



# DIKSHANT TODAY

NOVEMBER 2023

## GWALIOR 'CITY OF MUSIC'

UNESCO  
CREATIVE CITIES

### What's special

- ⇒ Mera Yuva Bharat (MY Bharat)
- ⇒ Broadcasting Services (Regulation) Bill, 2023
- ⇒ SHREYAS
- ⇒ Haryana employment reservation law
- ⇒ An alternative to the Suez Canal
- ⇒ The Agartala-Akhaura Rail Link
- ⇒ Project Kusha
- ⇒ Digital Advertisement Policy, 2023
- ⇒ 25 years of the International Space Station
- ⇒ UNESCO names Kozhikode city of literature
- ⇒ UNESCO declares Gwalior the 'city of music'
- ⇒ Practice Question For UPSC Pre. & Mains Exam



For better preparation of  
Current Affairs, must attend  
Daily Free Current Affairs class  
on Dikshant Education App

Scan the QR code  
to download  
DIKSHANT APP



VISIT US:  
DIKSHANTIAS.COM



9312511015  
8851301204



FACEBOOK.COM  
/DIKSHANT.IAS.7



YOUTUBE.COM  
/DIKSHANTIAS



TWITTER.COM  
/DIKSHANTIAS



INSTAGRAM.COM  
/DIKSHANTIAS



T.ME/  
DIKSHANTIAS



# BPSC

## PRE+MAINS

### फाउंडेशन बैच

# सामान्य अध्ययन

## ऑनलाइन/ऑफलाइन



सर्वश्रेष्ठ एवं अनुभवी शिक्षकों द्वारा अध्यापन



600 घंटे से अधिक की कक्षाएँ



प्रत्येक विषय/खंड के प्रिंटेड नोट्स



नियमित क्लास टेस्ट



डाउट क्लियरेंस हेतु विशेष मेन्टर की व्यवस्था

## कक्षा आरंभ 05 DEC. 2023

Offline  
Fee

~~₹ 75,000~~  
₹ 30,000

3 INSTALLMENT OF ₹10,000

Online  
Fee

~~₹ 22,500~~  
₹ 15,000

3 INSTALLMENT OF ₹ 6,000

नामांकन प्रारंभ

सीमित सीटें

TO REGISTER INSTALL DIKSHANT APP/ ADD.: 289, DHAKA JOHAR, DR. MUKHERJEE NAGAR, DELHI-09, CALL : 7428092240



# DIKSHANT TODAY

## DECEMBER 2023

### EDITOR IN CHIEF

Dr. S. S. Pandey

### DIRECTOR

Shipra Pandey

### EXECUTIVE EDITOR

Rakesh Pandey

### CO-EXECUTIVE EDITOR

Saket Anand

### MANAGEMENT CONSULTING

Tej Prakash, Prakash  
Jaiswal, Marina, Shagla

### EDITING SUPPORT

Bhoolan Prasad, Md. Shoaib,  
Neha Kumari, Jaya Soni

### TYPE SETTING AND DESIGNING

Suryajeet, Sunil

\*\*\*\*\*

- The information, news, knowledge and facts published in this magazine have been completely verified. However, the publisher, editor or printer is not responsible for any damage caused to any individual or entity if any information or facts have been published incorrectly.
- The information published in this magazine has been taken from various newspapers and websites for non-commercial and educational purposes and we express our gratitude to all of them for this.
- All disputes will be settled in Delhi Jurisdiction.

IAS PCS

## DOWNLOAD DIKSHANT LEARNING APP NOW

↓

GET IT ON  
 Google Play

**CALL US:**  
**7428092240**  
**9810386285**

Get all Dikshant online classes at one platform...

Download the New "Dikshant Learning App"

Click:

<https://play.google.com/store/apps/details?id=com.cnb.dikshant.ias>

Get it on the Google Play Store !

To know more about the Dikshant Scholarship Programme

[https://dikshantias.com/free\\_coaching\\_scholarship](https://dikshantias.com/free_coaching_scholarship)

### HEAD OFFICE

289, Dhaka Johar, Near Dusshara Ground, Dr. Mukherjee Nagar, Delhi-09

**Contact:** 7428092240, 9312511015, 8851301204

**Email :** dikshantias2011@gmail.com

**Web.:** www.dikshantias.com

## CONTENTS

## CURRENT AFFAIRS

## POLITY &amp; GOVERNANCE

⇒ Mera Yuva Bharat (MY Bharat) platform launched	5
⇒ ECI signs MoU with the Ministry of Education to bring Electoral Literacy to Classrooms	6
⇒ Advocate on Record system in the Supreme Court	7
⇒ States in Court against their Governors	7
⇒ Broadcasting Services (Regulation) Bill, 2023	9
⇒ Scholarships for Higher Education for Young Achievers Scheme (SHREYAS) for OBC and Others	9
⇒ NITI Aayog report on improving India public schools	11
⇒ The price of persistent federal frictions	12
⇒ Haryana employment reservation law	13
⇒ Parliamentary panel seeks robust safeguards for technology in legal process	14

## INTERNATIONAL RELATIONS

⇒ The massive displacement in Congo	15
⇒ First INDUS X Investors Meet ahead of 2 plus 2 Indo US Ministerial Dialogue	16
⇒ An alternative to the Suez Canal	16
⇒ India, US, 12 other IPEF members ink supply chain resilience agreement	17
⇒ Ruling against the U.K. Rwanda deal	18

## ECONOMY

⇒ How cargo transport can be improved	19
⇒ Understanding worker productivity	20
⇒ Domestic sailing of the first International Cruise Liner in India	21
⇒ PMGKAY extended	22
⇒ The Agartala-Akhaura rail link	23
⇒ Indo Pacific Economic Framework for Prosperity (IPEF) Supply Chain Agreement	24
⇒ The Bangladesh garment workers unrest	25
⇒ Investor Risk Reduction Access platform	26
⇒ E-Commerce cargo movement sets course for Ganga (NW 1) as IWAI and Amazon signs MoU	27

## SECURITY

⇒ Project Kusha	28
⇒ India to bring in a National Security Strategy	28

## ENVIRONMENT

⇒ Brazzaville Summit of the Three Basins ends with a declaration	29
⇒ Adaptation Gap Report 2023	30
⇒ Environmental factors determine height of children	31
⇒ Where do domesticated silkworm cocoons get their wild colours from?	31
⇒ Deforestation in Maritime Continent may make El Nino events more complex and harder to predict	33
⇒ Australia's offer of climate migration to Tuvalu residents	33
⇒ Sand and dust storms are increasing, human activities contribute 25 percent emissions, UNCCD	34
⇒ Coal isn't easy to exclude from sustainable development	35
⇒ Threatened species up by 25 percent in Queensland Wet Tropics	36
⇒ Reflection of Earthquake Source Process in the Ionosphere could pave way for deciphering earthquake	37

## SCIENCE &amp; TECHNOLOGY

⇒ NICED makes quick detection of drug resistant H. pylori possible	38
⇒ Newly developed affordable radiative paint	38
⇒ Understanding the fundamentals of how electricity is transmitted	39
⇒ Trouble with India guidelines on genetically modified insects	41

⇒ Why has the govt. issued a directive on deepfakes	42
⇒ Digital Advertisement Policy, 2023	43
⇒ Unravelling the secrets of swing in cricket with physics	43
⇒ 'Rashtriya Vigyan Puraskar' awards	44
⇒ The future of transport is electric	45
⇒ Chimaeras hosts to multiple genotypes, and maybe human organs	47
⇒ Meet the Langlands Program, the world's biggest maths project	48
⇒ 25 years of the International Space Station	49
⇒ NASA spacecraft fired a laser at Earth	50

### SOCIAL ISSUE

⇒ PM Particularly Vulnerable Tribal Groups Development Mission	51
⇒ How the mandatory reporting provision under POCSO works	52

### HEALTH

⇒ Haemoglobin isn't used only in blood, scientists discover	53
⇒ The Zika genome and insights into the era of emerging outbreaks	54
⇒ How was the first vaccine for chikungunya approved	55
⇒ COVID 19, brain damage mechanism uncovered	55
⇒ How free cancer care alone won't help the fight against cancer in India	56

### CULTURE

⇒ UNESCO names Kozhikode city of literature	57
⇒ UNESCO declares Gwalior the 'city of music'	58
⇒ Indian miniature painting tradition	59

### MISCELLANEOUS

⇒ What led ICC to suspend Sri Lanka Cricket?	60
--	----

## PRELIMS FACT

### POLITY & GOVERNANCE

⇒ UPSC tightens rules for appointment of State police chiefs	62
⇒ Bihar House passes Bill raising ceiling on caste quota to 65 percentage	62
⇒ Speedy disposal of cases against lawmakers	63
⇒ AAINA Dashboard for Cities portal launched	63
⇒ Centre asks States to use tracking devices on prison inmates released on parole	64
⇒ Parliamentary panel on criminal law Bill leaves decision on death penalty to Centre	64
⇒ MGNREGS audit crosses 50 percent local bodies in just six States	65

### ECONOMY

⇒ DAY NRLM and SIDBI signed MOU	65
⇒ Major action to curb film piracy as industry faces losses of Rs. 20,000 crore annually due to piracy	66
⇒ GoI and ADB sign 400 million dollar loan to support urban services	67
⇒ Govt constitutes committee to draft safety pledge for e-comm platforms	67
⇒ UP, Bihar replace Kerala as top contributor of workforce to GCC countries	68
⇒ International Tropical Timber Council concludes	69
⇒ India becomes Chair of International Sugar Organisation (ISO) for 2024	69

### SECURITY

⇒ Hindustan Aeronautics and Safran launch JV for helicopter engines	70
⇒ Surya Kiran XVII	70
⇒ Exercise MITRA SHAKTI 2023	70

### ENVIRONMENT

⇒ ISA to provide 10 million dollar to the GSF	71
---	----

⇒ India hosts the 6th Session of the International Solar Alliance Assembly	72
⇒ Delhi chokes on pollution, What is AQI and how is it measured	72
⇒ New technology for converting CO <sub>2</sub> to CO holds potential for carbon in the steel sector	73
⇒ Fossil fuel plans of major producers not aligned with Paris Agreement goals, warns UNEP Report	74
⇒ Kerala forms Organic Farming Mission to boost agriculture	75
⇒ Delhi most polluted city in world, Swiss survey	75
⇒ Molecular mechanism behind intriguing green alga surviving in extreme conditions	75
⇒ High rainfall afforded resilience to tropical rainforests around 50 million years ago	76
⇒ Kadalundi shrinking mudflat ecosystem keeps birds away	77
⇒ Gujarat gets a state fish	77

**SCIENCE & TECHNOLOGY**

⇒ Chandrayaan 3 carried nuclear technology to Moon	78
⇒ Larger scale warfare may have occurred 1,000 years earlier	78
⇒ Status of Kavach installations	79
⇒ Indian astronomer discovers black hole that could fit 100 million suns inside it	80
⇒ Krishi, the first ever AI powered solution for automated agricultural news monitoring and analysis	80
⇒ NASA to launch Peregrine Lander to Moon in December	81
⇒ After Chandrayaan 3, Nasa to study effects of rockets on Moon surface	81
⇒ Scientists have found evidence why some planets are shrinking	82
⇒ AI powered chemist makes oxygen from Martian meteorites	83
⇒ SpaceX loses contact with Starship rocket in new test flight	83
⇒ Tantalum, the rare metal found in Sutej	84
⇒ Scientists fabricate 2D protein monolayer that can help to study diseases like Amyloidosis	84
⇒ Lower oxygen at high altitudes increases lifespan in ageing mice	85
⇒ Generic drugs for 4 rare diseases made available in India	86

**SOCIAL ISSUES**

⇒ Leave benefits for women in armed forces made uniform	86
⇒ COLORS to support the 'Beti Bachao, Beti Padhao' initiative	87
⇒ Jal Diwali Women for Water, Water for Women Campaign launched	87
⇒ SC calls for collaborative efforts to bring children into the adoption pool	88
⇒ Bihar urges Centre for 65 percent quota in 9th Schedule to seek legal shield	88
⇒ UP government launches Safe City project to ensure women's safety	89

**HEALTH**

⇒ IIT Guwahati discovers modified graphene oxide potential in medicine	89
⇒ WHO acknowledges India success in declining TB incidence	90
⇒ Fresh China outbreak attributed to multiple known pathogens	91

**MISCELLANEOUS**

⇒ National Efficient Cooking Programme launched	91
⇒ Author Nandini Das wins 2023 British Academy Book Prize	92
⇒ Tremors reveal gaps in emergency alert system	92
⇒ Tamil writer Perumal Murugan wins 2023 JCB Literary Prize	93
⇒ First-ever Khelo India Para Games	93
⇒ IMA, nurses association honoured with Indira Gandhi Peace Prize	94

**PRACTICE SET**

⇒ Practice Question For Upsc Prelims Exam	95
⇒ Practice Question For Upsc Mains Exam	106



## POLITY & GOVERNANCE

### MERA YUVA BHARAT (MY BHARAT) PLATFORM LAUNCHED



#### Why in news?

- The Prime Minister recently launched 'Mera Yuva Bharat (MY Bharat)' platform for youth of the country on October 31st, at Kartavya Path on the National Unity Day.

#### Vision:

- 'Mera Yuva Bharat (MY Bharat)' is envisioned as a pivotal, technology-driven facilitator for youth development and youth-led development, with the overarching goal of providing equitable opportunities to empower the youth in realizing their aspirations and contributing to the creation of a "Viksit Bharat" (developed India), across the entire spectrum of the Government.
- It envisions a framework where the youth of our country can seamlessly connect with programs, mentors, and their local communities.
- This engagement is designed to deepen their understanding of local issues and empower them to contribute to constructive solutions.

#### Beneficiaries:

- Mera Yuva Bharat (MY Bharat), an autonomous body will benefit the youth in the age group of 15-29 years, in line with the definition of 'Youth' in the National Youth Policy.
- The beneficiaries will be in the age-group of 10-19 years.

- Mera Yuva Bharat (MY Bharat) is 'Phygital Platform' (physical + digital) comprising physical activity along with an opportunity to connect digitally.

#### Significance:

- Role of youth in Amrit Kaal: India's youth are to play a critical role in defining the future of the nation - especially at the pivotal juncture of India's 75 years of independence, as the country embarks on a paradigm-shifting development journey over the next 25 years of building an Amrit Bharat by 2047.
- Establishing a framework for bringing youth from diverse areas under a single platform: Vision 2047 requires a framework that can bring rural youth, urban youth and Rurban youth on a single platform. The existing schemes of the Government were designed and launched at different points in time over the last 50 years with the then prevailing understanding of the needs of rural youth in our society. The dynamic shifts in the urban-rural landscape have necessitated a re-evaluation of these approaches.
- Establishing a new contemporary technology-led platform to engage with the present-day youth: In today's fast-paced world, characterized by rapid communication, the prevalence of social media, and the emergence of new digital tools and cutting-edge technologies, a technology-driven platform can connect youth to programmes that can help them improve their capabilities and also connect them with community activities.
- Ensuring accessibility by creating a phygital ecosystem: The Mera Yuva Bharat platform will create a phygital ecosystem and empower young individuals to become catalysts for community transformation. They would act as "Yuva Setu," linking the government with its citizens.

#### Objectives:

- The primary objective of Mera Yuva Bharat (MY Bharat) is to make it a whole of Government platform dedicated to the advancement of the youth. Its objectives include:
  - Improve the leadership skills through experiential learning by shifting from isolated physical interaction to programmatic skills
  - Investing in youth to make them social innovators, and leaders in the communities
    - Enhanced efficiency through Convergence of existing programmes

- Act as a one-stop shop for young people and Ministries
- Create a centralized youth database
- Improved two-way communication to connect youth government initiatives and activities of other stakeholder that engage with youth
- ⊖ Ensuring accessibility by creating a Phygital Ecosystem - a blend of physical and digital experiences.
- ⊖ Encourages various activities to promote voter awareness among students, ensuring they are well-versed with the country's electoral system and encouraging them to register as voters and participate enthusiastically, with a well-informed and ethical approach, in every election.
- ⊖ Seeks to evolve a robust mechanism to fulfil the aspirational goal of ECI to handover the voter ID card to every student immediately after their attaining the age of 18 years: an institutional framework to be created for online registration of eligible and prospective students who have attained 17+ years of age (after every qualifying date (1st January, 1st April, 1st July and 1st October of every calendar year) and during the annual summary revision of electoral rolls.
- ⊖ Include electoral literacy in the curriculum for adult literacy and basic education, creating educational content focused on electoral processes for lifelong learning.
- ⊖ Designate one of the rooms in every senior secondary school as the 'Democracy Room' for the regular display of voter education materials and the conduct of Continuous Electoral and Democracy Education (CEDE) activities throughout the year. A dedicated 'Democracy Room' will offer a platform for students to learn, discuss, and participate in various aspects of our democratic processes throughout the year.
- ⊖ Developing critical thinking, communication, and leadership skills amongst university students to actively participate in university-level politics, including engaging in informed debates and discussions.
- ⊖ Devise a system of credits for students taking part in CEDE to pursue higher studies;
- ⊖ Providing standard ramps, accessible toilets, proper lighting and electricity on a permanent basis.

### ECI SIGNS MOU WITH THE MINISTRY OF EDUCATION TO BRING ELECTORAL LITERACY TO CLASSROOMS



#### Why in news?

- ⊖ Recently, a Memorandum of Understanding (MoU) on electoral literacy was signed between the Election Commission of India (ECI) and the Ministry of Education.

#### Details:

- ⊖ The MoU underscores the development of an institutional framework that seeks to incorporate electoral literacy formally into the school and college education system.
- ⊖ This includes structured curricular, co-curricular, and extracurricular activities, all of which will help in preparing future and new voters for greater electoral participation and in effect strengthening democracy.

#### Salient features:

- ⊖ Systematically integrating voter education and electoral literacy into the curriculum, starting from classes 6 to 12 in all schools.
- ⊖ This integration will also extend to the curricular framework for all colleges and universities, tailored to suit different disciplines and credited accordingly.
- ⊖ NCERT will introduce and update textbooks to include content on electoral literacy and will advise State Education Boards and other Boards to follow suit.
- ⊖ Emphasises the orientation and training of teachers in effectively imparting electoral literacy in classrooms.
- ⊖ Fosters a sense of responsibility within State Education Departments for establishing Electoral Literacy Clubs (ELCs) in schools and colleges.

#### Background:

- ⊖ The MoU is aimed at extending the ECI's flagship Systematic Voters' Education and Electoral Participation (SVEEP) in schools and colleges. The objective is to encourage universal and enlightened participation of future voters in elections.
- ⊖ The MoU also aims to address the issues like apathy among urban and young voters, as a crucial aspect of Continuous Electoral and Democracy Education.
- ⊖ This integration seeks to motivate future voters to participate more actively in elections, fostering responsible citizenship, and reinforcing our democratic system with informed and dutiful citizens.
- ⊖ There were almost 297 million electors (out of 910 million) who did not cast their votes in General Election to Lok Sabha - 2019. The voting percentage was 67.4%. The Commission has taken this as a challenge to improve upon.

## ADVOCATE ON RECORD SYSTEM IN THE SUPREME COURT



### Why in news?

- The Supreme Court recently pulled up an Advocate-on-Record (AoR) for filing a frivolous case and dismissed the public interest litigation. The Court censured the lawyer that an AoR cannot merely be a “signing authority.”
- A bench of Justices also called for a “comprehensive plan” for reforming and improving the AoR system of the top court, which will be drawn up in collaboration with the Bar.

### Who is an AoR?

- Only an AoR can file cases before the Supreme Court. An AoR might engage other lawyers including senior counsels to argue before the Court but the AoR is essentially the link between the litigant and the highest court of the country.
- After fulfilling an eligibility criteria and clearing a rather tough examination, an advocate is qualified to be an AoR.
- AoRs are a pool of elite Delhi-based lawyers whose legal practice is mostly before the SC. They can appear before other courts too. The idea behind this practice is that a lawyer with special qualifications, picked by the Supreme Court itself, is equipped to appear for a litigant because it is a court of the last opportunity for the litigant.

### How does one become an AoR?

- The Supreme Court Rules, 2013 prescribe eligibility criteria for an AoR.
- While an advocate has to clear an examination set by the Court itself, the advocate has to meet specific criteria to be eligible to appear for the exam. The advocate must train with a court approved AoR for at least one year to take up the exam. She must also have at least four years of practice before starting the training itself.
- An advocate needs to score at least 60% i.e. a minimum of 240 marks out of 400 with at least 50% in each subject in a three-hour exam. The subjects include Practice and Procedure, Drafting, Professional Ethics

and Leading Cases. Approximately 200-250 lawyers clear the exam to become AoRs.

- An AoR must have an office in Delhi within a 16-kilometre radius of the SC. Additionally, she is required to give an undertaking to employ, within one month of being registered as an AoR, a registered clerk.

