-drone techniques like **drone jammers, Directed Energy Weapons such as lasers and the use of suitable guns, missiles and other hard kill options.**
- Enhanced **international cooperation and consensus on the development and deployment of technologies** are required to combat such new methods of terror attacks.
- **Tighter regulation of drones sales and operations** needs to be implemented to prevent their use for terrorist activities.

6. Oil well blowout: SC stays order on panel

Background:

- In May 2020, there was a continuous flow out of gas in Baghjan gas well in the Tinsukia district of Assam, following a blowout.
  - The Baghjan well is a purely gas-producing well in the Tinsukia district.
  - Since 2006, the gas well is being drilled by Oil India Limited (OIL).

- It underwent a blowout (uncontrolled escape of gas at tremendous velocity) on May 27, 2020.

Dibru-Saikhowa National Park:

- Dibru-Saikhowa is a **National Park as well as a Biosphere Reserve** situated on the **south bank of the river Brahmaputra in Assam.**
- It is an identified **Important Bird Area (IBA)** notified by the Bombay Natural History Society.

7. What lies ahead for IBC and stressed assets resolution?

Context:

- Recent National Company Law Tribunal (NCLT) rulings have put the spotlight on the Insolvency and Bankruptcy Code (IBC). The article analyzes the effectiveness of the process and suggests steps to be taken to improve it further.

Background:

IBC, 2016:

- The Insolvency and Bankruptcy Code (IBC) has been the **key mechanism for addressing corporate distress and the accumulation of bad loans in the financial sector** since its implementation.

- The initial version of the IBC that came into effect in December 2016 is quite different from the current version. **Section 29A and Section 49A** have helped in resolving some of the problems with the IBC.

Performance over the years:

- The **recoveries and resolutions have been quite good** since the implementation of the IBC.
- They have also **reduced the time required for the recovery and resolution** compared to other measures available to the lenders. As compared to the earlier timeline of five to six years on average, under IBC it has been around three years.

Concerns/Challenges:

Infrastructural deficit:

- The IBC is plagued by infrastructure issues like the **unavailability of sufficient NCLTs and judicial members in them.**
- There continue to be a lot of vacancies in the NCLTs and there are a lot of **delays in appointments.**
- Also since a **lot of resolution plans finally end up in the NCLT**, the inadequately sourced NCLTs are unable to cater to the large number of cases.

Long delays:

- The **large numbers of legacy cases** continue to remain a major challenge in the timely disposal of cases.
- There have been **delays in almost all aspects of the process** right from the level of admitting a resolution application to approval and implementation of the resolution plan.
- These kinds of delays are a significant issue with the implementation of the code.

Extent of haircuts:

- There are concerns also about the extent of haircuts that banks and financial creditors have to take in order to achieve resolution.

Promoter owned and run companies:

- Unlike in most developed countries where the companies are run by professionals and the ownership is widely spread, in India, most companies are mainly promoter-owned and run which acts as an **impediment to the taking over of assets.**

Recommendations:

- There needs to be **capacity building in terms of NCLT**. The NCLT should be adequately funded and provided with an adequate number of members as well as infrastructure to deal effectively with the cases brought in front of it.
- **Resolution within the mandated timelines** should be prioritized as it will help increase the predictability of the process.
- The article argues that the size of the haircut should not be the measure of the success of the IBC process but it should **focus on attracting more buyers or a more diverse range of strategic buyers to bid for assets,** and submit resolution plans under the code. These should be top priority for the IBC.
- The article also suggests **broadening the scope of who can submit a resolution plan**. It recommends letting promoters also submit resolution plans with adequate safeguards in place to avoid its misuse. It recommends certain relaxations to Section 29A.