### What are the rules governing the AoR system?

- According to Section 30 of the Advocates Act, any lawyer enrolled with the Bar Council is entitled to practice law before any Court or tribunal in the country. However, the provision also categorically states that “nothing in the provision shall be deemed to affect the power of the Supreme Court to make rules under Article 145 of the Constitution.”
- Under Article 145 of the Constitution, the Supreme Court is empowered to make rules and regulate its own procedure for hearing cases.
- The AoR system is broadly based on the British practice of barristers and solicitors. While barristers wear the black gown and wig and argue cases, solicitors take up cases from clients.
- In the Federal Court, the colonial predecessor of the Supreme Court, “agents” would take up cases while barristers would argue.
- In High Courts, the arguing counsels were referred to as pleaders. Senior advocates in India are designated by the Court and wear a distinct gown. Like barristers, they cannot solicit clients and are only briefed by other lawyers, say for example, an AoR.
- The inaugural proceedings of the SC was done after “taking care to ensure that the Rules of the Supreme Court were published and the names of all the Advocates and agents of the Federal Court were brought on the rolls of the Supreme Court.”

## STATES IN COURT AGAINST THEIR GOVERNORS



### Context:

- A battery of non-BJP ruled States have approached the Supreme Court accusing their Governors of using a non-existent discretion to unreasonably delay the passing of crucial Bills into law.
- The Bills in limbo cover sectors such as public health, higher education, Lokayukta and cooperative societies.

**Accusations by State's:**

- Tamil Nadu has accused Governor R.N. Ravi of toying with the citizens' mandate by sitting on the Bills by neither assenting nor returning them. It said the Governor has positioned himself as a "political rival" who has caused a "constitutional deadlock" by simply sitting on the Bills for months together.
- Kerala, in its separate petition, said that eight proposed laws passed by its Legislative Assembly were pending with the Governor, not for months, but years. Of the eight, three Bills were waiting for the Governor's word for over two years.
- Punjab complained that seven of its Bills were stuck with the Governor since June, threatening to bring the administration to a "grinding halt".
- The Supreme Court had to intervene in April for the Telangana Governor to clear Bills pending since September 2022, compelling advocate Dushyant Dave, appearing for the State, to submit that legislatures in Opposition-ruled States were at the mercy of the Governors, who had become a law unto themselves.

**Constitutional provisions:**

- Article 200 of the Constitution covers the options before the Governor when a Bill passed by both Houses of the Legislature is presented to him.
- The first proviso to the Article says the Governor could either declare his assent to the Bill or withhold the assent if it is not a Money Bill or reserve the law for the consideration of the President if he thinks the Bill derogates from or endangers the power of judicial review of the High Court.
- In case the Governor chooses to withhold assent, he should return the Bill "as soon as possible" with a message requesting the Legislative Assembly to reconsider the proposed law or any specified provisions or suggest amendments.
- The Assembly would reconsider and pass the Bill, and this time, the Governor should not withhold his assent. In short, the constitutional head of the State would bow to the considered decision of the elected representatives of the people.

**Discretionary power of the Governor:**

- Governors did have a discretion to return Bills before the first proviso in the draft Article 175 (now Article 200). This was amended by the Constituent Assembly in 1949.
- Though it was thought that the Governor's exercise of discretion would act as a "potential check on disruptive legislative tendencies" by States, Dr. B. R. Ambedkar, while introducing the amended proviso, said "in a responsible government there can be no room for the Governor acting on discretion".
- T. T. Krishnamachari, a Constituent Assembly member from Madras and later Finance Minister, approved of the amendment, saying "the Governor

cannot act on his own, he can only act on the advice of the Ministry...When a Governor sends a Bill back for further consideration, he does so expressly on the advice of his Council of Ministers".

- He explained that if the Bill passed by the Legislative Assembly needs modification or has garnered adverse public opinion, the government uses the Governor to return the Bill to the Lower House as quickly as possible for re-legislation.
- The first proviso to Article 200 is thus a "saving clause" and retains the discretion over the fate of the Bill solely in the hands of the State Cabinet.
- Article 163 makes it clear the Governor is not expected to act independently.
- The Supreme Court in the Shamsher Singh case verdict has held that as a formal head of the State a "Governor exercises all his powers and functions conferred on him by or under the Constitution on the aid and advice of his Council of Ministers save in spheres where the Governor is required by or under the Constitution to exercise his functions in his discretion."
- The assent or return of the Bill does not involve the discretion of individuals occupying the Governor's post.

**By when should Bills be returned?**

- The first proviso of Article 200 says it should be "as soon as possible". The Constitution is silent on what exactly this phrase means.
- The Supreme Court has interpreted "as soon as possible" in the proviso to mean "as early as practicable without avoidable delay" in its 1972 judgment in Durga Pada Ghosh versus State of West Bengal.
- Justice (now retired) Rohinton F. Nariman, in his 2020 judgment in the Keisham Megha Chandra Singh case, said a 'reasonable time' would mean three months.
- The States have urged the court to interpret the phrase in the proviso and fix a time limit by which Governors should assent or return a Bill.
- The 1988 Sarkaria Commission report on Centre-State relations had suggested consultation with the Governor while drafting the Bill and fixing a deadline for its disposal.

**1962 case:**

- Kerala has asked the Supreme Court to form a seven-judge Bench to review a five-judge Bench judgment in the 1962 Purushothaman Nambudiri versus State of Kerala case which held the view that Article 200 did not provide "for a time limit within which the Governor should come to a decision on the Bill referred to him for his assent".
- The State said that, at the time, the court did not consider the possibility of Governors holding back Bills for an indefinite time.

## BROADCASTING SERVICES (REGULATION) BILL, 2023



### Why in news?

- ⇒ Ministry of Information and Broadcasting, Government of India has proposed a draft Broadcasting Services (Regulation) Bill, 2023.
- ⇒ The draft Bill provides for a consolidated framework to regulate the broadcasting services in the country and seeks to replace the existing Cable Television Networks (Regulation) Act, 1995 and other Policy Guidelines currently governing the broadcasting sector in the country.

### Details:

- ⇒ The Bill streamlines regulatory processes, extends its purview to cover the Over-the-Top (OTT) content and digital news, and introduces contemporary definitions and provisions for emerging technologies.
- ⇒ It seeks to provide for Content Evaluation Committees and a Broadcast Advisory Council for self-regulation, different program and advertisement code for different Broadcasting Network Operators, Accessibility measures for persons with disabilities, and statutory penalties, etc.
- ⇒ The Bill comprises of six Chapters, 48 Sections and three Schedules.

### Key Highlights:

#### Consolidation and Modernization:

- ⇒ It addresses a long standing need of consolidating and updating the regulatory provisions for various broadcasting services under a single legislative framework. This move streamlines the regulatory process, making it more efficient and contemporary.
- ⇒ It extends its regulatory purview to encompass broadcasting over-the-top (OTT) content and digital news and current affairs currently regulated through IT Act, 2000 and regulations made there under.

#### Contemporary Definitions and Future-Ready Provisions:

- ⇒ To keep pace with the evolving technologies and services, the bill introduces comprehensive definitions for contemporary broadcasting terms and

incorporates provisions for emerging broadcasting technologies.

#### Strengthens the Self Regulation Regime:

- ⇒ It enhances self-regulation with the introduction of 'Content evaluation committees' and evolves the existing Inter-Departmental Committee into a more participative and broader 'Broadcast Advisory Council'.

#### Differentiated Programme Code and Advertisement Code:

- ⇒ It allows for a differentiated approach to Programme and Advertisement Codes across various services and require self-classification by broadcasters and robust access control measures for restricted content.

#### Accessibility for Persons with Disabilities:

- ⇒ The bill addresses the specific needs of persons with disabilities by providing for enabling provisions for issue of comprehensive accessibility guidelines.

#### Statutory Penalties and Fines:

- ⇒ The draft Bill introduces statutory penalties such as: advisory, warning, censure, or monetary penalties, for operators and broadcasters. Provision for imprisonment and/or fines remains, but only for very serious offenses, ensuring a balanced approach to regulation.

#### Equitable Penalties:

- ⇒ Monetary penalties and fines are linked to the financial capacity of the entity, taking into account their investment and turnover to ensure fairness and equity.

#### Infrastructure Sharing, Platform Services and Right of Way:

- ⇒ The bill also includes provisions for infrastructure sharing among broadcasting network operators and carriage of platform services. Further, it streamlines the Right of Way section to address relocation and alterations more efficiently, and establishes a structured dispute resolution mechanism.

#### Way Forward:

- ⇒ Technological advancements have introduced new platforms such as DTH, IPTV, OTT, and various integrated models.
- ⇒ With the digitization of the broadcasting sector, especially in cable TV, there is a growing need to streamline the regulatory framework.

## SCHOLARSHIPS FOR HIGHER EDUCATION FOR YOUNG ACHIEVERS SCHEME (SHREYAS) FOR OBC AND OTHERS

### Why in news?

- ⇒ The scheme Scholarships for Higher Education for Young Achievers Scheme- SHREYAS, has been proposed to implement during the 2021-22 to 2025-26

by placing two ongoing Central Sector schemes for OBC and others namely

- a) National Fellowship for OBC
- b) Dr. Ambedkar Central Sector Scheme of Interest Subsidy on Educational Loans for Overseas Studies for Other Backward Classes (OBCs) and Economically Backward Classes (EBCs).



### Objectives:

- ⇒ The main objective of the schemes is Educational Empowerment of OBC & EBC students by way of awarding fellowship (financial assistance) in obtaining quality higher education and interest subsidy on educational loan for overseas studies.

### National Fellowship for OBC students

- ⇒ The scheme aims at providing financial assistance to the OBC students in obtaining quality higher education leading to degrees such as M.Phil and Ph.D in universities, research institutions and scientific institutions.
- ⇒ The scheme is designed to provide a total number of 1000 Junior Research Fellowships per year to undertake advanced studies and research leading to M.Phil. /Ph.D. Degrees, who have qualified in the following tests:
  - i. National Eligibility Test – Junior Research Fellowship (NET-JRF) of UGC (for Humanities/Social Sciences) or
  - ii. UGC-Council of Scientific and Industrial Research (UGC-CSIR) NET-JRF Joint Test (for Sciences).
- ⇒ The scheme covers all universities/institutions recognized by the University Grants Commission (UGC) and are implemented by the UGC itself on the pattern of the scheme of UGC Fellowships being awarded to research students pursuing M.Phil. and Ph.D.

### Salient features of the Scheme:

- ⇒ The scheme is now implemented by the Ministry through the designated Central Nodal Agency; National Backward Classes Finance and Development Corporation (A Govt. of India Undertaking, under the administrative control of Ministry of Social Justice & Empowerment and All universities/institutions recognized by the University Grants Commission (UGC).

- ⇒ Eligibility conditions are as per notification for UGC-NET and CSIR-UGC-NET examinations. The rate of fellowship for JRF level is Rs.31000 per month and for SRF level it is Rs.35000 per month, besides contingencies amount.
- ⇒ Out of 1000 slots available under this scheme, 750 will be allocated for the subjects under National Eligibility Test – Junior Research Fellowship (NET-JRF) of UGC and remaining 250 UGC-Council of Scientific and Industrial Research (UGC-CSIR) NETJRF joint test (for Science streams).
- ⇒ These 1000 slots will be over and above the OBC Students selected under the normal reservation policy of the Government. At least 5% of the total seats should be reserved for students with disabilities while making selection of candidates for award of fellowships by the UGC.

### Dr. Ambedkar Scheme of Interest Subsidy on Educational Loans for Overseas Studies for Other Backward Classes (OBCs) & Economically Backward Classes (EBCs)

- ⇒ This is a Central Sector Scheme to provide interest subsidy to the student belonging to the OBCs and EBCs on the interest payable for the period of moratorium for the Education Loans for overseas studies to pursue approved courses of studies abroad at Masters, M.Phil. and Ph.D. level.

### Salient features of the Scheme:

- ⇒ The scheme is implemented through the Canara Bank (the Nodal bank for the scheme). The Scheme is applicable for higher studies abroad.
- ⇒ The interest Subsidy shall be linked with the existing Educational Loan Scheme of Indian Banks Association (IBA) and restricted to students enrolled for course at Masters, M.Phil and Ph.D level.
- ⇒ The students should have secured admission in the approved courses at Masters, M.Phil or Ph.D levels abroad for the courses listed in the guidelines.
- ⇒ For OBC candidates, total income from all sources of the employed candidate or his/her parents/guardians in case of unemployed candidate shall not exceed present Creamy Layer criteria.
- ⇒ For EBC candidates, total income from all sources of the employed candidate or his/her parents/guardians in case of unemployed candidate shall not exceed Rs.5.00 lakh per annum , 50% of the total financial assistance is reserved for women candidates.
- ⇒ Under the scheme, 100% interest payable by the students availing the education loans of the IBA for the period of moratorium (i.e. course period, plus one year or six months after getting job, whichever is earlier) as prescribed under the Education Loan Scheme of the IBA, shall be borne by the Government of India.

- After the period of moratorium is over, the interest on the outstanding loan amount shall be paid by the student, in accordance with the existing Educational Loan Scheme as may be amended from time to time.
- The candidate will bear the Principal installments and interest beyond moratorium period. Maximum limit of loan is Rs 20 Lakhs.

### NITI AAYOG REPORT ON IMPROVING INDIA PUBLIC SCHOOLS



#### Why in news?

- To enhance the learning experience for students in government-run-and-aided schools across India, the NITI Aayog has recommended merging schools that have fewer students and optimising the allocation of teachers to fill up large-scale vacancies.

#### Details:

- The recommendations were made in an October report under project SATH-E (Sustainable Action for Transforming Human Capital – Education), an initiative started by the NITI Aayog in 2017 to help states improve the quality of education at local schools.
- While 16 states had responded to the NITI Aayog's project proposal, Jharkhand, Odisha and Madhya Pradesh were eventually selected for the implementation of the project.
- The latest report builds on the outcomes observed in these three states to make recommendations for overall improvement in the quality of public school education across the country.

#### Structural Interventions:

##### School consolidation:

- The first suggestion made as part of structural intervention includes school consolidation, including the merger of sub-scale schools. The report goes on to explain that these are schools with less than 50 students and just one or two teachers.
- The challenges faced by these schools, the report adds, were lack of individual attention to students owing to multi-grade and multi-level teaching (one teacher teaching multiple classes), limited time for teaching and inadequate learning infrastructure.

#### Other suggestions:

- The suggestion pertains to the development of a subset of schools as exemplary or leader schools, with a set of disproportionate investments made toward those schools in order to create new momentum in the public education system. This would also involve drawing in students from other sub-scale public, as well as private schools, to these exemplary schools.
- The report also suggests focussing on building a high-performance organisation as part of the state education department that is well-staffed and has oversight over all academic and administrative matters, in order to manage the academic and administrative responsibilities.
- It also recommends optimising teacher allocation, to address the acute shortages of teachers in schools, especially at the secondary and higher secondary levels.

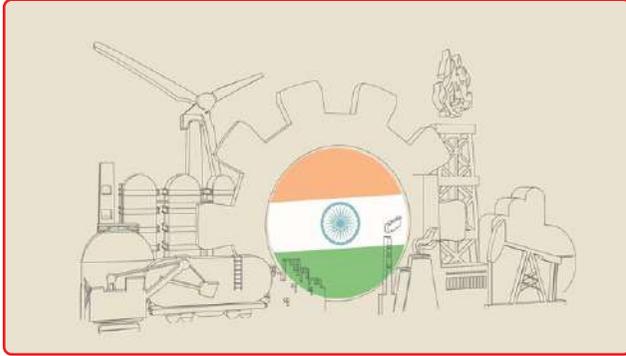
#### Academic Interventions:

- According to the report, the learning gap can be bridged by innovative in-class interventions and engaging students in activities.
- One of the ways to do this is through foundational literacy and numeracy (FLN), which involves skills and strategies focusing on reading, speaking, writing and interpreting a student's thoughts and numeracy is the ability to reason and to apply simple numerical concepts.
- The report also suggests innovations in teacher assessment to improve instructional design. This includes certification of the teaching staff based on unbiased assessments and rewards and incentives to keep teachers motivated.

#### Governance and Accountability Interventions:

- The suggestions include building a strong management information system (MIS) for data-driven decision-making in schools and administrative offices.
- Jharkhand has been instrumental in developing a comprehensive integrated education MIS platform called e-Vidya Vahini, which incorporates all the multiple aspects of information gathering, processing, validation in the education department and facilitates data-backed decision-making at state, district, block, and school level.
- The report also suggests driving accountability to ensure systemic outcomes at state, district and block levels.
- It highlights strengthening school management committees (SMC) for improved service delivery.
- The drop-out rate in India, according to the report, stands at 16 percent at the secondary level, with transition rates from primary to upper primary being 93 percent and primary to secondary, 91 percent.
- The role of SMCs includes organising parent-teacher meetings, organising events such as annual day and creating SMC grievance cells.

## THE PRICE OF PERSISTENT FEDERAL FRICTIONS



### Context:

- Disputes between the Centre and States regarding economic policies have a long history in India.
- However, in recent years the frequency and intensity of such disputes have increased and assumed the character of 'persistent frictions' in the federal system.

### Impact on the economy:

- The current context of economic relations between the Centre and States is very different from the 1980s and 1990s.
- Continuing economic reforms since 1991 has led to the relaxation of many controls on investments, giving some room to States, but the autonomy regarding public expenditure policies is not absolute as State governments depend on the Centre for their revenue receipts.
- Several States have recently pushed back as a result of which the 'give and take' equation between the Centre and the States has given way to a more hardened stand by both, leaving little room to negotiate.

### Sites of conflict:

- Apart from issues around resource sharing, there are other areas that have emerged as sites of conflict. These include the homogenisation of social sector policies, functioning of regulatory institutions and the powers of central agencies.
- Ideally bulk of the policies in these spheres should be at the discretion of States, with an apex central body overseeing the process of resource allocation.
- However, the apex bodies have often attempted to increase their influence and push States in directions that are amenable to the Centre.

### Economic consequences:

- The spread of the Centre's span of activities leads to a situation where the Centre starts crowding out the States in terms of investments.

### Case study of PM Gati Shakti:

- The Centre launched the PM Gati Shakti, a digital platform, to incorporate schemes of various Ministries and State governments to achieve integrated planning

and coordinated implementation of infrastructure connectivity projects.

- All States and UTs had to prepare and operationalise a State master plan in line with the national master plan for seamless implementation. However, the flexibility of States in formulating their master plan is curtailed by the centralisation of planning and implementation of the national master plan.
- This leads to underinvestment by States as is evident from the fact that the combined capital expenditure (capex) of the 16 large States, which account for 80% of the country's gross domestic product, on roads and bridges fell to 0.58% of the gross state domestic product.
- At the same time in absolute terms, the centre's capex on roads increased at a compound annual growth rate of 32.3% since 2015-16, whereas the growth in States has just been 11.2%.
- Furthermore, spending has become more concentrated within the three largest States of Uttar Pradesh, Maharashtra and Gujarat, accounting for nearly half of the expenditure by 16 States between 2021-22 and 2023-24.
- Data for 25 States shows that a total of ₹7.49 lakh crore was budgeted for by these States but they spent only ₹5.71 lakh crore which is 76.2% of the total.

### Fiscal competition between the Centre and States:

- In a federal system, fiscal competition manifests between different regions/States. However, in a scenario of frictions with the Centre, State governments will engage in competition with other States and with the Centre. Welfare provisioning is one such area.
- The Centre with enhanced fiscal space has more spending power, while States' revenues, especially non-tax revenues, remain flat as possibilities of raising non-taxes are confined to a smaller sphere due to the direct provisioning of many utilities and services by the Centre.

### Inefficiencies associated with 'parallel policies':

- Federal abrasions lead to either the Centre or the States duplicating the other's policies. The case of pension reforms is one such example of parallel policies developed by the States.
- The National Pension System (NPS) changed the architecture of the pension system in India from a defined benefit scheme to a defined contribution scheme.
- The scheme, mandatory for all central government employees, enlarged its scope and coverage with most of the States joining at different points of time.
- Though States joined the NPS initially, some States have started to roll back to the old pension scheme as the fiscal cost of reverting would be visible only after 2034 when most of the newly joined employees retire.

⇒ The emergence of such parallel schemes is mainly due to the trust deficit prevailing in the federal system, the fiscal costs of which have long run consequences on the economy.

### Inevitable interdependence:

- ⇒ For securing the implementation of many of its laws and policies, the Centre depends on the States, particularly in the concurrent spheres.
- ⇒ The States also entrust their executive functions, with the consent of the Centre, to the government or agencies of the Centre (Article 258A). Such interdependence is inevitable, especially in a large, diverse, developing society and needs to be preserved.

## HARYANA EMPLOYMENT RESERVATION LAW

### LAW ON RESERVATION

<p>▶ <b>Mar 2, 2021</b>   Haryana assembly passes the law providing 75% quota in private sector</p> <p>▶ <b>Nov 6, 2021</b>   Haryana labour department notifies the applicability of the statute</p>	<p>▶ <b>Dec 9, 2021</b>   HC asks Haryana as to why the law should not be stayed</p> <p>▶ <b>Jan 15, 2022</b>   The law came into force in the state</p> <p>▶ <b>Feb 3</b>   HC stays the operation of the law</p>
---	--

“ We will continue to fight for employment opportunities for Haryanvi youth ”

**Dushyant Chautala** | DEPUTY CM HARYANA

Tweeted after the HC order

### Why in news?

- ⇒ The Punjab and Haryana High Court recently quashed a law enacted by the Haryana government in 2021 that guaranteed 75% reservation to locals in private sector jobs in Haryana.
- ⇒ It ruled that the Haryana State Employment of Local Candidates Act, 2020, was unconstitutional and violated fundamental rights.