- The proposed **national ARC (Asset Reconstruction Company)** should be set up at the earliest. This will help cover up the legacy issues and thus free the system from the legacy burden.
- The IBC should not be the only solution for resolving stress. Apart from strengthening the IBC framework, it's equally important to look at the range of different options outside the IBC for resolving distress, like **one-time settlements, restructuring packages, etc.**

THE INDIAN EXPRESS

GS 2 : Polity, Governance, International Relations

1. First Movable Freshwater Tunnel Aquarium: Indian Railways

Why in News

Recently, Indian Railway (IR) has opened the **first movable freshwater tunnel aquarium at Bengaluru** Railway Station.

Key Points

- The **Krantivira Sangolli Rayanna Railway Station also known as Bengaluru City Railway Station** has become the first railway station in India with a movable freshwater tunnel aquarium.
- The aquarium has been **opened by the Indian Railway Stations Development Corporation Limited (IRSDC)** in collaboration with the HNi Aquatic Kingdom.
- The aquarium is a **one-of-its-kind aquatic park based on the Amazon River** (of South America) **concept.**
- This is a 12-feet long aquatic kingdom, **first paludarium** (vivarium that incorporates both terrestrial and aquatic elements) with myriad flora and fauna.
- It is **home to various aquatic animals** such as alligator gar ranging, stingrays, sharks, lobsters, snails and shrimps. The aquarium is adorned with natural rocks and splashes of driftwood, artificial coral rocks.

- This has been built at a cost of Rs 1.2 crore with the **aim of enhancing the passenger experience at the station.**
- It is also **aimed at improving revenue earning for IR.**
- It is **also educational in a way** that a life size kingdom of fishes can be experienced here.

2. United District Information System for Education Plus (UDISE+) 2019-20

The Union Education Minister has released the Report on United Information System for Education Plus (UDISE+) 2019-20 for School Education in India.

What is UDISE+?

- UDISE+ is one of the largest Management Information Systems on school education.
- It covers more than 1.5 million schools, 8.5 million teachers and 250 million children.
- Launched in 2018-2019, UDISE+ was introduced to speed up data entry, reduce errors, improve data quality and ease its verification.
- It is an updated and improved version of UDISE, which was initiated in 2012-13 by the Ministry of Education under the UPA govt by integrating DISE for elementary education and SEMIS for secondary education.

Why is it important?

- As per the UDISE+ website, "Timely and accurate data is the basis of sound and effective planning and decision-making.
- Towards this end, the establishment of a well-functioning and Sustainable Educational Management Information System is of utmost importance today."
- In short, the UDISE+ helps measure the education parameters from classes 1 to 12 in government and private schools across India.

What does the 2019-20 report say?

- The total enrolment in 2019-20 from primary to higher secondary levels of school education was a little over 25.09 crore.
- Enrolment for boys was 13.01 crore and that of the girls was 12.08 crore.
- This was an increase by more than 26 lakh over the previous year 2018-19.

(1) Pupil-teacher ratio improves

- The Pupil-Teacher Ratio — the average number of pupils (at a specific level of education) per teacher (teaching at that level of education) in a given school year — showed an improvement all levels of school education in 2019-2020 over 2012-2013.

(2) GER improves

- The gross enrolment ratio (GER), which compares the enrolment in a specific level of education to the population of the age group which is age-appropriate for that level of education has improved at all levels in 2019-2020 compared to 2018-2019.
- The GER increased to 89.7 percent (from 87.7 percent) at Upper Primary level, 97.8 percent (from 96.1 percent) at Elementary Level, 77.9 percent (from 76.9 percent) at Secondary Level and 51.4 percent (from 50.1 percent) at Higher Secondary Level in 2019-20 compared to 2018-19.
- GER for girls at secondary level has gone up by 9.6 percent to reach 77.8 percent in 2019-20 compared to 68.2 percent in 2012-13.

(3) Phyical infrastructure improves, but computers and internet access remain lacking

- The report stated that just 38.5 percent of schools across the country had computers, while only 22.3 percent had an internet connection in 2019-20.
- This is an improvement over 2018-2019 when 34.5 percent of schools had computers and a mere 18.7 percent of schools had internet access.