### What does the reservation law say?

- ⇒ In November 2020, the Haryana Assembly passed the Haryana State Employment of Local Candidates Bill which made it mandatory for employers in the State to reserve 75% of jobs paying a monthly salary of less than ₹30,000 (originally ₹50,000) for local residents of the State.
- ⇒ The Bill received the Governor's assent on March 2, 2021, and came into effect in January 2022. The law is applicable to all private entities in the State including companies, trusts, societies, partnerships, and limited liability partnerships.

### Key features:

- ⇒ It also covers any person employing 10 or more persons for the purpose of manufacturing or providing any service.
- ⇒ A 'local candidate' has been defined under the law as anyone domiciled in Haryana for the past five years. Such candidates will have to mandatorily register themselves on a designated portal in order to avail

benefits and employers have to make recruitments only through this portal.

- ⇒ Companies can seek an exemption if they do not find local candidates of a desired skill or qualification, but this claim can be rejected by government officials if they doubt its legitimacy. Employers found to be violating the Act are liable to a fine between ₹10,000 and ₹2 lakh.

### Why was the law challenged?

- ⇒ Several industry associations challenged the validity of the law on the ground that it violates Article 19 of the Constitution, which guarantees the right to freedom, including to reside and settle in any part of the Indian territory and practise any profession, business or trade.
- ⇒ They also contended that the law was an infringement of Article 14 (equality before the law) and Article 15, which prohibits discrimination on various grounds such as religion, race, caste, sex or place of birth.
- ⇒ The court was also apprised that the reservation creates a wedge between persons domiciled in different States and is contrary to the concept of common citizenship envisaged in the Constitution.

### How has the State defended it?

- ⇒ The State government contended that the law intends to 'protect the right to livelihood of people domiciled in the State', and that the enactment was rooted in the rising unemployment in Haryana.
- ⇒ It was also asserted that the government is empowered to create such reservations under Article 16(4) of the Constitution, which stipulates that the right to equality in public employment does not prevent the State from 'making any provision for the reservation of appointments or posts in favour of any backward class of citizens which, in the opinion of the State, is not adequately represented in the services under the State'.

### Have other States enacted such laws?

- ⇒ States such as Maharashtra, Karnataka, Andhra Pradesh and Madhya Pradesh have enacted laws providing reservations for their local residents in the private sector.
- ⇒ In November 2019, the Andhra Pradesh Assembly passed the Andhra Pradesh Employment of Local Candidates in the Industries/Factories Bill, 2019, reserving three-fourths of jobs for local candidates within three years of the commencement of the Act.
- ⇒ The law was subsequently challenged in the Andhra Pradesh High Court, which opined that 'it may be unconstitutional'. However, the challenge is yet to be heard on its merits.

### Has the Supreme Court intervened?

- ⇒ On February 3, 2022, the High Court passed an interim order staying the law following which a division Bench of the Supreme Court bench set it aside on

the ground that the High Court had not provided 'sufficient reasons' for putting the law on hold.

- The High Court was ordered to expeditiously decide the petition and the Haryana government was also directed to not take any coercive steps against companies for non-compliance until the matter is finally decided upon.

### Why did the High Court quash it?

- The court ruled that the law was unconstitutional to the extent that 'a person's right to carry on occupation, trade, or business' under Article 19(1)(g) of the Constitution was being impaired.
- It also highlighted that the law discriminates against individuals who do not belong to a certain State by 'putting up artificial walls throughout the country'.
- Placing reliance on Article 35 of the Constitution, the court outlined that the provision bars the State legislature from legislating on matters that fall within the purview of Article 16(3) of the Constitution (equality of opportunity in matters of public employment) since only the Parliament can pass laws on such subjects.
- Referring to Section 6 of the Act which requires employers to submit quarterly reports with details of local candidates employed and Section 8, under which officers could call for documents to ensure the law was being implemented, the court said that these restrictions amounted to 'Inspector Raj' that furthered State control over private employers.

## PARLIAMENTARY PANEL SEEKS ROBUST SAFEGUARDS FOR TECHNOLOGY IN LEGAL PROCESS



### Why in news?

- A parliamentary panel, which examined the three proposed criminal laws, has hailed the move to enhance the use of technology in legal proceedings but said the adoption of electronic means for communication and trials should proceed only after the establishment of robust safeguards.
- The Parliamentary Standing Committee on Home Affairs, headed by BJP MP Brij Lal, also said enabling online or electronic FIR registration is a positive step

forward but these should be allowed only through modes specified by the state.

### Background:

- The Bharatiya Nagarik Suraksha Sanhita (BNSS-2023) bill was introduced in the Lok Sabha on August 11 along with the Bharatiya Nyaya Sanhita (BNS-2023) and the Bharatiya Sakshya Adhinyam (BSA-2023) bills.
- The three proposed laws seek to replace the Code of Criminal Procedure Act, 1898, the Indian Penal Code, 1860, and the Indian Evidence Act, 1872, respectively.

### Clause 532:

- According to Clause 532 of the Bharatiya Nagarik Suraksha Sanhita, all trials, inquiries and proceedings under this Code, including
  - summons and warrant, issuance, service and execution thereof;
  - holding of inquiry;
  - examination of complainant and witnesses;
  - trial before a court of session, trial in warrant cases, trial in summons-cases, summary trials and plea bargaining; recording of evidence in inquiries and trials;
  - trials before high courts;
  - all appellate proceedings and such other proceedings,
- May be held in electronic mode, by use of electronic communication or use of audio-video electronic means.

### Concerns: Education Centre

- The committee observed that while the increased utilisation of technology offers numerous advantages, it also creates opportunities for manipulation and misuse.
- The collection and storage of electronic evidence raise concerns about data security and the possibility of unauthorised access or breaches.

### Challenges under Clause 173:

- The panel said allowing any form of electronic communication for FIR registration can create logistical and technical challenges for law enforcement.
- Moreover, it could become difficult to track all the FIRs filed, especially if, for example, sending an SMS to any police officer is considered as providing information within the scope of Clause 173.
- According to Clause 173 of the Bharatiya Nagarik Suraksha Sanhita, "Every information relating to the commission of a cognisable offence, irrespective of the area where the offence is committed may be given orally or by electronic communication.
- As the Sanhita stands out by introducing the formal adoption of audio-visual and electronic means to undertake various processes, the Committee feels that a proviso may be added to Clause 266 to facilitate

the recording of evidence for defence through audio-video electronic mode as well.

- The committee, recommends that an appropriate proviso may be inserted to the clause for facilitating audio-video recording of evidence of defence, after ensuring proper safeguards.

#### Way Forward:

- The committee recommends that the adoption of electronic means for communication and trials should proceed only after the establishment of robust safeguards to ensure the secure usage and authentication of electronically available data.

## INTERNATIONAL RELATIONS

### THE MASSIVE DISPLACEMENT IN CONGO



#### Why in news?

- Recently, the UN International Organization of Migration (IOM) reported that the number of people who have been internally displaced in the Democratic Republic of Congo (DRC) has risen to 6.9 million.
- In the eastern province of North Kivu, nearly a million people have been displaced due to the ongoing conflict with the rebel group, Mouvement du 23 Mars (M23).

#### What is the conflict in the DRC?

- The conflict in the DRC dates back to the 1990s when it went through two civil wars in 1996 and 1998.
- The conflict erupted in the wake of the Rwandan genocide in 1994 where ethnic Hutu extremists killed nearly one million minority ethnic Tutsis and non-extremist Hutus. Since then, the eastern DRC, bordering Rwanda, has been facing insurgency perpetrated by several rebel militant groups.
- According to the UN, besides M23, more than 120 insurgent groups are active in the eastern provinces of North Kivu, South Kivu, Ituri and Tanganyika.
- The resurfacing of the Tutsi-led M23 rebel campaign in November 2021 worsened the security situation in the eastern provinces of DRC. The group carries out frequent attacks and has taken control of several towns.
- In November 2022, a ceasefire was mediated between the DRC and Rwanda; however, it failed after the M23 rebels announced non-compliance.

- The East African Force and the UN peacekeeping force which were deployed to oversee the withdrawal of the rebel groups failed to achieve their objectives. Since January 2023, M23 has been advancing in the region.

#### Who are the major actors?

- The prominent rebel groups besides M23 include the Allied Democratic Forces (ADF) and the Cooperative for Development of the Congo (CODECO).
- ADF, the Uganda-based rebel group, has been operating since mid-1999 in eastern DRC and have pledged their allegiance to the Islamic State in 2019.
- CODECO claims they aim to protect the interests of the ethnic Lendu against the Hemas and the Congo army. Then there is Rwanda who the DRC accuses of supporting the Tutsi-led M23 group.
- In contrast, Rwanda claims the DRC supports the Hutu militias who carried out the Rwandan genocide in 1994 and fled to eastern DRC. Both countries deny the other's allegations.
- In November 2022, the East African Community (EAC) deployed its troops in eastern DRC to stem the violence. The forces were from Kenya, South Sudan, Burundi and Uganda.
- However, since August, widespread protests have been ongoing demanding the withdrawal of the EAC and UN peacekeeping forces.

#### Why has there been displacement?

##### Ethnic intolerance & insurgency:

- Following the Rwandan genocide, around two million Hutu refugees crossed Rwanda into North Kivu and South Kivu provinces of DRC. They organised ethnic militias in DRC fearing prosecution.
- Tensions intensified as Rwandan Tutsis organised militias against the Hutus who fled to the DRC. Subsequently, several ethnic and inter-ethnic groups who felt threatened started organising their militias against each other.
- The multiple rebel groups and several actors fighting in the region have carried out widespread killing, sexual violence and massive human rights atrocities.

##### Political uncertainty & lack of inclusive governance:

- President Felix Tsikedi came to power in 2019 through democratic elections. The country is to hold elections on December 20.
- Meanwhile, the peripheries of DRC are ruled by numerous ethnic chiefdoms which are recognised by the government.
- The grievances of these peripheries are not met inclusively as struggles for representation, power, territory and resources are being ignored.

##### Regional tensions:

- The armed groups have been supported by the governments of Rwanda, Uganda, and Burundi at

various points, acting as proxies for each country's interests in the region.

### Humanitarian crisis:

- In 2023, 1,400 people were killed and over 600 attacks were reported in the region.
- According to the World Food Programme (WFP), the crisis has left more than 1.1 million people in need of food support across North Kivu, Ituri, and South Kivu.

### Feeble international response:

- International actors have failed to make a considerable effort to address the crisis.
- According to organisations such as WFP and the Norwegian Refugee Council, lack of funding is a major challenge in assisting Congolese people facing hunger, starvation and humanitarian crises.

## FIRST INDUS X INVESTORS MEET AHEAD OF 2 PLUS 2 INDO US MINISTERIAL DIALOGUE



### Why in news?

- Innovations for Defence Excellence (iDEX) under the Department of Defence Production, Ministry of Defence and US Department of Defence, organised the maiden INDUS-X Investors Meet recently at New Delhi as a pre-cursor to the 2+2 Indo-US Ministerial Dialogue.
- The INDUS-X Educational Series (Gurukul) was also launched during the event.

### Key Highlights:

- The first-ever INDUS-X Investors Event evinced the interest of the investors in the start-ups and MSMEs operating in the defence sector and the emerging opportunities under the INDUS-X initiative.
- The interactive meet brought all the stakeholders viz Startups/MSMEs, Investors, Incubators, Industry from both sides under one roof to discuss the collaborative agendas and opportunities thereon.
- The event also had focused panel discussions with a select audience of 50 thought leaders, including start-ups, investors, government officials and business leaders from the defence industry.
- The panel discussed on 'Investment Opportunities in the Defence Sector', elaborating upon establishing a sustainable commercial foundation for defence collaboration and co-production.

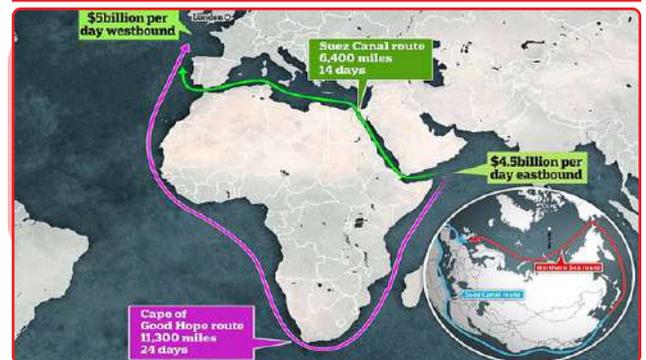
### Gurukul initiative:

- The Gurukul initiative is aimed to help the innovators /startups to navigate in the defence eco-system of the US and India.
- The Gurukul (Education) series will have sessions for the startups/innovators by the experts from both sides including Govt Officials, Corporate Leaders, Industry Forums, Incubators/ Accelerators etc.

### About INDUS-X:

- India - U.S. Defense Acceleration Ecosystem (INDUS-X) was launched in June 2023 during the State Visit of Prime Minister of India to the US to expand strategic technology partnership and defense industrial cooperation between governments, businesses, and academic institutions of India and US.
- INDUS X will be a defence innovation bridge which would inter-alia include Joint Challenges, Joint Innovation Fund, Academia engagement, Industry-startup connect, investment by private entities in defence projects, mentoring by experts, niche technology projects etc.

## AN ALTERNATIVE TO THE SUEZ CANAL



### Why in news?

- It has been speculated that one of the reasons behind Israel's desire to eliminate Hamas from the Gaza Strip and completely control the Palestinian enclave is to give itself the chance to better explore a dramatic economic opportunity that has been talked about for several decades, but for which peace and political stability in the region is an essential prerequisite.

### Ben Gurion Canal Project:

- The Ben Gurion Canal Project, named after Israel's founding father David Ben-Gurion (1886-1973), remains one of the most ambitious infrastructure projects ever planned on paper.
- The idea is to cut a canal through the Israeli-controlled Negev Desert from the tip of the Gulf of Aqaba, to the Eastern Mediterranean coast, thus creating an alternative to the Egyptian-controlled Suez Canal that starts from the western arm of the Red Sea and passes to the southeastern Mediterranean through the northern Sinai peninsula.

- The Ben Gurion Canal Project was first envisioned in the 1960s would, if it were to be actually completed, transform global maritime dynamics by taking away Egypt's monopoly over the shortest route between Europe and Asia.
- However, any attempt to construct the canal would have to overcome gigantic logistical, political, and funding challenges which, in the current situation, makes it seem largely fantastical.

### Suez Canal:

- When it opened in 1869, the Suez Canal revolutionised global maritime trade.
- By connecting the Mediterranean and Red Seas through the Isthmus of Suez, it ensured that ships travelling between Europe and Asia would not have to travel all the way around the continent of Africa.
- The canal cut the distance between London and Bombay (now Mumbai) by a more than 41 per cent.
- In the 2022-23 fiscal year, around 26,000 vessels crossed the Suez Canal, accounting for approximately 13 per cent of global shipping.

### Issues with Suez Canal:

- The 193 km-long, 205 m-wide, and 24 m-deep Suez Canal is the world's biggest shipping bottleneck. Despite being widened and deepened over the years, it remains perennially congested, with long queues at either end.
- In March 2021, the mammoth cargo ship Ever Given got stuck in the canal, blocking passage for more than a week. It was estimated that the resulting "traffic jam" held up an estimated \$ 9.6 billion of goods every day.

### Source of conflict:

- Also, Egypt's control over the waterway has been a source of conflict for almost 70 years now. In 1956, after President Gamal Abdel Nasser (1918-70) decided to nationalise the canal, war broke out, with the UK, France, and Israel attacking Egypt in order to regain control.
- The Suez Crisis ended in a military victory for the aggressors but an overwhelming political victory for Egypt, which kept control over the canal, which was shut for more than six months due to the conflict.
- This was also a pivotal moment in the Cold War, with Soviet threats of intervention key to stopping the allied aggression against Egypt.
- The Suez Canal was also the focal point of both the 1967 and 1973 Arab-Israeli wars, and was shut from 1967-75.

### Economic value:

- The canal is, of course, critical to Egypt's economy. It collects all the toll revenue generated, in addition to the benefits it brings to its local economy.
- In the 2022-23 fiscal year, Egypt's Suez Canal Authority saw toll revenues reach a record \$ 9.4

billion, accounting for nearly 2 per cent of Egypt's GDP of \$ 476.8 billion. Thus, for the West, a shipping lane through Israel would be ideal.

### What has stopped Israel from constructing the canal?

- Such a project would be extremely complex and almost prohibitively expensive. The estimated cost of such a project may be as high as the \$ 100 billion, much more than what it might take to widen the Suez Canal and solve its traffic problem.
- It was the cost of digging such a canal conventionally that made planners look at the nuclear option. Of course, the risk of nuclear fallout makes this option extremely risky as well.
- Costs aside, the planned route of the Ben Gurion Canal is over 100 km longer than the Suez Canal, primarily due to limitations of the terrain and topography. Even if built, many ships might still favour the older, shorter route.

### INDIA, US, 12 OTHER IPEF MEMBERS INK SUPPLY CHAIN RESILIENCE AGREEMENT



### Why in news?

- India, the US and 12 other members of the IPEF grouping have signed a supply chain resilience agreement.
- It would provide benefits like potential shifting of production centres in critical sectors and mitigating risks of economic disruptions from supply chain shocks.

### Details:

- The agreement was signed in San Francisco, during the ministerial meeting of the Indo-Pacific Economic Framework For Prosperity (IPEF).
- The agreement would help member countries like India to reduce its dependence on China.
- The COVID outbreak had severely disrupted the global supply chain, as most countries were dependent on China for various products, like pharma raw materials.
- The benefits of the pact include supply chain diversification, mobilisation of investments, deeper integration of India in global value chains, support

to MSMEs and creation of a seamless regional trade ecosystem, which would facilitate the flow of Indian products.

### Key Highlights:

- Under the agreement, IPEF partners seek to provide a framework to build their collective understanding of significant supply chain risks; improve crisis coordination and response to supply chain disruptions; facilitate cooperation, mobilise investments, promote regulatory transparency in sectors and goods critical to national security and public health and safety.
- The critical sectors would be identified by the member countries.

### Monitoring:

- To implement and monitor the agreement, the bloc would set up the IPEF Supply Chain Council.
- The council will meet every year and all the members would have to report on the progress of implementation of the agreement.
- Besides the council, the bloc would set up the IPEF Supply Chain Crisis Response Network and the IPEF Labor Rights Advisory Board.
- The network would deal with emergency issues and help partners to seek support during a supply chain disruption and to facilitate information sharing and collaboration among IPEF partners during a crisis, enabling a faster and more effective response that minimises negative effects on their economies.
- On the other hand, the advisory board would help members in promoting labour rights in their supply chains.

### About IPEF:

- IPEF was launched jointly by the US and other partner countries of the Indo-Pacific region on May 23, 2022 in Tokyo.
- The framework is structured around four pillars relating to trade, supply chains, clean economy and fair economy (issues like tax and anti-corruption). India has joined all the pillars except the trade one.
- Australia, Brunei Darussalam, Fiji, India, Indonesia, Japan, Republic of Korea, Malaysia, New Zealand, Philippines, Singapore, Thailand, the US and Vietnam are members of the bloc.
- It would come into force after the implementation of the agreement by any of the five member countries.

## RULING AGAINST THE U.K. RWANDA DEAL

### Why in news?

- The government policy of the U.K., of creating a mechanism for the transfer of asylum seekers not considered by the U.K. to Rwanda, has been ruled as unlawful by the U.K. Supreme Court.

### What is the Rwanda deal?

- The Migration and Economic Development Partnership (MEDP) was announced in April 2022 by former Prime Minister Boris Johnson.



- The objective of the deal is to “create a mechanism” for the transfer of asylum seekers not considered by the UK into Rwanda.
- The inadmissibility clause of the UK’s asylum system plays a key role in categorising people who enter the U.K. through “irregular journeys” such as the English Channel.
- According to the Memorandum of Understanding between the two nations, the U.K. will screen asylum seeker applications and arrange for safe transport to Rwanda. On arrival of the refugees, Rwanda is obliged to provide accommodation for every individual and protect them from ill-treatment and refoulement.
- Rwanda will be the sole authority to recognise or not recognise the refugee status of an individual. If an individual is not recognised, they will be moved to their country of origin.

### Why did the U.K. choose Rwanda?

- Rwanda offers three solutions for those sent out by the U.K.:
  - a) It facilitates returning them to their country of origin;
  - b) helps in moving them to a third country; or
  - c) helps them settle in Rwanda with decent housing, access to universal health insurance and the right to work.
- The U.K. will bear the accommodation and transit costs. Rwanda was not the first country to be approached. Former Prime Minister Tony Blair attempted to persuade Tanzania for asylum claims but failed.
- Britain’s colonial history aligns with the current scenario where it used to move particular sections of migrant labour to certain territories.
- The U.K. has, in the past, moved refugees to colonised countries under the guise of development and economic growth. The MEDP arrangement resonates with this colonial scheme of dispersing refugees.