Key takeaways

- While physical infrastructure is steadily improving, the digital infrastructure for schools has a long way to go.
- With the overwhelming majority of schools have neither computers (61 percent) nor internet access (78 percent), achieving the Centre's 'Digital India' vision when it comes to online education is still some ways off.
- The vast increase in hand wash facilities is a big step towards the fulfilment of the Modi government's 'Swachh Bharat' push.
- The Gross Enrolment Ratio improving at all levels of school education in 2019-20 compared to 2018-19 is a plus.
- While 93 lakh more boys enrolled in education than girls, when it comes to GER, the girls pulled ahead.

3. Rule of Law vs Rule by Law

Understanding law

- Law, in its most general sense, is a tool of social control that is **backed by the sovereign.**
- However, such a definition of law can be used not only to render justice, **it can also be used to justify oppression.**
- Therefore it is argued that a law cannot really be classified as a "law" unless **it imbibes within itself the ideals of justice and equity**.
- So, any law backed by a sovereign must be **tempered by certain ideals or tenets of justice.**
- Only a state that is governed by such law, can be said to have the Rule of Law.
- The British colonial power used the law as a tool of political repression, enforcing it unequally on the parties, with a different set of rules for the British and for the Indians.
- It was an enterprise famous for "Rule by Law", rather than "Rule of Law.

Four principles of rule of law

- **Clarity and accessibility:** Laws must be clear and accessible, the people at least ought to know what the laws are.
- Another implication of this principle is that the**y should be worded in simple, unambiguous language.**
- **Equality**: An important aspect of equality before law is **having equal access to justice.**
- This guarantee of equal justice will be rendered meaningless if the vulnerable sections are unable to enjoy their rights because of their poverty or illiteracy or any other kind of weakness.
- Another aspect is the issue of "gender equality".
- **Participation of people:** The third principle, the "right to participate in the creation and refinement of laws".
- The very essence of a democracy is that its citizenry **has a role to play, directly or indirectly, in the laws that govern them.**
- In India, it is done through elections.
- The idea that people are the ultimate sovereign is also to be found in notions of human dignity and autonomy
- **Strong independent judiciary:** The fourth principle stemsp from the idea that the judiciary is the "guardian" of the Constitution.

- The judiciary is the primary organ which is tasked with ensuring that the laws that are enacted are in line with the Constitution.

Independent judiciary and role of media

- The judiciary cannot be controlled, directly or indirectly, by the legislature or the executive, or else the Rule of Law would become illusory.
- At the same time, judges should not be swayed by the emotional pitch of public opinion either, **which is getting amplified through social media platforms.**
- Judges have to be mindful of the fact that the noise thus amplified is **not necessarily reflective of what is right and what the majority believes in.**
- Therefore**, media trials cannot be a guiding factor in deciding cases.**
- It is, therefore, extremely vital to function independently and withstand all external aids and pressures.
- While there is a lot of discussion about the pressure from the executive, it is also **imperative to start a discourse as to how social media trends can affect the institutions.**

Conclusion

The importance of the judiciary shouldn't blind us to the fact that the responsibility of safeguarding constitutionalism lies not just with the courts. All the three organs of the state, i.e., the executive, legislature and the judiciary, are equal repositories of constitutional trust.

4. 7th Edition of Indian Ocean Naval Symposium

Why in News

Recently, the 7th edition of **Indian Ocean Naval Symposium (IONS)** was hosted by the French Navy at Réunion island.

- It is a **biennial event** which was **conceived by the Indian Navy in 2008.**

Key Points

- **About:**
  - o The IONS is a voluntary and inclusive initiative that **brings together navies of Indian Ocean Region littoral** states to increase **maritime co-operation and enhance regional security.**

- o It also serves to develop an **effective response mechanism and humanitarian assistance and disaster relief (HADR)** against **natural disasters.**
- o The chairmanship of IONS has been held by India (2008-10), UAE (2010-12), South Africa (2012-14), Australia (2014-16), Bangladesh (2016-18) and Islamic Republic of Iran (2018-21).
  - o **France** assumed the **Chairmanship in June 2021** for a two-year tenure.
- **Members:**
  - o IONS includes **24 member nations** that touch or lie within the **Indian Ocean Region (IOR)**, and **8 observer nations.**
  - o The members have been geographically grouped into the following **four sub-regions:**
  - o **South Asian Littorals:** Bangladesh, India, Maldives, Pakistan, Seychelles, Sri Lanka and United Kingdom (British Indian Ocean Territory)
  - o **West Asian Littorals:** Iran, Oman, Saudi Arabia and United Arab Emirates
  - o **East African Littorals:** France (Reunion), Kenya, Mauritius, Mozambique, South Africa, and Tanzania.
  - o **South East Asian and Australian Littorals:** Australia, Indonesia, Malaysia, Myanmar, Singapore, Thailand and Timor-Leste.
- **Significance For India:**
  - o IONS fits into **India's three-fold ambitions** in the region:
    - **Strengthening and deepening the relations** with the Indian Ocean littoral states;
    - Establishing its leadership potential and aspirations of being a **net-security provider;** and
    - Fulfilling **India's vision of a rules-based and stable maritime** order in the IOR.
  - o It will help India **to consolidate its sphere of influence from the Straits of Malacca to Hormuz.**
  - o IONS can be used to counter-balance the increasing presence of China in the region.
- **Other Important Groupings/Initiatives Associated with IOR:**
  - o **Indian Ocean Rim Association:** The **Indian Ocean Rim Association (IORA)** was established in 1997.
    - It is aimed at strengthening regional cooperation and sustainable development within the Indian Ocean region.
  - o **Indian Ocean Commission:** Recently, India has been approved as an **observer of the Indian Ocean Commission**, the inter-governmental organization that coordinates maritime governance in the south-western Indian Ocean.

- o **Security and Growth for All in the Region (SAGAR):** It was launched in 2015.
    - Through SAGAR, India seeks to deepen economic and security cooperation with its maritime neighbours and assist in building their maritime security capabilities.
- o **Asia Africa Growth Corridor:** The idea of **Asia Africa Growth Corridor (AAGC)** emerged in the joint declaration issued by India and Japan in 2016.
    - The AAGC is raised on four pillars of Development and Cooperation Projects, Quality Infrastructure and Institutional Connectivity, Enhancing Capacities and Skills and People-to-People partnership.

GS 3 : Economy, Science and Technology,Environment

5.New Source of Gravitational Waves Discovered

Why in News

Recently, **LIGO Scientific Collaboration (LSC)** has made the **discovery of gravitational waves from a pair of neutron star-black hole (NS-BH) mergers.**

- The reverberations from these two objects were picked up using a **global network of gravitational wave detectors**, the most sensitive scientific instruments ever built.
- Until now, the **LIGO-Virgo Collaboration (LVC)** was only able to observe collisions between pairs of black holes or neutron stars. The **NS-BH merger is a hybrid collision.**

Black Hole

- A black hole is a **place in space where gravity pulls so much that even light can not get out.** The gravity is so strong because matter has been squeezed into a tiny space.
- **Gravitational waves are created** when two black holes orbit each other and merge.

Neutron Stars

- Neutron stars **comprise one of the possible evolutionary end-points of high mass stars.**
- Once the core of the star has completely burned to iron, energy production stops and the core rapidly collapses, squeezing electrons and protons together to form neutrons and neutrinos.
- A **star supported by neutron degeneracy pressure is known as a 'neutron star',** which may be seen as a pulsar if its magnetic field is favourably aligned with its spin axis.