### Why was it ruled unlawful?

- The ruling was based on two major issues:
  - a) The Court of Appeal’s entitlement to intervene in the High Court’s ruling, and
  - b) If the Court of Appeal had looked into the real risk for asylum seekers when moved to Rwanda.

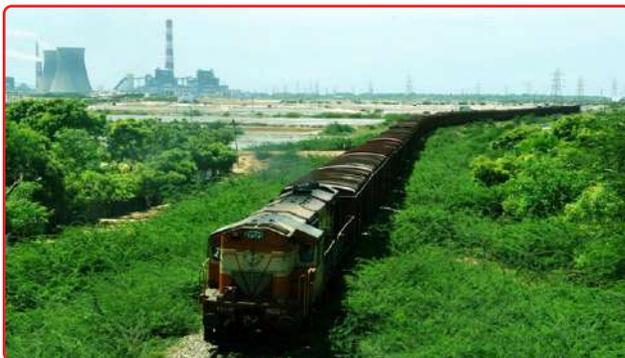
- The Supreme Court found the High Court decision to be "erred," due to its failure to consider the evidence of the risk of refoulement. Under the European Court, it is the U.K.'s responsibility as a removing state to protect the refugee from refoulement and ensure asylum. Instead, the High Court recognised the expertise and promise of Rwanda.
- The Supreme Court found evidence that asylum seekers face a real risk of ill-treatment from refoulement. Rwanda's track record on human rights and its non-compliance with assurances were taken as instances for considering the real risk of refoulement.
- While Rwanda has become a key partner of the U.K., the court highlighted the periods of violence in Rwanda since 1994 and how its human rights record was viewed as critical for the ruling.

### Why are domestic responses mixed?

- The reason behind different perceptions is the uncertainty over the legality of the arrangement and treatment of the refugees in Rwanda.
- The double voluntarism from the U.K. and Rwanda to create a safe transit or guaranteeing rights is impossible.
- The UNHCR clearly states that once a refugee enters a territory via land or sea it becomes the responsibility of the respective country to ensure the safety of the refugee. In this case, the U.K. cannot be relieved from this duty even after the transfer of the refugee to Rwanda.
- While the U.K. government argues over simultaneous investment in refugees and Rwanda's economy for development, the doubts over refoulement and the implications to other EU countries do not seem to end.
- This might trigger other EU nations to consider such deportation schemes leading to a decline in humanitarian standards and creating risks for refugees in third-party countries.

## ECONOMY

### HOW CARGO TRANSPORT CAN BE IMPROVED



#### Context:

- Analysis of the carriage of non-bulk and general cargo by the Indian Railways (IR).

#### Details:

- In 2018-19, before the onset of COVID-19, the IR loaded 62 million tonne (MT) of general cargo consisting of 45 MT of general goods, 12 MT of domestic containers and 5 MT of parcels, earning a total of ₹8,247 crore with the average earnings per tonne being ₹1,339 for goods and ₹3,384 for parcel.
- However, general cargo loading is nowhere near what a Rail India Technical and Economic Service (RITES) study had projected in 2008 for the next ten years, between 194 to 292 MT depending on the IR's efforts.

#### Move for general cargo:

- The IR's current strategy for moving general cargo is two-pronged, the parcels are moved either by passenger trains or special heavy parcel van (VPH) trains.
- However, these approaches appear to have gone haywire as loading leased parcel vans and full parcel trains fell by 15% and 8% respectively.

#### Why VPH parcel trains are proving counterproductive?

- One of the reasons for the decline in the parcel segment is the high tariff; an analysis of 15 origin to destination pairs indicates that both premium (P) scale rates and Rajdhani (R) rates, after adding the first and last mile costs, are higher than truck rates, an exception being cargo moved to destinations in the northeast.
- Other factors are improper terminals, inconsistent weighbridges intensified by excessive penal charges, unreliable transit times, complex booking and delivery mechanisms and self-imposed environmental restrictions.
- A matching covered wagon (more technically a Covered Bogie Wagon Type with Air Brake and Heavy Load (BCNHL)) carries 700% more cargo with 45% more volume.
- Even if the P scale rates are reduced by half, the revenue generated would be 3.5 times that of the VPH rake.

#### Inadequacy of containerization:

- Another great hope for the IR was the expected fillip to general cargo movement by private container train operators (CTOs) through containerisation.
- However, after 15 years of privatisation, domestic cargo moved by containers is a mere 1% of the IR's loading and 0.3% of the total freight in the country. High haulage rates is one of the reasons of such under-performance.
- The problem perhaps also lies in the risk involved in developing the market as it would inevitably involve losses over a period of time. Furthermore, sustaining a developed market is also difficult as predatory pricing by other CTOs can wean the market away.

- The elephant in the room for carriage of general cargo by the IR is that a shipper can either only send a few tonnes under parcel tariff or thousands of tonnes under freight tariff.
- General cargo has thousands of buyers and sellers and usually their shipment sizes are a few to hundreds of tonnes.
- The IR is therefore, not their choice as it has no service to meet their needs. Asking these shippers to book a freight train is akin to asking a passenger travelling by the Rajdhani express to come with a load of passengers before a berth is booked.

### Future Roadmap:

- General cargo is segmented into three categories: highly time sensitive (HTSG), medium time sensitive (MTSG) and low time sensitive (LTSG).
- HTSG cargo is mostly valuable goods or perishables and they should continue to be moved by passenger trains. Attaching two to three parcel vans in all popular trains would easily double the parcel loading capacity and these parcel vans can bring around five times the revenue of sleeper coaches and around two times that of AC coaches.
- MTSG and LTSG cargo are price-sensitive and this cargo should be moved under the IR freight rates, which are lower than truck rates. Even after the addition of first and last leg costs there is a cost-benefit to shippers. However, the problem lies in getting a full train load.
- Shippers should be permitted to book individual wagons with provision to run a train to the schedule even if the train is not fully loaded. The assurance of timely movement would certainly attract shippers to the IR.
- Running such freight trains does not require any change in policy, only change in mindset. Tweaking of freight tariff rules would be required by adding freight of any kind (FAK) for wagon loads to the tariff table. Indents for a single wagon should be encouraged.
- To incentivise volumetric loading, tariff may also be moderated by increasing charges in slabs as per quantity loaded.

### Way Forward:

- Finally, the IR needs to encourage cargo aggregators by tweaking the existing freight forwarder policy. In the long run new kinds of stocks to optimise pay load and speed would also be required which the IR and the rolling stock industry are fully capable to design and deliver.

## UNDERSTANDING WORKER PRODUCTIVITY

### Why in news?

- Infosys founder N.R. Narayana Murthy recently sparked a debate by urging young Indians to work 70 hours per week, citing Japan and Germany as

examples of countries that grew because their citizens worked harder and for longer hours to rebuild their nations in the aftermath of the Second World War.

- He further noted that India's worker productivity is one of the lowest in the world.



### What is worker productivity? Is it the same as labour productivity?

- The only conceptual difference between the two is that the 'work' in worker productivity describes mental activities while the 'work' in labour productivity is mostly associated with manual activities.
- Productivity of an activity is usually measured as the quantum of output value per unit of labour (time) cost at a micro level.
- At a macro level, it is measured in terms of the labour-output ratio or change in Net Domestic Product (NDP) per worker in each sector (where working hours are assumed to be 8 hours per day).
- However, in certain types of services, especially ones involving intellectual labour, measuring the value of the output independently is very difficult, so the income of workers is usually taken as proxies to suggest productivity.

### Productivity attribute of skill:

- Human capital (a more reductionist version of Human Development) including education, training, nutrition, health etc., enhances the ability of labour to become more productive, or churn out greater quantum of value within the same number of working hours.
- Based on this understanding, the reduction in the number of working hours does not hamper the value of output produced, but in turn enhances the leisure and quality of life of workers in real terms, while the value added to the economy could still be increasing, nominal wages remaining the same.

### Is there a direct link between worker productivity and economic growth?

- While an increase in productivity made through any sector is likely to affect the value added and the accumulation or growth in the economy, the relationship between the two could be quite complex.
- In 1980, India's Gross Domestic Product was about \$200 billion, which by 2015 exceeded \$2,000 billion.

However, in terms of the distribution of income across groups in India, Lucas Chancel and Thomas Piketty have shown that during 1980-2015, where the share in the national income of 40% of the middle income group and 50% of the low income group in India had decreased from 48% to 29% and 23% to 14% respectively, the top 10% income groups share had increased from 30% to 58%.

- This effectively means that the income groups in the bottom 50% in India experienced an increase in their income from 1980 to 2015 by 90%, whereas income groups in the top 10% experienced an increase in income by 435%.
- The top 0.01% has had an increase of 1699% percent from 1980 to 2015 and the top 0.001% have had an increase of 2040%.
- The increase in incomes or the prosperity of the richest people is not quite explained by their productivity. On the contrary, this prosperity is either linked to hereditary transfers of wealth upon which the rich are earning yields (he called this patrimonial capitalism) or to the 'super managerial' class who seem to be deciding their own exorbitant pay packages, quite arbitrarily, not related in any way to their productivity.

### Does India have one of the 'lowest worker productivity' in the world?

- As incomes are seen as a proxy for productivity, there is a fallacious inference about productivity of workers in India being low.
- The question as to why over the years, beginning with the 1980s, the share of wages and salaries have declined while the share of profits has increased, perhaps is linked to the informalisation of employment, labour laws and the development and regulation regime becoming unfavourable to workers.
- Kronos Incorporated, a U.S based multi-national workforce management firm, has in fact observed that Indians are among the most hard working employees in the world.
- On the other hand, Picodi.com an international ecommerce platform has observed that India ranks one of the lowest in terms of average wages per month globally.
- Therefore, Mr. Murthy's statement does not seem to be backed by facts. It seems to be part of an effort to push further labour reforms unfavourable to the workers by creating a false narrative.

### Does having a high informal labour pool complicate the calculation of worker productivity and its correlation to GDP?

- Yes. Informal employment in both the unorganised as well as the organised sectors has been on the rise through the course of economic reforms.
- The dubious claim of increased formalisation has been limited only to bringing activities under the tax

net. This has however had no impact on improving labour standards or working conditions.

- Even in the formal manufacturing sector one find an overwhelming presence of Micro-Small-Medium Enterprises (MSME) which are labour intensive. Studies have also found that there is a systematic process of cost cutting through wage cutting in these enterprises.
- However, since high labour productivity combined with low wages fetch high profits, there can be no other explanation, but for exploitation of the workers, for why this segment becomes the preferred mode of investment.
- In fact, large number of large-scale corporations have been found to outsource and sub-contract production to these smaller units, in India as well as globally. This is true with the IT sector as well.

### Are the comparisons of India's economy with those of Japan and Germany economies apt?

- These comparisons don't seem to enable serious analysis. Japan and Germany are neither comparable in terms of the size and quality of labour force nor in terms of the nature of their technological trajectories or their socio-cultural and political structures.
- India presents a unique case and any arbitrary comparison would only lead to dubious analytical inferences and fallacious policy prescripts.
- Enhancing social investments, focusing on exploring domestic consumption potential for increased productivity with a human centric assessment of development achievements is the way to a more sustainable and desirable outcome.

### DOMESTIC SAILING OF THE FIRST INTERNATIONAL CRUISE LINER IN INDIA



#### Why in news?

- Recently, the Union Minister of Ports, Shipping & Waterways flagged off the maiden voyage of the vessel Costa Serena, the first International Cruise Liner in India from Mumbai.

#### Cruise sector:

- India has enhanced its focus on the cruise sector with Ministry of Ports, Shipping and Waterways

(MoPSW) actively promoting cruise tourism for its vast economic positive impact, the potential for job creation, for earning foreign exchange, amongst many other benefits.

- One of the key thrust areas is to develop cruise destinations at tourism places of coastal state and islands.

#### Costa Cruises:

- The launch of Costa Cruises' domestic sailings has been made possible by a series of initiatives taken by the government to promote and revitalize the cruise tourism industry in India.
- Costa cruises, Italy is part of Carnival Corporation, one of the largest cruising conglomerates in the world with reputed cruise brands.
- These measures include guaranteed berths to cruise ships, removal of Ousting charges, Concessional uniform single rate for all Major ports, Volume discounts in cruise tariff up to 30% for domestic cruise ships, waiver of cabotage for foreign cruise vessels, Uniform SOPs for Customs, Immigrations, CISF, Ports, upgradation and modernization of cruise terminals with enhance passenger facilities, etc.

#### Initiatives for River cruise tourism in India:

- One of the most significant steps in this journey taken recently was the conditional IGST exemption to foreign flag foreign going vessel when it converts to coastal run, which substantially reduced the financial burden on foreign cruise operators.
- As a result of these initiatives, from 102 Cruise ship Calls and 84,000 Passengers handled in 2013-14, the tally went up to 227 calls and 4.72 lakh passengers during 2022-23 representing an increase of 223% in cruise calls and 461% in cruise passengers in the last 9 years.
- River cruise tourism has also seen a 180% rise in operations during the last 9 years.

#### Sagarmala Programme:

- Development of cruise tourism and lighthouse tourism are being actively considered under MoPSW's flagship scheme Sagarmala Programme.
- For promoting tourism in maritime states under Sagarmala, projects have been identified in convergence with Ministry of Tourism and tourism development departments of maritime state governments.
- Over a period of the last 9 years Sagarmala Programme has completed 11 Projects worth Rs.267 crores promoting coastal & cruise tourism and Island Development.
- Some of these projects include Cruise Passenger Facilitation Centre at Chennai, Construction of International Cruise Terminal at Cochin and development of Cruise Berthing and Cruise Passenger facilities at Mormugao Port.

#### Maritime India Vision 2030:

- Under the Maritime India Vision 2030, Government envisions to establish India as the premier cruise hub in the Asia Pacific region.
- To achieve this goal, significant steps are being taken, including the development of state-of-the-art cruise terminals, the implementation of standardized procedures, and the introduction of e-visa facilities, among other measures. Going forward, the objective is to increase the annual number of cruise passengers in India to 18 lakhs by 2030, up from the current figure of 4.72 lakhs.

#### Maritime Amritkaal Vision 2047:

- In accordance with the Maritime Amritkaal Vision 2047 launched by the Prime Minister during the recently concluded Global Maritime India Summit 2023 in Mumbai, it is projected that India will have 25 operational cruise terminals by 2047, with an estimated annual passenger count of approximately 5 million cruise passengers per year.
- Government is also planning to launch a well-defined and consistent cruise tourism policy in line with international standards and practices.
- This policy will encompass various critical aspects such as GST, taxation, excise, and custom duties, both at the central and state levels, with the aim of fostering the growth of this emerging industry within India.

#### PMGKAY EXTENDED

##### Extension of Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY-Phase V)

➤ The PMGKAY scheme for Phase V extended from December 2021 till March 2022

➤ Expected total outgo of foodgrains in Phase V is 163 MLT

➤ Would entail an estimated additional food subsidy of Rs. 53344.52 Crore

➤ Will provide food grains at 5 kg per person per month free of cost for all the beneficiaries covered under the NFSA



#### Why in news?

- Prime Minister recently announced the extension of the Pradhan Mantri Garib Kalyan Ann Yojana (PMGKAY) while addressing a rally in Durg, Chhattisgarh.
- At the beginning of 2023, the scheme had been extended for one year, which will end on December 31. He ensured the scheme will continue for another five years.

### What is the Pradhan Mantri Garib Kalyan Ann Yojana (PMGKAY)?

- Pradhan Mantri Garib Ann Yojana (PMGAY), also known as the Pradhan Mantri Garib Kalyan Ann Yojana (PMGKAY), is an initiative through which eligible beneficiaries receive a fixed quantity of food grains, such as rice and wheat, at a nominal price.
- The scheme was launched in April 2020 as a part of the Atmanirbhar Bharat initiative envisioned by PM Modi, aimed to help around 800 million impoverished people.
- Under the PM-GKAY scheme, the government provides 5 kg of free food grains every month to eligible beneficiaries.
- This assistance is in addition to the subsidised ration provided under the National Food Security Act (NFSA), allowing families covered under the Public Distribution System (PDS) to access essential food items at a nominal cost ranging from Rs 1 to Rs 3 per kilogram.

### Pradhan Mantri Garib Kalyan Package (PMGKP) vs PMGKAY

- The Pradhan Mantri Garib Kalyan Package (PMGKP) was introduced in the wake of the Covid-19 pandemic to provide economic relief to the vulnerable sections of society.
- Launched in March 2020, the scheme included various measures such as free food grains, cash transfers, and insurance coverage for healthcare workers, among others, to support those affected by the pandemic and the subsequent lockdown measures.
- The insurance scheme under PMGKP covered Rs 50 lakh per health worker fighting Covid-19. This insurance scheme was further extended by 180 days in April 2022.

### The cost of PMGKAY:

- According to the Ministry of Women and Child Development, between financial years 2020-22, approximately 111.8 million metric tonnes of food grains were allocated, amounting to a planned financial outlay of Rs 3.91 trillion. This covered phases I to VII of the scheme over the span of 28 months.
- As of January 1, 2023, PMGKAY was extended for another year, with an estimated expenditure of Rs 2 trillion, making it one of the largest food security programmes in the world.

### What is the NFSA Act?

- The National Food Security Act 2013, also known as the Right to Food Act, aims to provide subsidised food grains for approximately 67 per cent or two-thirds of India's population.
- It was signed into law on September 12, 2013, retroactive to July 5, 2013, under Prime Minister Manmohan Singh's Congress-led UPA Government.
- The midday meal scheme, Public Distribution System,

and maternity entitlements, among other initiatives, fall under this Act.

### Integrating PMGKAY and NFSA

- In January 2023, the government approved the integration of PM-GKAY benefits with the provisions of the NFSA Act.
- This integration will streamline the delivery of free food grains. It also ensures that families falling under the Antyodaya Ann Yojana (AAY) and priority households (PHH) categories receive free food grains according to their entitlement under NFSA.
- For the financial year 2023-24, the central government has allocated around 60 mt of foodgrain under the NFSA. This includes around 40 mt of rice, 19 mt of wheat, and 1 mt of coarse grains.
- The central issue price (CIP), the rate at which grains are made available to NFSA beneficiaries, is Rs 3 per kg for rice, Rs 2 per kg for wheat, and Rs 1 per kg for coarse cereals.

### Who is eligible for the scheme?

- Families eligible for PM-GKAY include those under the AAY and PHH categories. PHH beneficiaries are identified by state governments and Union territory administrations based on their specific criteria. This ensures that households in most need receive the necessary support.
- AAY families, comprising widows, terminally ill persons, disabled individuals, elderly individuals without means of subsistence or societal support, primitive tribal households, and various vulnerable categories, are also eligible for the scheme.
- To avail of these benefits, eligible individuals need to visit their nearest fair price shop and provide their ration card number or Aadhaar number for authentication. Aadhaar authentication can be done through fingerprints or iris-based identification.

---

## THE AGARTALA-AKHAURA RAIL LINK

---

### Why in news?

- Recently, Indian Prime Minister and his Bangladeshi counterpart virtually inaugurated the rail link between Agartala and Akhaura (in Bangladesh).
- It serves to re-establish connectivity between Bangladesh and India's northeast through Tripura.

### What is the rail link about?

- The 12.24 km long rail line constituting of about 6.78 km dual gauge rail line in Bangladesh and 5.46 km in Tripura, would link the latter to Akhaura in its immediate neighbourhood and thereby, its broader rail network.
- Nischintapur in West Tripura would serve as the international immigration station, that is, provide facilities to process immigration-related scrutiny for passengers.



- Additionally, in September, the Central Board of Indirect Taxes and Customs (CBIC) had declared Nischintapur as a Land Customs Station (LCS). It refers to any notified place meant for the clearance of goods imported or to be exported by land or inland water.
- Other than the international transit, once completely operational, the project would also reduce the travel time between Agartala and Kolkata from about 31 hours at present to 10 hours.
- The existing commute distance between the two cities is 1,581 km and a requires a re-route via Guwahati and Lumding in Assam. This would be curtailed to 460 km.

**Act East Policy:**

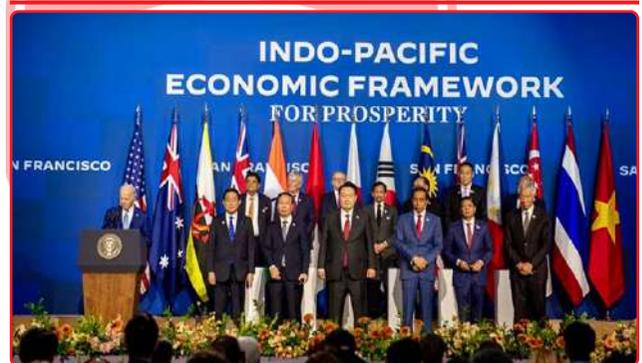
- The project also is in continued adherence to the Central government’s ‘Act East Policy’ and ‘Neighbourhood First Policy’.
- As was pointed out by the Northeast Frontier Railway (NFR) earlier, it would help the growth of small-scale industries in the border area, boost tourism in Northeast India and more importantly, help local producers with quicker import and export of items.