Key Points:

- **About the Gravitational Waves:**
  - These are **invisible ripples in space** that form when:
    - A star explodes in a **supernova**.
    - Two big stars orbit each other.
    - Two **black holes** merge.
    - Neutron star-Black hole (NS-BH) merges.
  - They **travel at the speed of light** (1,86,000 miles per second) and squeeze and stretch anything in their path.
    - As a gravitational wave travels through space-time, it causes it to stretch in one direction and compress in the other.
    - Any object that occupies that region of space-time also stretches and compresses as the wave passes over them, though very slightly, which can only be detected by specialized devices like LIGO.
  - **Theory and Discovery:**
    - These were proposed by **Albert Einstein in his General Theory of Relativity**, over a century ago.
    - However, the first **gravitational wave** was actually detected by LIGO only in 2015.
- **Detection Technique:**
  - As the **two compact and massive bodies orbit around each other**, they come closer, and **finally merge, due to the energy lost in the form of gravitational waves.**
  - The Gravitational Waves signals are buried deep inside a lot of background noise. To search for the signals, scientists use a **method called matched filtering.**
  - In this method, **various expected gravitational waveforms predicted by Einstein's theory of relativity, are compared with the different chunks of data** to produce a quantity that signifies how well the signal in the data (if any) matches with any one of the waveforms.
  - Whenever this match (in technical terms **"signal-to-noise ratio" or SNR) is significant (larger than 8), an event is said to be detected.**

- o **Observing an event in multiple detectors** separated by thousands of kilometers almost simultaneously gives scientists increased confidence that the signal is of astrophysical origin.
- ▪ **Importance of Discovery:**
  - o **A neutron star has a surface** and black hole does not. **A neutron star is about 1.4-2 times the mass of the sun** while the other black hole is much more massive. **Widely unequal mergers** have very interesting effects that can be detected.
    - Inferring from data as to how often they merge **will also give us clues about their origin and how they were formed.**
  - o These observations **help us understand the formation and relative abundance of such binaries.**
    - **Neutron stars are the densest objects in the Universe**, so these findings can also **help us understand the behaviour of matter at extreme densities.**
    - **Neutron stars are also the most precise 'clocks' in the Universe**, if they emit extremely periodic pulses.
    - The discovery of pulsars going around Black Holes **could help scientists probe effects under extreme gravity.**
- ▪ **LIGO Scientific Collaboration (LSC):**
  - o LSC was **founded in 1997** and currently made up of more than 1000 scientists from over 100 institutions and 18 countries worldwide.
  - o It is a **group of scientists** focused on the **direct detection of gravitational waves**, using them to explore the fundamental physics of gravity, and developing the emerging field of gravitational wave science as a tool of astronomical discovery.
  - o **LIGO Observatories:** The LSC carries out the science of the **LIGO Observatories**, located in **Hanford, Washington** and **Livingston, Louisiana** as well as that of the GEO600 detector in Hannover, Germany.
  - o **Other Observatories:**
    - **VIRGO:** Virgo is located **near Pisa in Italy.** The Virgo Collaboration is currently composed of approximately 650 members from 119 institutions in 14 different countries including Belgium, France, Germany, Hungary, Italy, the Netherlands, Poland, and Spain.
    - **The Kamioka Gravitational Wave Detector (KAGRA):** The KAGRA detector is **located in Kamioka, Gifu, Japan.** The host institute is the Institute of Cosmic Ray Researches (ICRR) at the University of Tokyo.
      - This interferometer is underground and uses cryogenic mirrors. It has 3 km arms.

LIGO-India Project

- The **LIGO-India observatory** is scheduled for completion in 2024, and will be built in the **Hingoli District of Maharashtra.**
- LIGO India is a planned **advanced gravitational-wave observatory** to be located in India as part of the worldwide network.
  - The LIGO project operates three gravitational-wave (GW) detectors.
  - Two are at Hanford in the State of Washington, north-western USA, and one is at Livingston in Louisiana, south-eastern USA.
- The LIGO-India project is an **international collaboration between** the LIGO Laboratory and three lead institutions in the LIGO-India consortium: **Institute of Plasma Research, Gandhinagar; IUCAA, Pune;** and **Raja Ramanna Centre for Advanced Technology, Indore.**
  - It will significantly improve the sky localisation of these events.
  - This increases the chance of observation of these distant sources using electromagnetic telescopes, which will, in turn, give us a more precise measurement of how fast the universe is expanding.

6. What is the 'Heat Dome' causing record temperatures in USA?

A US city has recorded the highest temperatures as high as 46-degree Celsius part due to the historic heatwave that lasted as a result of a phenomenon referred to as a "heat dome".

What is a Heat Dome?

- To understand what causes a heat dome, one should liken the Pacific Ocean to a large swimming pool in which the heater is turned on.
- Once the heater is on, the portions of the pool close to the heating jets will warm up faster and therefore, the temperature in that area will be higher.
- In the same way, the western Pacific ocean's temperatures have increased in the past few decades and are relatively more than the temperature in the eastern Pacific.
- This strong change in ocean temperature from the west to the east is what a team of scientists believe is the reason for the heat dome.
- This occurs when the atmosphere traps heat at the surface, which encourages the formation of a heatwave.
- To compare, the reason that the planet Venus is the hottest in the Solar System is that its thick, dense cloud cover traps the heat at the surface, leading to temperatures as high as 471 degrees Celsius.

Is this heat wave a result of climate change?

- It cannot be said for sure if the heatwave is a direct result of global warming.
- Scientists are usually wary of linking climate change to any contemporary event mainly because of the difficulty in completely ruling out the possibility of the event having been caused by some other reason.
- Similarly, scientists who have been studying the climate tend to agree that the heat waves occurring today are more likely to be a result of climate change for which humans are responsible.

7. Global Cybersecurity Index 2020

India has made it to the top 10 in Global Cybersecurity Index (GCI) 2020 by ITU, moving up 37 places to rank as the tenth best country in the world on key cybersafety parameters.

Global Cybersecurity Index

- GCI assessment is done on the basis of performance on five parameters of cybersecurity including legal measures, technical measures, organizational measures, capacity development, and cooperation.
- The performance is then aggregated into an overall score.
- For each of the five aspects, all the countries' performance and commitment are assessed through a question-based online survey, which further allowed for the collection of the supporting evidence.

India's progress

- As per the ranking, India has moved up by 37 places to rank as the tenth best country in the world.
- The US topped the chart, followed by the UK and Saudi Arabia tied on the second position, while Estonia was ranked third in the index.
- India has also secured the fourth position in the Asia Pacific region, underlining its commitment to cybersecurity.

Its significance

- The affirmation by the UN body of India's efforts on cybersecurity comes just ahead of the sixth anniversary of Digital India on July 1.
- India is emerging as a global IT superpower, asserting its digital sovereignty with firm measures to safeguard data privacy and online rights of citizens.

Prelims Practice Questions

1. With reference to Kalbeliya dance, which of the following statements is/are correct?

1. It is a folk dance of Madhya Pradesh.
2. This dance performance is accredited by UNESCO as an Intangible Heritage.
3. The Kalbelia is almost exclusively performed by females.

Options:

a. 1 and 2 only
b. 2 and 3 only
c. 1 and 3 only
d. 1, 2 and 3

Answer: b

Explanation:

- Kalbeliya dance is a folk dance of Rajasthan.
- This dance performance is accredited by UNESCO as an Intangible Heritage.
- The Kalbelia is almost exclusively performed by females.
- The traditional occupation of the Kalbelia tribes is catching snakes and trading snake venom. Hence, the dance movements and the costumes of their community bear a resemblance to serpents.

2. With reference to Bharat Net Project, consider the following statements:

1. It is the world's largest rural broadband connectivity programme using Optical fibre.
2. It is being implemented by the the Ministry Ministry of Electronics and Information Technology

Which of the statements given above is/are correct ?