**How many connectivity routes are operational now?**

- As of now, five broad gauge connectivity routes are operational entailing links with Bangladesh – all of them from West Bengal.

- These include Gede railway station (West Bengal) to Darsana (Bangladesh), Benapole to Petrapole (West Bengal), Singhabad (West Bengal) to Rohanpur, Radhikapur (West Bengal) to Birol and Haldibari (West Bengal) to Chilahati. Work is underway to connect Mahihasan railway station in Assam to Shahbazpur in Bangladesh.
- The MoU for the Agartala-Akhaura rail link was signed in 2010 during Ms. Hasina’s visit to India.
- Trade between the two countries have been on a consistent growth trajectory.
- There is an interchange of close to 100 cargo trains per month and approximately 2.66 metric tonnes were sent to Bangladesh in the previous financial year.
- The major commodities of export include stone, food grains, China clay, gypsum, maize, onion and other essential items, as and when required, from India.
- As for people-to-people ties, it is facilitated by three passenger trains, namely, Kolkata-Dhaka Maitree Express, Kolkata-Khulna Bandhan Express and New Jalpaiguri-Dhaka Mitali Express.

**INDO PACIFIC ECONOMIC FRAMEWORK FOR PROSPERITY (IPEF) SUPPLY CHAIN AGREEMENT**



**Why in news?**

- The third Indo-Pacific Economic Framework for Prosperity (IPEF) Ministerial Meeting was held in San Francisco, California recently hosted by the US.

**About IPEF:**

- IPEF was launched jointly by the USA and other partner countries of the Indo-Pacific region on May 23, 2022 at Tokyo.
- IPEF has 14 partner countries including Australia, Brunei, Fiji, India, Indonesia, Japan, Republic of Korea, Malaysia, New Zealand, Philippines, Singapore, Thailand, Vietnam & USA.
- It seeks to strengthen economic engagement among partner countries with the goal of advancing growth, peace and prosperity in the region.

**Pillars:**

- The framework is structured around four pillars relating to

- a) Trade (Pillar I);
  - b) Supply Chains (Pillar II);
  - c) Clean Economy (Pillar III); and
  - d) Fair Economy (Pillar IV).
- ⇒ India had joined Pillars II to IV of IPEF while it has an observer status in Pillar-I.

#### Details:

- ⇒ At this Ministerial Meeting, negotiations under the IPEF Pillar-III (Clean Economy), Pillar IV (Fair Economy) and the Agreement on the Indo-Pacific Economic Framework for Prosperity (which seeks to establish a ministerial-level council and a commission) were substantially concluded.

#### Clean Economy:

- ⇒ Under the Clean Economy (Pillar-III), IPEF partners are aiming to advance cooperation on research, development, commercialization, availability, accessibility, and deployment of clean energy and climate friendly technologies, and facilitate investment towards climate-related projects in the region.
- ⇒ India emphasized the need for increased collaboration among partners on research and development of innovative and affordable climate friendly technologies.
- ⇒ Further, it stressed the need to prioritize implementation of Cooperative work programmes envisaged under this pillar, including hydrogen supply chain initiative and other proposals in the pipeline such as India's proposal for biofuels and e-waste recycling.

#### Fair Economy:

- ⇒ Under the Fair Economy (Pillar-IV), IPEF partners aim to strengthen implementation of effective anti-corruption and tax measures to boost commerce, trade, and investment among IPEF economies.
- ⇒ India highlighted enhancing information sharing among partners, facilitating asset recovery and strengthening cross-border investigations and prosecutions as the key benefits to emerge from the Agreement.
- ⇒ This will strengthen the joint resolve to fight against corruption, money laundering and terror financing.

#### Way Forward:

- ⇒ Following the substantial conclusion of the negotiations on the IPEF Supply Chain Agreement in May 2023, the IPEF Ministers signed the IPEF Supply Chain Agreement during the Ministerial Meeting.

## THE BANGLADESH GARMENT WORKERS UNREST

#### Why in news?

- ⇒ Since October, one of Bangladesh's largest labour forces, the 4.4 million-strong ready-made garment (RMG) sector workers are demanding a trebling of

their legally mandated minimum wages from 8,000 Bangladeshi Taka (BDT), or about \$72, to 23,000 taka (\$208).



#### What is fast fashion's significance to Bangladesh's economy?

- ⇒ Bangladesh is the world's second-largest exporter of fast fashion, or RMG, after China, accounting for 85% of the country's exports earnings of \$55 billion in 2022. It has a global market share of almost 8%.
- ⇒ The RMG sector's main markets are the U.S., the U.K., Europe and Canada, with H&M being the top importer. Other big brands include Levi's and Zara.
- ⇒ The 4,000 odd manufacturing facilities in the RMG sector are largely small and medium enterprises (SMEs), mainly employing rural women, and it has been credited with helping the country's drastic reduction in poverty from 44.2% in 1991 to 5% in 2022 based on the international poverty line of \$2.15 a day (using 2017 Purchasing Power Parity exchange rate).
- ⇒ Rising remittances by a growing emigre population is the other factor contributing to the government's foreign exchange.

#### Why are the RMG sector workers protesting now?

- ⇒ It has been over five years since 2018, when Bangladesh's Minimum Wage Board fixed a rate of BDT 8,000 for fast fashion sector workers.
- ⇒ Unlike a universal base wage, Bangladesh follows a system of setting minimum wages for each sector of the economy, which is revised every five years.
- ⇒ In the past four years, the country has witnessed steep inflation exacerbated by the COVID-19 pandemic, and more recently, the volatility in oil prices fuelled by the Russia-Ukraine war.
- ⇒ The country's apex bank, the Bangladesh Bank, has pegged inflation of a 12-month, monthly average at 9.37% in October 2023, which is a more than 2% point rise from 7.23% in the corresponding period last year. This has priced out essentials like food and fuel for a vast number of Bangladeshis.
- ⇒ Garment worker unions rejected a more than 50% raise in minimum wage proposed by Sheikh Hasina's government earlier, saying it is too little too late. They have stuck to their demand of nothing short of BDT 23,000.

### What role can brand importers play?

- Big brands like Nike have faced intense criticism beginning in the 1990s for being responsible for driving down procurement costs and amassing super profits at the expense of workers' rights in the Global South, as they took advantage of neo-liberalism's 'race to the bottom' approach of finding the cheapest source wherever available.
- These criticisms led to marginal changes, like verifying work conditions, working hours, safety gear, wages and sanitary conditions at global procurement facilities.
- But it did not lead to a meaningful contribution of sharing big brands' profits, or investing in supplier SME's infrastructure, or wages, until recently. This recent shift has been fuelled more so, by the global movement to decarbonise supply chains to tackle climate change.
- The Berlin-based coalition of "19 garment brands and IndustriALL Global Union", called Action, Collaboration, Transformation (ACT) has pledged "supporting a living wage in the RMG sector in Bangladesh through the promotion of the conditions to achieve an industry-wide collective bargaining agreement supported by Brands' purchasing practices"

### What is the relationship between the RMG sector and carbon emissions?

- According to the UN Environment Programme, the fashion industry is responsible for anywhere between 2-8% of global greenhouse gas emissions, making it "one of the largest contributors to the climate and ecological crisis".
- In Bangladesh, the textile and RMG sector combined constitute more than a quarter of the country's total emissions as on 2020, with an average annual growth rate of more than 8% CO2 emissions in the past two decades alone.
- Bangladesh has the maximum number of U.S. Green Building Council certified RMG factories globally. While 202 facilities out of more than 4,000 is a good start, there is still a long way to go to be on track to realise the country's 15% reduction in greenhouse gas emissions by 2030.
- While top global fashion brands recognise these gaps in financing, technology, governance, and the fragility of highly climate vulnerable economies like Bangladesh, their response to the current RMG sector crisis and decarbonising their own supply chains, at best, could be described as wanting.

### What is at stake for Sheikh Hasina?

- The incumbent Prime Minister has been in power since 2008, making her the longest serving female head of state in history; and her government will be tested in the upcoming January 7 polls, where she is seeking a record fourth-term in office.

- It would be no exaggeration to say that this would be one of the biggest tests in her long political career.

### INVESTOR RISK REDUCTION ACCESS PLATFORM



#### Why in news?

- Recently, the Securities and Exchange Board of India (SEBI) launched the Investor Risk Reduction Access (IRRA).
- IRRA has been jointly developed by all the stock exchanges – BSE, NSE, NCDEX, MCX and Metropolitan Stock Exchange of India (MSE).

#### Details:

- The platform will act as a 'safety net' for investors in case of technical glitches faced by a trading member or a stock broker registered with SEBI.
- It will provide investors an opportunity to close open positions and cancel pending orders in case of disruption at the stock brokers' end.

#### What is the IRRA platform?

- IRRA platform has been developed to reduce risks faced by investors in the eventuality of technical glitches at the trading member's end at both the primary site and disaster recovery site.
- Its purpose is to provide investors with an opportunity to square off/close their open positions and cancel pending orders using the IRRA platform in case of technical glitches or unforeseen outages that render the trading member's site inaccessible.
- It has been designed to reduce risks for investors participating in the market. It is not meant for taking fresh positions or orders, but only to cancel the pending orders.

#### Why was there a need for it?

- With increasing dependence on technology in the securities market, there has been a rise in instances of glitches in trading members' systems, some of which lead to disruption of trading services and investor complaints.
- In such instances, investors with open positions are at risk of non-availability of avenues to close their positions, particularly if markets are volatile.

### How will the IRRA platform work?

- IRRA can be invoked by trading members when they are faced with a technical glitch at their end impacting their ability to service clients across exchanges from both – the primary site and disaster recovery site, where relevant.
- Even stock exchanges can also monitor parameters like connectivity, order flow and social media posts, and suo moto initiate the enablement of the IRRA service, if needed, irrespective of any such request by the trading member, according to SEBI.
- This service shall be enabled by the exchanges, suo moto, only in case of disruption of trading services of trading member across all the exchanges, where the trading member is a member
- On invocation, after basic checks, the platform downloads trades of the trading member from all the trading venues and sends SMS/email to investors using internet trading or wireless technology along with a link to access IRRA.

### How will the platform help investors?

- Once the investors are authorized to access the IRRA platform, investors can view and cancel pending orders across all segments and all stock exchanges from the order book, square off/close the open positions across segments and exchanges and cancel the orders across segments which are pending at the exchanges.
- IRRA is not available for algo trading and Institutional clients. Securities available for trading and settlement on a Trade-for-Trade basis will not be available for square-off, as per the Frequently Asked Questions (FAQ) available on the BSE's website.

## E-COMMERCE CARGO MOVEMENT SETS COURSE FOR GANGA (NW 1) AS IWAI AND AMAZON SIGNS MOU



### Why in news?

- Recently, a Memorandum of Understanding (MoU) was signed between Inland Waterways Authority of India (IWAI) and Amazon Seller Services Private Limited (Amazon) for promoting cargo movement and transportation of customer shipments & products

via inland waterways using river Ganga (National Waterway 1).

### Significance:

- This partnership seeks to harness the efficiency and sustainability of water transport to optimize logistics, diminish environmental footprints, and promote economic development.
- According to a World Bank Report, rail and road transport consume 18.5% and 91.6% more fuel than water transport, making it the most environmentally friendly mode of transportation.

### Enhancing inland waterways:

- The collaboration between Amazon India and IWAI is another step towards realizing the Prime Minister's Maritime Amrit Kaal Vision 2047 of enhancing inland waterways as an affordable and sustainable mode of transportation and promoting cargo movement and transportation of customer shipments/products through Inland Water Transport using National Waterway-1.
- The Amrit Kaal Vision 2047 was launched by the Prime Minister of India during Global Maritime India Summit 2023 on 17th October 2023 at Mumbai.
- To accelerate water transport within the country Sagarmala has embarked upon 113 projects worth Rs. 7,030 Crores related to RoRo/RoPax and Inland Water Transport. Out of these projects 15 projects worth Rs. 1,100 Crores have been completed and 32 projects worth Rs. 3,900 crores are under implementation.

### Prospects for Amazon:

- Amazon will be able to utilize all possible modes of transport in the country, including Rail, Air, Water, and Surface, to ensure faster, cost-effective, sustainable and more reliable delivery of customer packages and provide a wider reach to its millions of sellers.
- This partnership will not only benefit Amazon by lowering their transportation cost but also open up new possibilities for all e-commerce companies to leverage the extensive inland waterways in India.

### Key Highlights:

- Upto 2023, the cargo handled by the Inland Waterways is 126 MMT and as per the Maritime India Vision 2030, launched during the Maritime India Summit 2021, Ministry aims to increase inland water transport volumes by more than 200 MMT by 2030 and to achieve a target of more than 500 MMT by 2047.
- The plan also includes increasing the number of operational waterways to 23 by 2030, in which 24 waterways are already operational till date which is planned to be increased to more than 50 by 2047 as per the Vision Document.
- This mode is anticipated to become regular with shipments from other e-commerce platforms as well through the Inland Waterways Transport (IWT) mode.

**Way Forward:**

- Collaboratively, IWAI and Amazon are poised to explore and implement state-of-the-art solutions, addressing the evolving needs of the e-commerce industry and contributing to a greener and more resilient logistics ecosystem.

**SECURITY****PROJECT KUSHA****Why in news?**

- India is taking steps to develop its own long-range air defence system, similar to the Iron Dome.
- This ambitious venture, named Project Kusha, aims to equip India with a robust air defence system capable of detecting and neutralising incoming threats.
- The Defense Research and Development Organisation (DRDO) in India is spearheading this project, which is scheduled for deployment by 2028-2029.

**Project Kusha:**

- At the heart of 'Project Kusha' is the development of India's very own Long-Range Surface-to-Air Missiles (LR-SAM) that, is comparable to Russia's S-400 Triumf air defence system.
- Jointly developed with Israel Aerospace Industries, Israel's major aerospace and aviation manufacturers, Kusha was greenlit by the Cabinet Committee for Security in May 2022.
- It was accorded Acceptance of Necessity (AoN), the first step toward procurement of any military equipment and hardware by the Defence Ministry for procuring five of its squadrons for the IAF for Rs 21,700 crore.

**Key features of indigenous LR-SAM system:**

- The mobile LR-SAM, with its long-range surveillance and fire control radars would have different types of interceptor missiles designed to hit hostile targets at 150 km, 250 km, and 350 km ranges.
- Meant to provide comprehensive air defence cover to strategic and tactical vulnerable areas, the system can take out "fighter-sized" targets at a range of up to 250 km and larger aircraft at 350 km.

- It is also capable of "reliable area air defence" with a single-shot kill probability of not less than 80 percent for a single missile launch and not less than 90 percent for salvo launch.
- The S400 can take down long, medium, and short-range threats, Project Kusha aims at the development of only long-range air defence.

**IACCS:**

- The LR-SAM system will be also made capable of interacting with an integrated command and control system (IACCS).
- The IACCS is an automated air defence command and control centre that the Indian Air Force uses for controlling and monitoring air operations.

**Other projects:**

- But LR-SAM isn't the only project India is developing with Israel.
- India's Kalyani Strategic Systems has already entered a joint venture with Israel's Rafael Advanced Systems Ltd for indigenous production of MRSAM, some of which have already been procured by the IAF.
- The IAF has already inducted some Medium-Range Surface to Air Missile (MRSAM).

**Defence against regional threats:**

- One of the primary security concerns for India is its neighbouring countries, particularly China.
- China is reported to have deployed several missile batteries across the Indo-Tibetan border, known as the Line of Actual Control (LAC).
- The ability of China to launch missiles at India and force the Indian Air Force to invest substantial time and resources in neutralising these threats stresses on the need for high-tech and precision-guided air defence systems.

**INDIA TO BRING IN A NATIONAL SECURITY STRATEGY****Why in news?**

- After years of deliberations in the military and strategic community, India has kickstarted the process of bringing in a National Security Strategy.
- The National Security Council Secretariat (NSCS) is in the process of collating inputs from several Central

ministries and departments to stitch together the draft of the strategy before seeking the final cabinet approval for it.

### What is a National Security Strategy?

- ⇒ A National Security Strategy document outlines the country's security objectives, and the ways to be adopted to achieve these.
- ⇒ Updated periodically, it defines traditional, non-traditional threats and opportunities while introducing accountability of agencies tasked with the implementation of such responsibilities.
- ⇒ A national security strategy would guide the military as well as critical defence and security reforms with strategic implications, providing a holistic view of the overall national security, the threats and the roadmap to address them.
- ⇒ The exact contours of the strategy being drafted is not known, but it will likely include the entire range of newer challenges and modern threats facing India, including non-traditional ones such as financial and economic security, food and energy security, information warfare, vulnerabilities in India's critical information infrastructure, as well as those associated with supply chains and environment.

### Which countries have a National Security Strategy?

- ⇒ Most developed countries with an advanced military and security infrastructure have a National Security Strategy in place, updated from time to time. The US, the UK and Russia have published national security strategies.
- ⇒ China also has such a strategy in place, called the Comprehensive National Security, which is closely tied to its governance structure.
- ⇒ Pakistan, too, has brought out a National Security Policy 2022-2026, underlining its national security objectives and priority areas.

### Need for a National Security Strategy:

- ⇒ A National Security Strategy for India has figured multiple times in military discourses and has long been discussed in the strategic community, but has failed to see the light of day despite three past attempts.
- ⇒ The complex nature of the various traditional and non-traditional threats, especially when rising geopolitical tensions have given way to uncertainties, urgency was felt to draft a national security strategy.
- ⇒ Only political direction to the Armed Forces in existence is Raksha Mantri's operational Directive of 2009.
- ⇒ Some experts have highlighted that major military reforms should ideally flow from a national security strategy.

### Why did India never have a national security strategy?

- ⇒ There have been varying views in the strategic community in the past over why India has not brought out a national security strategy—from lack of a cohesive, whole-of-government effort, to the government deliberately not making public its national security objectives.

## ENVIRONMENT

### BRAZZAVILLE SUMMIT OF THE THREE BASINS ENDS WITH A DECLARATION



#### Why in news?

- ⇒ The Summit of the Three Basins recently concluded with the declaration by the Heads of State and Government of the States.

#### Details:

- ⇒ The three-day meeting in Brazzaville, capital of the Republic of Congo, was attended by more than 3,000 delegates from countries in the three basins of the Amazon, Congo and Borneo-Mekong-Southeast Asia.
- ⇒ In the declaration, the delegates acknowledged that the three ecosystems of biodiversity and tropical forests provide ecosystem services that are very important for humankind and for the sustainable development of the societies that live there.
- ⇒ The delegates hope to ensure that tropical forests, which cover a third of the world's land surface, are protected in the future.

#### The seven-point declaration urged nations to:

- a) Recognise the value of enhanced cooperation between the three basins
- b) Recognise that sovereign management of biodiversity, forests and associated resources of the three basins is essential
- c) Develop solutions together
- d) Pool and capitalise on existing knowledge, experience, resources and achievements
- e) Involve all states and national authorities, including indigenous peoples, youth, women, civil society, academia and the private sector
- f) Encourage financial mobilisation and the development of traditional and innovative financing mechanisms

g) Establish a sustainable system of remuneration for the ecosystem services provided by the three basins

**Financial aspect:**

- The delegates said that there is a need to create a fund to address loss and damage due to climate change. In the declaration, the leaders urged developed countries to meet their commitments.
- These include the \$200 billion per year by 2030, as set out in the Kunming-Montreal Global Biodiversity Framework, and \$100 billion per year in climate finance as new, additional, predictable and adequate resources to developing countries.

**Concerns:**

- The declaration acknowledged the importance of protected areas. These basins are responsible for around three-quarters of all global biodiversity and 80 per cent of the world’s forest cover.
- Despite pledges by governments and businesses, a total of 4.1 million hectares of tropical forest was lost to deforestation in 2022.
- The vast majority of deforestation in the world—96 per cent— occurs in tropical regions.

**Way Forward:**

- Going forward, it will be important to have more robust representation and high-level leadership from all three regions and a more structured discussion on topics such as how to collectively tackle drivers of deforestation, promote restoration and sustainable forest management.

**Key Highlights:**

- Domestic budgets seem to be the largest source of funding for adaptation in many developing countries. They shell out between 0.2 per cent to over 5 per cent of their government budgets.
- Neither domestic nor private funding sources could help bridge the adaptation finance gaps, especially in low-income countries including Least Developing Countries and Small Island Developing Nations.
- Moreover, 85 per cent of countries have at least one national-level adaptation planning instrument such as a policy, strategy, or plan in place to cope with climate change.
- The current global adaptation finance gap (difference between needs and actual financial flows) is \$194-366 billion per year.

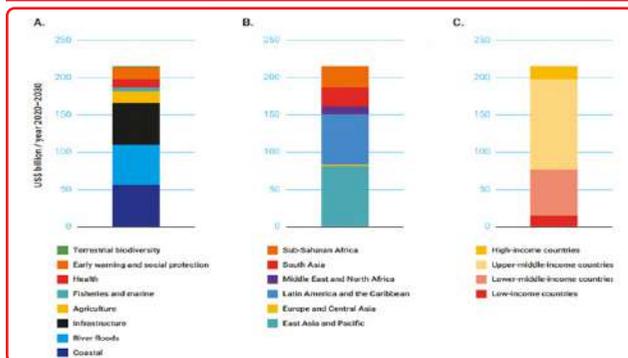
**Need of developing countries:**

- The finance needs of developing countries are now 10-18 times as big as international public finance flows.

**Source: Adaptation Gap Report 2023, UNEP**

- For developing countries, the total cost of adaptation amounts to \$215 billion per year. The cost of adaptation is the amount needed for planning, preparing for, facilitating and implementing measures to reduce harm or exploit beneficial opportunities arising from climate change.
- Adaptation measures such as river flood protection, infrastructure and coastal protection demand the highest adaptation costs in regions of East Asia and the Pacific as well as Latin America and the Caribbean.

**ADAPTATION GAP REPORT 2023**



**Why in news?**

- Climate adaptation finance flows from public multilateral (like the World Bank) and bilateral sources (from a developed to a developing nation) declined by 15 per cent to around \$21 billion in 2021, according to the 2023 Adaptation Gap Report.
- This dip, according to the United Nations Environment Programme (UNEP), is despite pledges that were made at the 26th Conference of Parties to the United Nations Framework Convention on Climate Change in Glasgow to double 2019 adaptation finance support to around \$40 billion per year by 2025.

**Modelled adaptation costs:**

- Though absolute costs in upper and lower-middle-income countries are much higher, adaptation costs expressed as a percentage of Gross Domestic Product are much greater for low-income countries (3.5 per cent of GDP) compared to lower-middle (0.7 per cent) and upper-middle (0.5 per cent).
- Modelled adaptation costs for Least Developing Countries and Small Island Developed nations are estimated at \$25 billion per year (2 per cent of GDP) and \$4.7 billion per year (0.7 per cent of GDP), respectively.

**Way Forward:**

- With extreme weather events battering countries across the world, adaptation financing is the need of the hour.
- Studies have estimated that every billion invested in adaptation against coastal flooding leads to a \$14 billion reduction in economic damages.
- Similarly, when \$16 billion per year is pumped into agriculture, the world can bring 78 million people from starvation or chronic hunger because of climate impacts.

## ENVIRONMENTAL FACTORS DETERMINE HEIGHT OF CHILDREN

### Why in news?

- ⇒ The scientists have discovered that environmental factors play a greater role than genetic variants in determining the height of children in low- and middle-income countries (LMICs) in contrast to those from European nations, where genetic aspects predominate in regulating childhood height.
- ⇒ This was expounded in a study carried out by the Hyderabad-based Centre for Cellular and Molecular Biology (CSIR-CCMB) along with several other national and international institutions.



### Epigenetic factors:

- ⇒ While human height is strongly influenced by fixed genetic and variable environmental factors, the contribution of modifiable epigenetic factors is under-explored.
- ⇒ Epigenetic factors are external influences, including lifestyle, nutrition and environment that affect the way genes work. Epigenetic changes affect gene regulation and alter gene expression but not the DNA sequence.
- ⇒ Many environmental factors, including socio-economic status, nutrition and infection load are believed to influence childhood growth which plays a critical role in determining one's height.
- ⇒ The World Health Organization, 2021 estimates indicated that a large proportion of stunted children reside in LMIC, particularly in South Asia and sub-Saharan Africa where undernutrition and associated co-morbidities are more prevalent compared to high income countries (HICs).
- ⇒ This offers a potential explanation for the disparity in height variation attributed to non-genetic factors between LMIC and high-income countries".

### Genome-wide association:

- ⇒ Although the impact of environmental exposure during early childhood is believed to be quite significant with long-term consequences, there are no genome-wide epigenetic investigations on height in childhood especially in low and middle income countries.

- ⇒ Epigenetic processes such as DNA methylation and histone modifications can influence gene expression. Methylation basically is chemical modification of DNA molecule used by cells to regulate gene expression.
- ⇒ It can be influenced by environmental factors such as diet, drugs, stress, exposure to chemicals and toxins.

### Highlights of the study:

- ⇒ In this study, the scientists did an epigenome-wide association analysis and genome-wide association study to independently investigate links between DNA methylation and genetic variants with childhood height in five cohorts—three from India, one from Gambia and another one from the U.K.
- ⇒ The scientists found a novel, robust association between methylation in the SOCS3 gene and height in children from low and middle income countries which was replicated in the HIC cohort but with a lower effect size.
- ⇒ The study provides strong evidence of genome-wide DNA methylation associations with height in children from LMIC.
- ⇒ The established 12,000 genetic variants were also associated with height in Indians but their effect was lower compared to the European and American counterparts.

### Outcome:

- ⇒ The genetic risk variations are similar for Europeans and Indians, although the magnitude differs between the two ancestries. However, the genetic risk appears to have been modified due to environmental factors in children in LMIC.
- ⇒ The environmental cues that trigger the epigenetic processes in children in low and middle income countries are different in Indians and thus not influencing the epigenetic regulation of height in Europeans.

## WHERE DO DOMESTICATED SILKWORM COCOONS GET THEIR WILD COLOURS FROM?



### Context:

- ⇒ Silk, the queen of fibres, is drawn or reeled from cocoons of the silk moth (*Bombyx mori*). Humans

domesticated it more than 5,000 years ago in China, from the wild moth (*Bombyx mandarina*).

- The ancestral moth is today found in China, the Korean Peninsula, Japan, and far eastern Russia, whereas the domesticated moth is reared all over the world, including in India.
- In fact, India is the world's second largest producer of raw silk after China.

### Silkworms:

- Caterpillars, also known as silkworms, of both these species feed exclusively on leaves of mulberry plants (genus *Morus*).
- The domesticated moth is much larger than its wild progenitor, and thus extrudes a longer silk fibre to build its larger cocoon, up to 900 metres long. But it depends wholly on human care for its survival and reproduction.
- Since having been domesticated, it has lost the ability to fly, and since its need for camouflage no longer exists, it has also lost its caterpillar and adult-stage pigmentation.

### Wild silk:

- 'Wild' silks which include the muga, tasar, and eri silks are obtained from other moth species: namely, *Antheraea assama*, *Antheraea mylitta*, and *Samia cynthia ricini*.
- These moths survive relatively independently of human care, and their caterpillars forage on a wider variety of trees.
- Non-mulberry silks comprise about 30% of all silk produced in India. These silks have shorter, coarser, and harder threads compared to the long, fine, and smooth threads of the mulberry silks.
- The ancestral mulberry moth makes (boringly uniform) brown-yellow cocoons.

### Colours in domesticated silk moth:

- In contrast, domesticated silk moth cocoons come in an eye-catching palette of yellow-red, gold, flesh, pink, pale green, deep green or white.
- Human handlers selected the differently coloured cocoons whenever they emerged, possibly in the hope of breeding for coloured silks.
- But they were disappointed: the pigments that coloured the cocoons are water-soluble, so they gradually fade away. The coloured silks seen in the market are instead produced by using acid dyes.

### Carotenoids and flavonoids:

- The cocoon's pigments are derived from chemical compounds called carotenoids and flavonoids, which are made by the mulberry leaves.
- Silkworms feed voraciously on the leaves, absorb the chemicals in their midgut, transport them via the hemolymph, arthropods' analogue of blood to the silk glands, where they are taken up and bound to the silk protein.

- Mature caterpillars then spin out the silk proteins and associated pigment into a single fibre. The caterpillar wraps the fibre around itself to build the cocoon.

### Mutant strains:

- The differently coloured cocoons arise from mutations in genes responsible for the uptake, transport, and modification of carotenoids and flavonoids.
- The mutant strains have become a valuable resource for scientists to study the molecular basis of how, in a relatively short span of 5,000 years, artificial selection generated such spectacular diversity.
- The researchers in Southwest University in Chongqing, China, proposed a model to explain how different combinations of mutations give rise to the different colours of the cocoons.
- They found that the formation of a yellow-red cocoon requires the Y gene, which encodes a protein that transports the carotenoids from midgut to the silk glands.
- Other genes (C, F, Rc, and Pk) encode proteins that selectively absorb specific carotenoids. Mutations in one or more of these genes produce the yellow, flesh-coloured, rusty, and pink cocoons. If the Y gene is mutated, the flavonoids are absorbed but the carotenoids are not, resulting in green cocoons.
- Further, whether the green is dark or light depends on whether genes for other proteins that enhance flavonoid uptake are normal or mutated.
- If both carotenoids and flavonoids are not taken up, the cocoons remain white. The researchers showed that a cluster of five closely related genes was responsible for the uptake of flavonoids.

### Hybrid moths:

- Domesticated and ancestral mulberry silk moths can be interbred to produce hybrid offspring. Earlier researchers created such hybrid moths and then specifically mutated either their *B. mori*- or *B. mandarina*-derived copy of a gene called *apontic-like*.
- The hybrid caterpillars, like their wild parent, made the pigment called melanin. But when the *B. mandarina*-derived copy of *apontic-like* was mutated, the hybrid failed to make melanin.
- The implication was that the domesticated silkworm's *apontic-like* gene had lost the ability to support melanin production.
- Both versions of the *apontic-like* gene make the same protein. Therefore, the difference between them was attributable to differences in sequences that regulate when and where the gene was turned 'on' or 'off'.

### Way Forward:

- Silk is an acme of domestication, comparable in its success to basmati rice, alphonso mangoes, and the golden retriever.
- Today, the tools are at hand for scientists to make and compare genetically identical hybrid silk moths that differ only in which of a gene's two parental versions is inactivated: domesticated or ancestral.

## DEFORESTATION IN MARITIME CONTINENT MAY MAKE EL NINO EVENTS MORE COMPLEX AND HARDER TO PREDICT



### Why in news?

- Deforestation in the Maritime Continent (MC) can strengthen subtropical El Nino-Southern Oscillation (ENSO) dynamics, causing more Central Pacific and multi-year ENSOs, according to a new climate modelling study.
- The archipelagos of Indonesia, Borneo, New Guinea, the Philippine Islands, the Malay Peninsula and the surrounding seas are part of the MC region.

### How deforestation alters ENSO?

- Deforestation in the region has the potential to alter ENSO's complexity, making El Nino more complex and less predictable.
- ENSO is an important climate phenomenon on Earth due to its ability to change the global atmospheric circulation, which in turn influences temperature and precipitation across the globe.
- Logging trees is a common land-use change, especially in tropical regions like the MC. However, deforestation reduces evapotranspiration and alters surface albedo, which measures how much sunlight the Earth's surface reflects.
- As surface albedo warms the ambient environment, this further impacts land-atmosphere-ocean interactions to modify the local climate.
- These local effects have the ability to affect land-atmosphere interactions, such as the land-sea breeze.

### Basis of research:

- Researchers used the community Earth system model to simulate hypothetical future deforestation over 100 years, converting native broadleaf evergreen and deciduous trees to warm-season grasses.
- When compared to control experiments, the deforestation model increased the occurrence of the Central Pacific and multi-year types of ENSO.
- This change in the complexity of the climate phenomenon can be attributed to the MC's intensification of subtropical ENSO dynamics.

### More complex El Nino:

- The likelihood of Central Pacific type El Nino events occurring increased by 11.7 per cent as a result of deforestation compared to background levels in the models, while La Nina events were exacerbated by 14.6 per cent in the same simulations.
- Further, if deforestation continues, more multi-year La Nina events are likely to occur in the coming decades. Simulations suggest a 13.8 per cent increase in La Nina events. Multi-year El Nino events may increase from 40.2-44.7 per cent after deforestation.
- A study has found that five out of six La Nina events since 1998 have lasted two to three years. Ten multi-year La Nina events over the past century had an accelerated trend, with eight of these occurring after 1970.
- The two types of multiyear La Nina events over this time period followed either a super El Nino or a central Pacific El Nino.

### Global carbon stack:

- The United Nations' Food and Agriculture Organization (FAO) estimated that around 420 million hectares (ha) of forest were lost between 1990 and 2020. Even though the rate of deforestation has declined, it was still 10 million ha per year in 2015-2020.
- Forests contain 662 billion tonnes of carbon, which is more than half the global carbon stock in soils and vegetation.
- Despite a continued reduction in area, forests absorbed more carbon than they emitted in 2011-2020 due to reforestation, improved forest management and other factors, stated State of the World's Forests 2022 by FAO.

## AUSTRALIA'S OFFER OF CLIMATE MIGRATION TO TUVALU RESIDENTS



### Context:

- Australia's recent Pacific Engagement Visa enabled up to 3,000 workers and their families from the Pacific and Timor-Leste to migrate permanently to Australia each year.
- In addition, the announcement of an Australia-Tuvalu Falepili Union Treaty is groundbreaking.

⇒ Under this deal, Australia will provide migration pathways for people from Tuvalu facing the existential threat of climate change. It is the world's first bilateral agreement on climate mobility.

### How the new visa program will work?

- ⇒ Based on the principles of “neighbourliness, care and mutual respect”, the treaty is a result of a request by Tuvalu for Australia to support and assist its efforts on climate change, security and human mobility.
- ⇒ Under the treaty, Australia will implement a special visa arrangement to allow Tuvaluans to work, study and live in Australia.
- ⇒ This is not a refugee visa, but rather will allow up to 280 Tuvaluans (from a population of around 11,200) to migrate to Australia each year, presumably on a permanent basis.
- ⇒ They will be able to access Australian education, healthcare and income and family support on arrival. This is a welcome development that will provide people with both legal and psychological security.

### How novel is the new treaty?

- ⇒ While there are other programs in the Pacific that facilitate mobility, this is the first to do so specifically in the context of climate change. It also operates differently from arrangements implemented by New Zealand and the United States.
- ⇒ As part of the “realm” of New Zealand, for instance, people from the countries of Niue, Tokelau and Cook Islands are considered New Zealand citizens, so they have the right to move there if they wish.
- ⇒ New Zealand has also long had its “Pacific Access” visa category and the Samoa quota resident visa, which together enable around 2,400 people to move from the Pacific to New Zealand on a permanent basis each year.
- ⇒ The United States has compacts of free association with the Marshall Islands, Federated States of Micronesia and Palau, which enable eligible citizens to enter the US visa-free and live and work there indefinitely. However, those migrants do not have access to many government benefits and can easily fall through the cracks.
- ⇒ In 2022, Argentina announced a special humanitarian visa program for people displaced from 23 countries in Latin America and the Caribbean due to disasters.
- ⇒ Unlike the Australia–Tuvalu treaty, which allows for migration in anticipation of climate-related disasters, access to the Argentinian program is only available after displacement has occurred. As yet, no one has used the scheme.

### What's next?

- ⇒ Earlier, Pacific Leaders endorsed a world-first Pacific framework on climate mobility, which has gone relatively unnoticed, despite the Australia–Tuvalu announcement.

- ⇒ Samoan Prime Minister Fiame Naomi Mata'afa suggested the Pacific could create a European Union-like entity, “based on cooperation and integration”, that would enable free movement across the region.
- ⇒ If enacted, it would follow a similar agreement signed by leaders in eastern Africa that specifically allows people in that region to cross borders in anticipation of or in response to disasters.
- ⇒ Though this is still a long way off in the Pacific, the agreement between Australia and Tuvalu could help pave the way for similar mobility pathways across the region and a broader regional scheme.

## SAND AND DUST STORMS ARE INCREASING, HUMAN ACTIVITIES CONTRIBUTE 25 PERCENT EMISSIONS, UNCCD



### Why in news?

- ⇒ Human activities contribute 25 per cent of global dust emissions, with agriculture being the main anthropogenic source, according to the United Nations Convention to Combat Desertification (UNCCD).
- ⇒ UNCCD, which is one of three Conventions that originated at the 1992 Earth Summit in Rio de Janeiro, released policy recommendations during a five-day meeting in Uzbekistan.

### Why it matters?

- ⇒ Every year, more than two billion tonnes of sand and dust travel over thousands of kilometres through the Earth's atmosphere.
- ⇒ Sand and dust storms are a meteorological phenomenon characterised by strong and turbulent winds lifting an ensemble of small particles to great heights. They are known to have adverse impacts on human health, the environment and economies.
- ⇒ Sand and dust storms present a formidable challenge to achieving 11 of the 17 Sustainable Development Goals.

### Sources:

- ⇒ The main sources of sand and dust storms are the world's drylands. About 75 per cent of emissions come from natural sources such as hyper-arid regions, topographic depressions in arid areas and dry ancient lake beds with little vegetative cover.

- ⇒ Anthropogenic factors such as land-use change, agriculture, water diversion and deforestation contribute to the remaining 25 per cent.
- ⇒ Abandoned cropland, for instance, are a source of sand and dust storms. Further, water consumption in agriculture shrinks water bodies, creating new sources of sand and dust storms.
- ⇒ For example, the excessive diversion of water from rivers in Central Asia over several decades towards agriculture has shrunk the Aral Sea, a pre-existing lake between Kazakhstan to its north and Uzbekistan to its south. It has now become the Aralkum Desert, a significant new source of sand and dust storms.
- ⇒ Climate change, too, plays a role. Extreme wind events, aridity and frequent, severe and longer droughts worsen the storms.
- ⇒ Other factors such as high air temperature, minimal precipitation and strong winds also act as drivers.

#### Impacts:

- ⇒ Sand and dust storms lower the yields and productivity of crops, trees, pastures, and livestock. However, many of these impacts have not yet been well-quantified.
- ⇒ For instance, a sand and dust storm that lasted for two days in mid-March 2021 affected an estimated 8,000 people in 2,000 households across 14 of Mongolia's 21 provinces. Further, 10 people lost their lives and 1.6 million livestock were reported missing.
- ⇒ Also, there is no policy to address the risks posed by sand and dust storms.

#### Way Forward:

- ⇒ The FAO calls for the establishment of risk monitoring and early warning systems. This will enable the timely issuing of alerts and early warnings.
- ⇒ It also recommended the strengthening of risk governance of sand and dust storms and increased investment and financing in sand and dust storm risk reduction and impact mitigation measures in agriculture along with developing national capacity and raising awareness of sand and dust storms.

### COAL ISN'T EASY TO EXCLUDE FROM SUSTAINABLE DEVELOPMENT



#### Context:

- ⇒ Fossil fuels produce 80% of the total energy supplied worldwide. In 2022, oil, coal, and gas accounted for 30%, 27%, and 23% of the world's total energy, while solar and wind energy sources together contributed only 2.4%.
- ⇒ The per capita energy supplied in India in 2022 was 37% of the global average, and only 26% of that of China. Therefore, India's energy needs will continue to grow.

#### Dependence on coal in India:

- ⇒ Only 11.5% of the electricity generated in India is produced by variable renewable energy (VRE) sources, and coal-fired thermal power plants (TPPs) generated 74.3% of India's electricity during FY 2022-2023 and continue to increase their share.
- ⇒ The coal sector plays a vital role in infrastructure development and in the core sector industries which employ millions of people.
- ⇒ Further, India's cumulative emissions from fossil fuels and industry between 1750 and 2021 are only 3.3% of the global total, behind those of Europe (31%), the U.S. (24.3%), and China (14.4%).
- ⇒ Fulfilling the development needs of 17% of the world's population, in India, is also a fundamental duty to which we must attend, or 'sustainable' development would be an empty catchphrase.
- ⇒ Against this backdrop, India must focus on increasing the efficiency of its TPPs to reduce emissions while ramping up nuclear energy and enhancing pumped storage to integrate more VRE sources into the grid.

#### Net zero goal:

- ⇒ According to Central Electricity Authority (CEA) projections for FY32, India's national grid can absorb 924 TWh of electricity from renewable energy sources by adding 47 GW of battery storage capacity and 27 GW of pumped storage projects.
- ⇒ Batteries will become cost-effective only after 2030, and the tariffs of pithead TPPs are only 40% of the round-the-clock tariffs for solar plants backed by battery storage in India today.
- ⇒ Further, any increase in battery storage capacity in India will require the import of critical minerals like lithium, cobalt, nickel, and graphite, which are controlled by other countries (mainly, China), posing significant risks to India's energy security.
- ⇒ Ninety-six percent of the coal used by TPPs in India comes from domestic mines and is key to keeping electricity affordable in India. So the CEA projects that TPP capacity in India will reach 259-262 GW by FY32, from 212 GW in FY23.
- ⇒ Recent projections indicate that only 19 GW of pumped storage projects and 18 GW battery storage capacity additions are expected by FY32, which will require a further 23 GW of TPP capacity to be added to the grid by then.

- To balance this with India's long-term goal of reaching net-zero by 2070, the country must continue to implement more efficient clean coal technologies.

#### Coal-washing:

- Coal deposits in India contain high levels of ash (35-50%) compared to those mined in other coal-mining countries. Burning coal with more ash erodes boiler tubes and other components, affecting the plant's availability, efficiency, and performance.
- The transport of unwashed raw coal to TPPs located more than 500 km from the mines also means transporting millions of tonnes of ash-producing non-coal material, congesting India's roads and rail transportation systems.
- The practice in all major coal-producing countries is that the miner washes the high-ash coal at the pithead and dumps the rejects in the mine before dispatching the washed coal to consumers.
- So the government can mandate miners to supply only washed coal to all TPPs located more than 500 km from mines to reduce emissions and pollution. The coal-washing cost can be fixed by the electricity regulator as a part of the tariff determination process.