A 1 only
B 2 only
C Both 1 and 2

D Neither 1 nor 2

Answer : A

Explanation

- **Bharat Net Project is the world's largest rural broadband** connectivity programme using Optical fibre. And also a flagship mission implemented by **Bharat Broadband Network Ltd. (BBNL). Hence, statement 1 is correct.**
- BBNL is a Special Purpose Vehicle (SPV) set up by the Government of India under the Companies Act, 1956 with an authorized capital of Rs 1000 crore.
- It is being **implemented by the Department of Telecommunication under the Ministry of Communications. Hence, statement 2 is not correct.**
- National Optical Fibre Network (NOFN) which was launched in October 2011 was renamed as Bharat Net Project in 2015.
    - NOFN was envisaged as an information superhighway through the creation of a robust middle-mile infrastructure for reaching broadband connectivity to Gram Panchayats.

3. Which of the following has/have been accorded 'Geographical Indication' status?

1. Jardalu mango
2. Hapus mango
3. Laxmanbhog mango
4. Banaganapalle mango
5. Appemidi mango

Options:

a. 1 and 4 only
b. 2, 3 and 5 only
c. 1, 3 and 4 only
d. 1, 2, 3, 4 and 5

Answer: d

Explanation:

All the mangoes mentioned above have been accorded the Geographical Indication tag.

Mango   State

1. Jardalu mango – Bihar
2. Hapus mango – Maharashtra
3. Laxmanbhog mango – West Bengal
4. Banaganapalle mango – Andhra Pradesh
5. Appemidi mango – Karnataka

4. With reference to G20, consider the following statements:

1. The G20 is an informal group of 20 countries with the European Union as observer.
2. It does not have any permanent secretariat or headquarters.

Which of the statements given above is/are correct ?

A 1 only
B 2 only
C Both 1 and 2
D Neither 1 nor 2

Answer : B

Explanation

- The **G20 is an informal group of 19 countries and the European Union**, with representatives of the International Monetary Fund and the World Bank. **Hence, statement 1 is not correct.**
  o **The members of the G20** are Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, the United States and the **European Union.**
- The G20 membership comprises a mix of the **world's largest advanced and emerging economies**, representing about two-thirds of the world's population, 85% of global gross domestic product, 80% of global investment and over 75% of global trade.
- It does **not have any permanent secretariat or headquarters. Hence, statement 2 is correct.**

5. Which of the following statements is/are correct?

1. Current account deficit may cause depreciation.
2. Current account deficit may be a sign the economy is uncompetitive.

Options:

a. 1 only
b. 2 only
c. Both
d. None

Answer: c

Explanation:

- A current account deficit indicates that a country is importing more than it is exporting.
- Current account deficit may cause depreciation as there is greater demand for imports and foreign currency.
  - When the current account deficit increases, it leads to an increased supply of a nation's currency in the foreign exchange markets. Therefore, in the currency market, there will be an outward shift of supply. This might lead to the external value of the currency falling causing depreciation.
- Current account deficit is an indication of an uncompetitive economy. It may imply the economy is becoming uncompetitive and the exchange rate relatively overvalued.

6. Consider the following Bhakti Saints:

1. Dadu Dayal
2. Guru Nanak
3. Tyagaraja

Who among the above was/were preaching when the Lodi dynasty fell and Babur took over?

a. 1 and 3
b. 2 only

c. 2 and 3
d. 1 and 2

Answer: b

Explanation:

The Bhakti saint who witnessed the fall of the Lodi dynasty was Guru Nanak (1469 – 1539).

<mark>**Mains Practice Questions**</mark>

1. Public interest litigation (PIL) should not become an instrument for contrivance of private grievances in the grab of public interest. Critically analyse. (250 words)

Approach

Briefly explain Public Interest Litigation (PIL).

Mention the intent behind its introduction in India.

Discuss the growing scenario of its misuse.

Suggest some measures to check this misuse while maintaining its original purpose.

2. What is the National Mission on Interdisciplinary Cyber-physical Systems (NM-ICPS)? How can it play a transformative role in the field of technological developments in India? (150 words)

Approach

Introduce with explaining the National Mission on Interdisciplinary Cyber-physical Systems (NM-ICPS).

Mention briefly its objective and application.

Highlight its impact in making technological developments in India.

Conclude suitably.