#### Issue with desulphurisers:

- Indian coals generally have less sulphur than that mined in other coal-rich countries. TPPs in India have tall stacks, and the flue gas' exit velocity plus favourable weather conditions means sulphur dioxide emissions are widely dispersed.
- Historical sulphur dioxide emissions have created a cooling effect by masking global temperature rise by 0.5 degrees Celsius.
- Retrofitting existing TPPs with flue-gas desulphurisers (FGDs), increases their specific coal consumption by 1.5-1.7%, leading to lower efficiency and higher emissions. FGDs require large capital investments leading to tariff hikes.
- India can therefore reduce particulate emissions by more than 99.97% by installing low-cost, high-performance electrostatic precipitators and reserve FGDs for TPPs near urban areas.

#### Other development strategies:

- Some 30% of the current TPP capacity in India is from supercritical or ultra-supercritical technologies. The advanced ultra-supercritical technology (AUSC), with a proven efficiency of 46%, could further reduce carbon dioxide emissions by 15% compared to supercritical technologies.
- Integrated gasification combined cycle (IGCC) power plants also have efficiencies of 46-48% and can capture carbon dioxide. So the Government of India can incentivise deployment of IGCC or AUSC technologies at scale.
- It can also repurpose some TPP sites to install small modular nuclear reactors under international

safeguards to enhance zero-carbon electricity generation.

#### Way Forward:

- Global warming is the result of the combustion of all fossil fuels, not just coal. The efficient operation of TPPs is critical for India since they ensure that peak and off-peak demands are met continuously, at affordable costs.
- For India, low-carbon development is not a choice but a necessity, and the steps to achieve this are reflected in its 'Long-term Low-Emissions Development Strategy'.
- It is hoped that developed countries will take the lead in combating climate change and provide new and additional climate-specific financial resources and technology transfer to developing countries as per the UNFCCC and its Paris Agreement.

### THREATENED SPECIES UP BY 25 PERCENT IN QUEENSLAND WET TROPICS



#### Why in news?

- Climate change has pushed 25 per cent more organisms in Australia's biodiversity-rich northern rainforests into the list of threatened species since 2020, a new report showed.
- The rainforests are world heritage sites.

#### Factors responsible:

- The new report 'State of the Wet Tropics' was highlighted the growing threats and declining health of species such as ringtail possum.
- The species was given international protection in 1988, but climate change, habitat loss and degradation of supporting ecosystem poses threats.
- Invasive species and diseases also threaten the existence of these species.
- It further stated that a number of other species, specifically the endemic rainforest frogs, high-altitude birds, ringtail possums and plants of the Myrtaceae family that were considered secure while listing, "now face significant challenges from accumulated and compounding threats".

#### Wet Tropics bioregion:

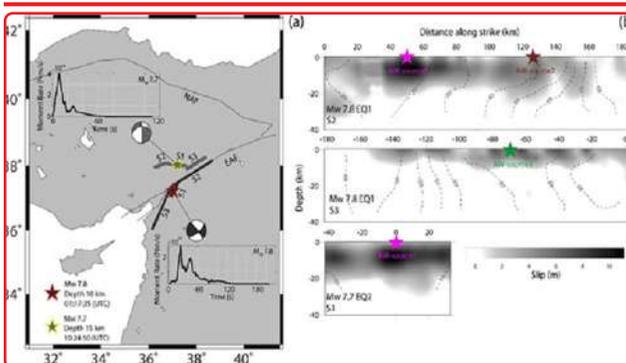
- The country is home to about 600,000 native species and a high proportion of them endemic to the region.

- The Wet Tropics bioregion contains 26 per cent of Australia's vascular plant species.
- Some 314 of these are classified as Vulnerable, Endangered or Critically Endangered, with a further 98 species listed as Near Threatened.
- It is a similar story for vertebrates, with at least 25 per cent of the area's fish, amphibians, birds and mammals having some level of conservation significance. The report observed that information on the region's invertebrate taxa is not adequate.

### Impact:

- The authors attributed this significant increase in threat to climate change and its impact on the species at multiple levels. The extinction of endemic vertebrate fauna in the region was predicted to occur by more than 50 per cent about 15 years ago.
- The area's distinctive upland flora and fauna were specifically affected as the protection of suitable climate offered for cool-adapted species is declining and further impacting their ability to adapt due to natural geographic barriers and modified landscapes.
- As many as nine species and subspecies of birds endemic to Wet Tropics now stand classified as threatened as per the International Union for Conservation of Nature criteria and additional five are Near Threatened due to climate change.
- Upland populations were impacted with increasing temperature and changing rainfall patterns, while the lowland populations are experiencing heatwaves.
- Climate change could further alter waterflows, threatening freshwater species with reduced runoff in headwater streams.
- Apart from changes in water regimes, climate change may affect the food supply and add nutritional stress among species.

### REFLECTION OF EARTHQUAKE SOURCE PROCESS IN THE IONOSPHERE COULD PAVE WAY FOR DECIPHERING EARTHQUAKE



### Why in news?

- Earthquake processes, even relatively smaller ones, have their reflection in the ionosphere, as they influence the amplitudes and periods of coseismic

ionospheric perturbations (CIP) along with factors such as geomagnetism and line-of-sights geometry, according to a novel study.

- The finding can help observing earthquake source processes from the space which may pave the way for deciphering earthquake precursors using space-based observations.

### CIP:

- Coseismic vertical crustal movements excite acoustic waves (AWs) in the atmosphere.
- The waves propagate upward, reach the ionosphere, causing disturbances in numbers of electrons along the line-of-sights connecting ground Global Navigation Satellite System (GNSS) receivers and satellites. These disturbances are called as coseismic ionospheric perturbations (CIP).
- Such near-field CIP occurs normally within 500–600 km of the source. Most of the past studies assumed point sources at the maximum vertical displacements for direct AWs and such near-field CIP had been modeled by assuming single acoustic pulse from the surface.
- However, large earthquakes involve ruptures of multiple fault segments spanning hundreds of kilometres and for such great earthquakes; such a single source assumption may become inappropriate.

### Recent research:

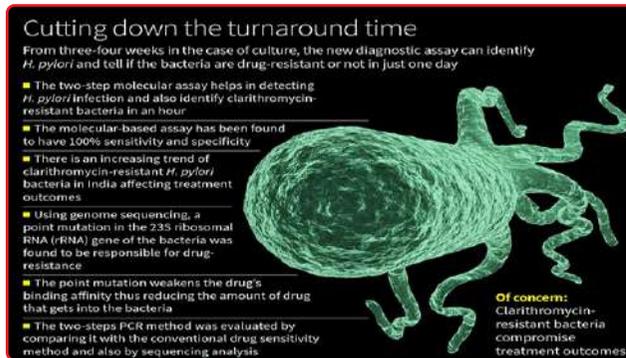
- Scientists from Indian Institute of Geomagnetism (IIG), in their attempt to verify this assumption for relatively small earthquakes, (less than 8 Mw) analysed near-field CIP of 2023 February Turkey Earthquakes.
- They demonstrated for the first time, that ionospheric perturbations generated by relatively small earthquakes could also contain contributions from multiple sources along the fault.
- On 6 February 2023, a devastating earthquake of Mw 7.8 (EQ1) occurred in southern Turkey near the Turkey-Syria border, one of the largest strike-slip events recorded on land. Around 9 hrs later an earthquake of Mw 7.7 (EQ2) occurred to the north of EQ1.

### Outcome:

- Studying CIP generated by EQ1 and EQ2, showed for the first time that CIP shows variety of amplitudes and periods for different satellite-station pairs due to combinations of sub-CIPs from multiple sources with different time lags.
- They elaborated that interference of acoustic waves (AWs) from these multiple sources makes differences in the perturbations amplitudes and periods at Global Navigation satellite System (GNSS) stations in different azimuths from the epicentre.

## SCIENCE &amp; TECHNOLOGY

## NICED MAKES QUICK DETECTION OF DRUG RESISTANT H. PYLORI POSSIBLE



## Why in news?

- A two-step PCR-based assay of a small region of the *Helicobacter pylori* (*H. pylori*) bacteria can help detect *H. pylori* infection and also identify clarithromycin-resistant bacteria and those which are drug-sensitive in six-seven hours has been developed by a team of researchers from the National Institute of Cholera and Enteric Diseases (ICMR-NICED), Kolkata.

## Why it matters?

- Since *H. pylori* bacteria grow slowly, it takes about a week to culture the bacteria and a couple of more weeks to test for drug-sensitivity, which the new diagnostic assay bypasses. The molecular-based assay has been found to have 100% sensitivity and specificity.
- There is an increasing trend of clarithromycin-resistant *H. pylori* bacteria in India leading to a decreasing success rate in treating the infection.

## Risk factors:

- Most of the infections caused by the bacterium *H. pylori* are asymptomatic, 10–15% of them develop peptic ulcer disorders or stomach cancer.
- In India, *H. pylori* infections affect 60-70% of the population. *H. pylori* infection is often acquired during childhood and remains in the stomach throughout life if not treated with antibiotics effectively.
- So, if someone suffers from gastroduodenal diseases along with the detection of *H. pylori* infection, eradication of the bacteria provides the most effective treatment.

## Antibiotic resistance:

- *H. pylori* infection is one of the robust known risk factors for gastric cancer. As it takes three-four weeks to culture the bacteria and carry out drug-sensitivity tests, drug-resistant studies of *H. pylori* are seldom carried out in India.
- So, the conventionally used empirical treatment using clarithromycin is routinely used without

knowing the drug-sensitivity. The growing incidence of clarithromycin-resistant bacteria is a big concern and has to be addressed as it is the most important reason for treatment failure.

## How research was conducted?

- The NICED researchers undertook the study to identify the root cause of resistance toward clarithromycin and to develop a molecular-based technique for rapidly detecting antibiotic resistance.
- They turned to genome sequencing to identify that the drug resistance was due to a point mutation (A to G mutation at 2143 position) in the 23S ribosomal RNA (rRNA) gene of the bacteria.
- To confirm that the point mutation was indeed responsible for drug-resistance, the researchers isolated and amplified 617 base pairs that contained the point mutation and transferred the base pairs to drug-sensitive bacteria.
- To further confirm the role of point mutation in drug resistance, they sequenced the bacteria that had become drug-resistant after the base pairs were transferred and found that the point mutation was present in the bacteria.

## PCR-based assay:

- Bioinformatics study revealed that drug-resistant and drug-sensitive strains had very different binding affinity for the drug – the drug's binding affinity to the mutant was weaker compared with drug-sensitive bacteria.
- The researchers developed a two-step PCR-based assay to first detect *H. pylori* infection and then to differentiate resistant isolates from sensitive ones directly from biopsy samples.
- In the initial step of PCR, the 617 base-pair segment containing the point mutation was amplified using DNA templates isolated from biopsy samples.
- In the second PCR step, 183 base pairs amplified by the first PCR step are used as a template. For the second PCR step, two allele-specific primer sets have been designed by exploiting the point mutation in the resistant strains.

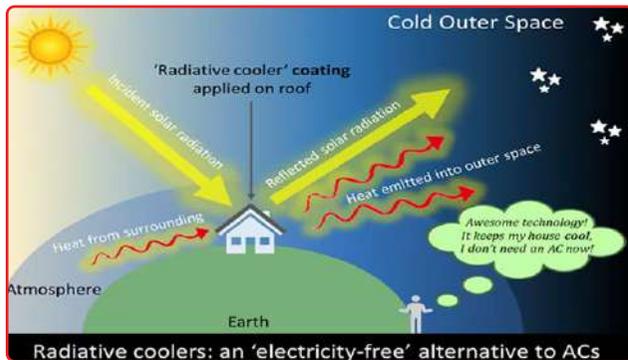
## Outcome:

- The two-steps PCR method was evaluated by comparing it with the conventional drug sensitivity method and also by sequencing analysis, which showed 100% sensitivity and specificity.

## NEWLY DEVELOPED AFFORDABLE RADIATIVE PAINT

## Why in news?

- A new affordable, eco-friendly radiative cooling paint, specifically engineered to effectively cool structures like buildings, pavers, and tiles in hot weather conditions can diminish electricity consumption and offer essential relief during sweltering summer days.



### Details:

- Cooling technologies are an integral part of human life due to the increased global warming and urban heat island effects.
- The radiative cooling technology has been developed that provides cool surfaces by emitting thermal radiation directly to the cold universe (around 3K) through the atmospheric transmission window (8 - 13  $\mu\text{m}$ ) without electricity consumption.
- As a result, passive daytime radiative cooling (PDRC) has drawn much interest recently for many applications such as pavers, tiles, building and automobile cooling, solar cell, and personal thermal management.

### Radiative cooling paint:

- At the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) in Bengaluru, researchers, have introduced a groundbreaking radiative cooling paint.
- Developed from a novel MgO-PVDF polymer nanocomposite, this low-cost, solution-processed paint demonstrates significant cooling capabilities with a high solar reflectivity and infrared thermal emissivity.
- The experimental findings, have shown that the surface temperature of a treated paver decreases by approximately 10°C under intense sunlight-- almost double of the reduction that conventional white paints give.

### How it was designed?

- The researchers developed polymer nanocomposite paint by using a simple solution-processed technique. They used ultra-white and ultra-emissive magnesium oxide (MgO)-polyvinylidene fluoride (PVDF) nanocomposite prepared from materials that are earth abundant, cheap, non-toxic and non-harmful.
- Initially, polymer powders were transformed into a solution using solvent and then, dielectric nanoparticles are dispersed inside the polymer matrix.
- After preparation, different spectroscopic techniques were used to characterize the optical properties of the prepared polymer nanocomposite paint. By

measuring the temperature of the paint using a thermocouple, excellent cooling performance was demonstrated under hot sunlight.

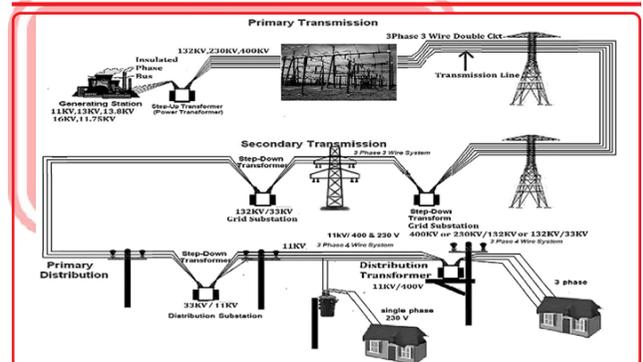
### Outcome:

- The optimized MgO-PVDF with a dielectric nanoparticles resulted in large solar reflectance of 96.3% and a record high thermal emission of 98.5% due to Mg-O bond vibrations, and other stretching/bonding vibrations from the polymer.
- The nanocomposite paint exhibited water-resistant hydrophobic properties and can be easily coated on pavers, wood sticks and so on with high uniformity and good adhesion.

### Way Forward:

- The work can motivate industries to implement the radiative cooling paint for building cooling applications.
- These findings indicate that the adoption of MgO-PVDF cooling paint in construction can significantly curtail the reliance on air conditioning, thus contributing to a reduction in associated environmental impacts.

## UNDERSTANDING THE FUNDAMENTALS OF HOW ELECTRICITY IS TRANSMITTED



### Context:

- Any power supply system has three broad components: generation, transmission, and distribution. Electricity is generated at power plants as well as at smaller renewable-energy installations.
- Then it is transmitted using a distributed network of stations, substations, switches, overhead and underground cables, and transformers, among other elements.
- Finally, it is distributed to consumers in a standardised way, befitting the needs of various machines and applications.

### What are the basics of transmitting electricity?

#### Transformers:

- In any conductor that transports electric current, the transmission efficiency is higher at lower current and higher voltage.
- This is because the energy loss during transmission increases as the square of the current, whereas the

- amount of voltage increase corresponds on a 1:1 basis with the amount of current decreased.
- That is, if voltage is increased by five units, the amount of current will drop by five units, but the amount of energy lost will be reduced by 25 units.
  - The transformers increase the voltage and reduce the current before feeding into transmission lines, and the reverse when receiving current to be supplied to consumers.
  - Transmission cables can be seen transporting current at 115 kV, 230 kV, etc. for this reason. However, more than 2,000 kV or so is infeasible because then air itself becomes conducting, causing the cable to 'leak' current.

### Resistance & transmission:

- The cables that move the current still have some resistance, which results in some energy loss. The amount of loss can be controlled by adjusting the cable's thickness: the thicker it is, the less energy is lost, but the cost increases. So when the cost of the cable's material is high, the cables are thinner.
- The longer the distance of transmission, the lower the transmission cost.
- All these factors are further complicated by the use of alternating current (AC). AC can be modified more easily in transformers than direct currents (DC) and also has higher transmission efficiency.
- But when the AC frequency is higher, the amount of resistance the current encounters in the material increases.

### What is AC power?

- The most common way to transfer electric power is in the form of three-phase AC. In AC, the voltage flips polarity. If one polarity urges the current to flow in one direction, the opposite polarity urges the current to flow the other way. The AC frequency is equal to the voltage flipping frequency.
- In a three-phase AC circuit, there are (at least) three wires. When current starts to follow in Wire A, the voltage is at 120°; in Wire B, it is 240°; and in Wire C, it is 360°. These are the three phases.
- All three wires transport AC power. Consumers, for example households, receive three such wires from where they can draw power for various appliances. These appliances are also designed to use AC because it is easier to control than DC.

### How is power transmitted?

- In a three-phase AC circuit, each wire transmits an AC current in a different phase. From a power station, the wires are routed to transformers that step-up their voltage. Then, they are suspended from transmission towers, which must be stable and properly wired, as they travel long distances.
- Insulators in contact with the wires draw away some current if there is a surge in the line; circuit-breakers 'break' the circuit if there is too much.

- The towers are also grounded and equipped with arresters that prevent sudden increases in voltage from affecting the wires. Similarly, dampers prevent vibrations in the wires from affecting the towers' stability. Switches are used to control the availability of current and to move currents between different lines.
- These wires eventually lead to and exit from different kinds of substations. For example, collectors collect power incoming from different sources and relay them to transmission substations. Converters modify the AC frequency.
- Distribution substations step-down the voltage in power lines and prepare them for consumption. Transmission substations merge or fork different lines and diagnose problems in different lines.
- All these centres require their own support and safety infrastructure, from electrical engineers to fire protection, from connections to computerised operations to facilities for staff. There are also many other elements and setups to perform various other functions, in keeping with the sophisticated needs of entire economic regions.

### How do grids operate?

- The transmission is situated between production and distribution. A national grid includes all three components, and as a result transmission also has to account for the particulars of power production at different types of sources, at various locations, and how and where that power is consumed.
- For example, some sources can produce energy continuously, whereas renewable energy sources are intermittent. So grids also have storage facilities that store electrical energy when there's a surplus supply and release it in times of deficit.
- They are also connected to sources like gas turbines that can provide power on short notice, such as during emergencies, as well as automated systems that 'tell' sources to increase or decrease their output in response to fluctuating consumer demand.
- Grids also need to respond to failure in different parts of the network and prevent them from carrying over to other parts, adjust voltages in response to demand (as well as manage demand), control the AC frequency, improve the power factor (the power drawn by a load versus the power available in a circuit), etc.

### Wide-area synchronous grid:

- A grid becomes a wide-area synchronous grid if all the generators connected to it are producing an AC current at the same frequency.
- The world's largest such grid covers Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, and Russia; the world's most powerful is the North Chinese State Grid, with a connected capacity of 1,700 GW.

- India's national grid is also a wide-area synchronous grid. Such grids result in lower power cost but also require measures to prevent cascading power-supply failures.

### TROUBLE WITH INDIA GUIDELINES ON GENETICALLY MODIFIED INSECTS



#### Context:

- India's bioeconomy contributes 2.6% to the GDP. In April 2023, the Department of Biotechnology (DBT) released its 'Bioeconomy Report 2022' report, envisioning this contribution to be closer to 5% by 2030.

#### Details:

- This ambitious leap will require aggressive investment and policy support. But neither funding for the DBT, India's primary promoter of biotechnology, nor its recent policies reflect any serious intention to uplift this sector.
- Along with more money, policies that enable risk-taking appetite within Indian scientists will be required to create an ecosystem of innovation and industrial action.

#### Funding issue:

- Funding for biotechnology India has been stagnating for a while. Despite a slight uptick during COVID-19, when DBT led the vaccine and diagnostics efforts, funding hasn't returned to the pre-pandemic level. The current allocation is also only 0.0001% of India's GDP, and it needs to be significantly revised if biotechnology is to be of any serious consequence for the economy.
- The reduced funding is detrimental to India's national interests as well, considering the DBT is essential to any pandemic preparedness efforts.
- Further efforts are also needed to attract private funding in biotechnology research and development, a key area that industry representatives, investors, and government officials have highlighted multiple times.

#### Guidelines for GE insects:

- Funding aside, biotechnology policies also need to be aligned to the economic goals set out in the

Bioeconomy report. However, the language in a set of guidelines that the Indian government released recently, pertaining to genetically edited insects, indicate a problem.

- In April 2023, the Department of Biotechnology (DBT) issued the 'Guidelines for Genetically Engineered (GE) Insects'. They provide procedural roadmaps for those interested in creating GE insects.

#### Challenges:

##### Uncertainty of purpose

- The guidelines note that GE insects are becoming globally available and are intended to help Indian researchers navigate regulatory requirements.
- However, the guidelines don't specify the purposes for which GE insects may be approved in India or how the DBT, as a promoter of biotechnology, envisions their use.
- The guidelines only provide regulatory procedures for R&D on insects with some beneficial applications.
- The guidelines set out forms and instructions for using GE insects of various types. The approval for these experiments comes under the broad ambit of the Review Committee on Genetic Manipulation, a body under the DBT.
- The guidelines have been harmonised to guidance from the World Health Organisation on GE mosquitoes. GE mosquitoes represent the most advanced application for this technology, yet the guidelines seem to downplay the economic opportunities that such insects provide.
- But the guidelines and policy are both quiet on how GE insects can benefit the bioeconomy and for which purposes the government might approve the insects' release.

##### Uncertainty for researchers

- The guidelines are applicable only to research and not to confined trials or deployment. That is, once the insects are 'made' and tested in the laboratory, researchers can conduct trials with them on the approval of the Genetic Engineering Appraisal Committee (GEAC), of the Union Environment Ministry.
- Government authorities will also have to closely follow the deployment of these insects. Once deployed, GE insects can't be recalled, and unlike genetically modified foods, they are not amenable to individual consumer choice.
- The nature of the technology products i.e. mosquitoes, honey bees, etc. also make their private use difficult. In any case, the government will be the primary buyer in many cases, such as 'GE mosquitoes for disease alleviation' or 'honey bees for increased pollination'. But then there's no clarity on whether the Environment Ministry will actually approve the deployment of GE insects or what criteria it might use to consider a proposal to do so.

- ⇒ The guidelines define GE insects by their risk group and not by the end product. It makes sense to subject any GE insects for human/animal consumption to stringent checks, but why using insects for silk or lac production needs to be checked the same way is not clear.
- ⇒ The guidelines can sidestep this by adapting its rules for genetically modified crops for non-consumption purposes.

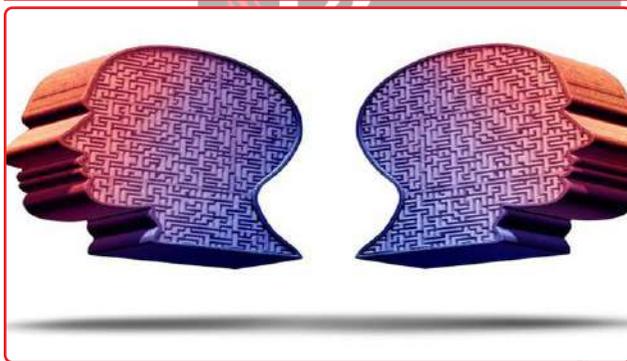
### Uncertainty of ambit

- ⇒ The guidelines offer standard operating procedures for GE mosquitoes, crop pests, and beneficial insects – but what 'beneficial' means, in the context of GE insects, is not clear.
- ⇒ The lack of clarity about the insects and the modifications to them that are deemed 'beneficial' will impede funders and scientists from investing in this research. In a country with low public as well as private funding, the absence of a precise stance to identify and promote research priorities hampers progress.

### Conclusion:

- ⇒ The guidelines are not in sync with the ambitions outlined in the Bioeconomy 2022 report.

## WHY HAS THE GOVT. ISSUED A DIRECTIVE ON DEEPFAKES



### Why in news?

- ⇒ Recently, the Indian government instructed "social media intermediaries" to remove morphed videos or deepfakes from their platforms within 24 hours of a complaint being filed, in accordance with a requirement outlined in the IT Rules 2021.
- ⇒ The instructions came as deepfake videos of actors Rashmika Mandanna and Katrina Kaif surfaced online within the span of one week.

### What are deepfakes?

- ⇒ Deepfakes have been around since 2017 and refer to videos, audios or images created using a form of artificial intelligence called deep learning.
- ⇒ The term became popular when a Reddit contributor used publicly available AI-driven software to impose

the faces of celebrities onto the bodies of people in pornographic videos.

- ⇒ Fast forward to 2023, deepfake tech, with the help of AI tools, allows semi and unskilled individuals to create fake content with morphed audio-visual clips and images.
- ⇒ Researchers have observed a 230% increase in deepfake usage by cybercriminals and scammers, and have predicted the technology would replace phishing in a couple of years.

### How does deepfake technology work?

- ⇒ The technology involves modifying or creating images and videos using a machine learning technique called Generative Adversarial Network (GAN).
- ⇒ The AI-driven software detects and learns the subjects' movements and facial expressions from the source material and then duplicates these in another video or image.
- ⇒ To ensure that the deepfake created is as close to real as possible, creators use a large database of source images. This is why more deepfake videos are created of public figures, celebrities and politicians.
- ⇒ The dataset is then used by one software to create a fake video, while a second software is used to detect signs of forgery in it.
- ⇒ Through the collaborative work of the two software, the fake video is rendered until the second software package can no longer detect the forgery. This is known as "unsupervised learning", when machine-language models teach themselves.
- ⇒ The method makes it difficult for other software to identify deepfakes.

### What do laws in India say about deepfakes?

- ⇒ India's IT Rules, 2021 require that all content reported to be fake or produced using deep fake be taken down by intermediary platforms within 36 hours.
- ⇒ The Indian IT ministry has also issued notices to social media platforms stating that impersonating online was illegal under Section 66D of the Information Technology Act of 2000.
- ⇒ The IT Rules, 2021, also prohibit hosting any content that impersonates another person and requires social media firms to take down artificially morphed images when alerted.

### Why do people create deepfake content?

- ⇒ The technology could potentially be used to incite political violence, sabotage elections, unsettle diplomatic relations, and spread misinformation.
- ⇒ This technology can also be used to humiliate and blackmail people or attack organisations by presenting false evidence. However, deepfakes have positive usages as well.
- ⇒ The technology has been used by the ALS Association in collaboration with a company to use voice-cloning technology to help people with ALS digitally recreate their voices in the future.

**How have other countries reacted?**

- The EU has issued guidelines for the creation of an independent network of fact-checkers to help analyse the sources and processes of content creation.
- The U.S. has also introduced the bipartisan Deepfake Task Force Act to counter deepfake technology.

**DIGITAL ADVERTISEMENT POLICY, 2023**



**Why in news?**

- The Ministry of Information and Broadcasting has approved a path breaking Digital Advertisement Policy, 2023 to enable and empower the Central Bureau of Communication which is the advertising wing of the Government of India to undertake campaigns in the Digital Media Space.

**Why it matters?**

- This policy marks a pivotal moment in CBC's mission to disseminate information and create awareness regarding various schemes, programs, and policies of the Government of India in response to the evolving media landscape and the increased digitalization of media consumption.
- The huge subscriber base in the Digital Universe, coupled with technology enabled messaging options through Digital advertisements will facilitate effective delivery of citizen centric message in a targeted manner, resulting in cost efficiencies in public oriented campaigns.

**Digital India program:**

- The Government of India's Digital India program has led to a huge growth in the number of people in the country who are now connected to the internet, social and digital media platforms.
- As per TRAI's Indian Telecom Services Performance Indicators January–March 2023, the internet penetration in India as of March 2023, is over 880 million, and the number of telecom subscribers as of March 2023 is over 1172 million.

**Key Highlights:**

- The Policy will enable CBC to empanel agencies and organisations in the OTT and Video on Demand Space. CBC will also be able to leverage the growing number of listeners to Podcasts and Digital Audio platforms through empanelment of Digital Audio platforms.

- Apart from rationalising its process of empanelling Internet Websites, CBC now for the first time will be able to channelize its public service campaign messages through Mobile Applications too.
- It further streamlines the process through which CBC can place advertisements for government clients on these platforms. The policy also empowers CBC to empanel Digital Media Agencies to enhance its outreach through the various platforms.
- The CBC's Digital Advertisement Policy, 2023, introduces competitive bidding for rate discovery, ensuring transparency and efficiency. Rates discovered through this process will remain valid for three years and will be applicable to all eligible agencies.

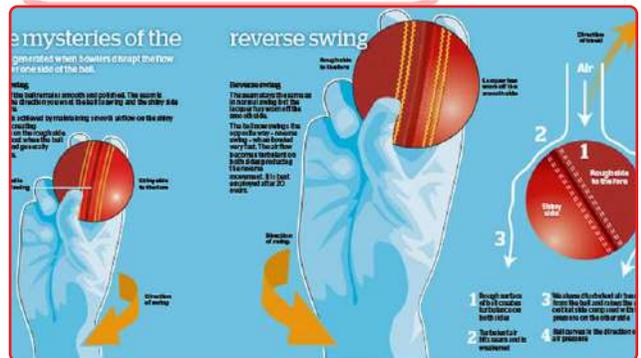
**Significance:**

- The outreach of government Ministries and departments will be further supplemented by Ministry of Information and Broadcasting's Media Unit, Central Bureau of Communication which is the designated organisation for issue of advertisements through all forms of media.

**About CBC:**

- The Central Bureau of Communication (CBC) operates under the Ministry of Information and Broadcasting and is responsible for creating awareness and disseminating information about various government programs, schemes, and policies in India.

**UNRAVELLING THE SECRETS OF SWING IN CRICKET WITH PHYSICS**



**Context:**

- Cricket matches under day-night conditions are associated with shifts in humidity and moisture.
- Most captains winning the toss in day-night matches prefer to bowl first and bat second.

**Dew factor:**

- The water vapour condenses on the ground in the evening, creating a slippery surface. As a result, spinners have a harder time getting the ball to grip and fast bowlers have more trouble producing swing and seam. Fielding on a slippery ground is also obviously harder.

- As a result of these changes in ground conditions, batters appear to have an advantage under dew, as they face less swing, less spin, and less lateral movement of the ball.
- Sometimes, fast bowlers release the ball at a certain angle into its flight path. As a result, air flow is turbulent on one side of the ball and streamlined on the other. This causes a sudden pressure difference that causes the ball to deviate from its path in a motion called its swing.)
- Batters also expect the ball to skid off the bat under dew, and expect opportunities to maintain a higher run rate with less effort.

### Friction & dew:

- A closer analysis of the physics of friction suggests that the belief that dew always increases slipperiness is scientifically flawed.
- Friction is reduced only when the water film in between is thick enough to reduce the amount of physical contact between two surfaces.
- When the thickness is below a certain threshold, it increases the overall friction because the water molecules interact more strongly with the two surfaces due to adhesive forces.
- A recent study led by Liang Peng of the University of Amsterdam found that the coefficient of friction doubled when humidity was increased by 20% and decreased only thereafter. The scientists attributed this to hydrogen bonds that formed as a result of electrostatic forces.
- Thus, in moist weather, the coefficient of friction increases, advantaging the bowler. This may have been why India's batters lost three early wickets in the match against Australia in Chennai.

### Impact on bowling speed:

- The work of German physicist Richard Stribeck on friction has shown that for a given layer of lubricant, friction increases when the speed of interaction between two surfaces is higher than a threshold value.
- So in wet conditions, fast bowlers can use this feature to force the ball to grip more by launching it at a higher speed.

### Effects of weather conditions:

- Cricketers have also displayed the belief that the dew content negatively influences swing.
- In specific weather conditions, there is one optimum bowling speed, one optimum seam angle, and one desirable spin rate. If the delivery speed is less than the optimal value, the spin will need to be increased to generate a certain amount of swing.
- The ball's trajectory through the air also creates an asymmetric flow field around its surface, which produces the so-called Magnus force. The strength of the force increases when the temperature is lower

and there is more moisture in the air. That is, changes in air density have a strong influence on the swing.

- For example, if the temperature drops from 25° C to 15° C, the air density will increase by 4%, and the ball's deviation due to swing can increase by an inch. The effect is minor but the outcomes can be significant.
- When the air temperature drops, sunlight causes less turbulence in the air above the pitch, giving bowlers more control. The success of Indian bowlers Mohammed Shami and Jasprit Bumrah in the ongoing ICC Men's Cricket World Cup may well be due to this effect.
- A misunderstanding of the impact of dew can leave batters overconfident, and cause them to get out caught when trying to hit what they believe to be 'easy' balls for boundaries.
- Instead, their chances can improve if they maintain a particular level of moisture content on their gloves and soles, while avoiding six-hitting.

### DLS method:

- Cricketers playing a game in wet weather also need to contend with the peculiarities of the Duckworth-Lewis-Stern (DLS) method.
- The prospect of rain forces captains to prefer risk-free play that preserves wickets. This is because the DLS method works with the ratio of runs scored to resources used, and the resources are the number of overs and wickets available.
- According to the DLS method, when setting a target, Team A's score per unit resource is multiplied by Team B's resources. The 'worth' of a ball and wicket in percentage terms are derived from data in a sliding four-year window.
- Key drawbacks of the DLS method are that it can't factor in the quantitative values of each team and that it favours teams that maintain a low run-rate and keep wickets in hand.
- In addition, the method also neglects the fact that, when after rain, Team B will have to play with a very damp pitch, which will influence its run-making abilities even while advantaging Team A, which can reap more gains if it knows how to use friction to achieve its goals.

### Way Forward:

- For these reasons, cricketers must be made fully aware of the intricacies of playing with dew and moisture, and ensure future wins.

## 'RASHTRIYA VIGYAN PURASKAR' AWARDS

### Why in news?

- Recently, the Council of Scientific and Industrial Research announced the winners of the Shanti Swarup Bhatnagar (SSB) awards for 2022.
- The announcement was highly anticipated not only due to the nearly year-long delay in declaring

the results, but also because it came amid the government's plans for a major revamp of the structure of science and medicine awards.

- In September 2022, the Ministry of Science and Technology discontinued nearly 300 existing science awards with the exception of the SSB awards.



### Rashtriya Vigyan Puraskar:

- The new system, called the 'Rashtriya Vigyan Puraskar' (RVP), includes a bouquet of awards: Vigyan Shri, Vigyan Yuva-Shanti Swarup Bhatnagar, Vigyan Team, and Vigyan Ratna. The government has expressed an intention to keep the RVP at par with the Padma and other national awards.
- The new awards will be open to an expanded group of "scientists, technologists and innovators (or teams) working in government, private sector organisations or individuals working outside any organisation".
- The RVP will be given across 13 scientific domains, including basic sciences, applied sciences, medicine, and engineering.
- The award announcement stated that "representation from each domain/field, including gender parity will be ensured".
- The RVP awards will invite nominations for some time, and be evaluated by a RVP Committee comprising "the Principal Scientific Adviser to Government of India and Secretaries of Science Departments, members of Science and Engineering Academies.

### Advantages of proposed RVP structure:

- The new awards are open to innovators and technologists, including those in industry, and with diverse, non-regular affiliations.
- The new awards will also have expanded eligibility criteria, including technology-led innovations or products, in addition to discovery-based research.
- The RVP also includes a set of team awards (Vigyan Team), to acknowledge the increasingly collaborative, cross-disciplinary, translational and intersectional nature of scientific research.
- With the exception of the Vigyan Yuva-SSB award, for scientists up to the age of 45 years, the other RVP awards don't have an age limit, while explicitly committing to ensure equitable gender representation.

- The RVP awards will also be open to Persons of Indian Origin abroad, which is relevant given India's large and accomplished scientific, engineering, and technology diaspora, and the increasingly global footprint of modern science.
- Finally, the new award system has eliminated cash prizes, and will instead include certificates and medals.

### Intent and processes

- To ensure that the RVP system recognises only truly "notable and inspiring contributions", the awards' descriptions must include a statement that the contributions are over and above the standard job description of a scientist/technologist, not merely incremental work or work integral to their appointment.
- Since the awards are national recognitions for exemplary work, dedicated citations for teaching, mentoring, science communication, public engagement and outreach, and leadership and administration are conspicuous by absence.
- The age limit of 45 years for the Vigyan Yuva-SSB for young scientists is a serious challenge to the new system's own commitment to ensure gender parity.

### A potential blueprint:

- When the RVP award process is implemented, the selection process must adhere to the predetermined timelines, provide a public list of shortlisted applicants, and include gender-balanced and diverse selection committees, international jury members, and a non-partisan jury member – a non-scientist, preferably to make sure the selection is fair.
- The new award system must pledge to consciously seek to ensure, in addition to gender parity, the proper socioeconomic and demographic representation among awardees, and account for contributions made in the face of serious systemic social challenges and/or constraints and considerations related to the workplace.
- In any case, continuously evaluating the impact of the new award system on subsequent scientific work, the growth of topics and fields, the effects of role models on diversity and inclusivity in science in India, and scientific temper of the country at large will be useful.

### Way Forward:

- With these aspects in place, this is an opportunity for the RVP awards to become a blueprint for an expansive, inclusive, and transparent award system that can be adopted by scientific ecosystems in other countries as well.

## THE FUTURE OF TRANSPORT IS ELECTRIC

### Context:

- With the planet needing to rapidly decarbonise to reach net zero targets, electric vehicles are seen as a key part of the transport solution.



- But the problem is how to accelerate EV uptake and implement complementary strategies to encourage people to shift to greener travel options.

### Emissions from transport:

- The greenhouse gas emissions from transport are growing, having increased nearly 56 percent since 1990 at an average annual rate of 1.7 percent. This represents the highest emissions growth of any sector of the economy.
- Around 74.5 percent of all transport emissions are generated from road vehicles including cars, vans, buses and trucks.

### Government policies:

- Much can be learnt from government policies that have played a major role in removing barriers to adoption in the world's top three EV markets; China, Europe and the US which collectively accounted for around 90 percent of all EV sales in 2022.
- Governments that provided people with financial incentives to buy EVs have been able to achieve a substantial shift in consumer sentiment towards greener car purchases.
- These incentives were designed to reduce the purchase price gap between electric and conventional vehicles and have mainly taken the form of vehicle purchase subsidies or rebates or registration tax discounts.
- Examples include the incentive schemes implemented in Norway since the 1990s, the US since 2008 and China since 2009.

### Incentive programmes:

- EV drivers in Norway pay lower road tolls, gain access to bus lanes and benefit from cheaper and, in the past, free ferry crossings and public parking. People living in apartments have 'charging rights' safeguarded by government legislation.
- This all helped to increase EV sales to 50 percent market share in 2020, and 79 percent by 2022. No other nation comes close.
- France provides targeted incentives for people on lower incomes to purchase EVs.
- Individuals with annual income up to €14,089 are eligible to receive a bonus of up to €7,000 on the

purchase of a new EV, while those above this threshold receive a maximum subsidy of €5,000.

- The subsidy is also capped at a maximum rate not exceeding 27 percent of the vehicle's gross purchase price.
- In the European Union, 21 of 27 member countries levied car taxes partially or totally based on carbon dioxide emissions in 2022.
- Ireland first introduced an emissions-based car taxation policy in 2008. An analysis of its impacts found it produced a cumulative carbon dioxide savings of 1.6 million tonnes from 2008 to 2018.

### Feebate system:

- Feebates involve placing a levy on purchases of vehicles with high emissions and using the revenues to provide rebates for purchases of vehicles with zero or low emissions to offset their higher prices. Examples include France's Bonus-Malus and New Zealand's Clean Car Discount.
- If developed carefully, these systems can be a cost-neutral method of discouraging purchases of high-emission vehicles and encouraging purchases of EVs.

### Phase-out of internal combustion engine:

- Any credible EV strategy also could consider EV mandates and the phase out of internal combustion engine vehicles.
- More than 35 countries have already announced plans for either full electrified sales, full electrified stocks or full phase-out of internal combustion engine vehicles over the next 10 to 30 years.
- The EU had planned to ban the sale of internal combustion engine cars from 2035.
- In February 2023, the European Parliament approved the ban, which was later revised to allow some combustion engines running on e-fuels to be sold beyond 2035. Still, this remains one of the world's strongest measures to phase out fossil fuel vehicles.
- Examples include the fuel tax credit scheme in Australia.
- This scheme has been criticised for subsidising the consumption of fossil fuels, particularly in the mining industry, and for providing direct benefits for high-polluting heavy diesel vehicles over 4.5 tonnes.

### Mandatory fuel efficiency standards:

- Countries with high EV adoption rates have also backed up their transport decarbonisation strategies with robust fuel efficiency standards.
- These standards aim to limit vehicle emissions by mandating a maximum annual average level of carbon emissions across a car company's overall new car sales.
- Penalties are imposed on car manufacturers if these maximum levels are exceeded, which encourages them to offer low and zero emissions vehicles in markets that enforce these standards.

- Properly devised standards also reduce the cap over time until all new vehicles sold become zero emissions.
- Strong fuel efficiency standards already cover more than 85 percent of the international market.
- In recent times, some countries have proposed to tighten these standards further. Examples include plans by the US to introduce strict new emissions limits that would require two-thirds of vehicles sold in the US to be electric by 2032.
- The proposal, if ratified, will represent the most aggressive vehicle emissions reduction plan in the US and will deliver an average 13 percent annual pollution cut.

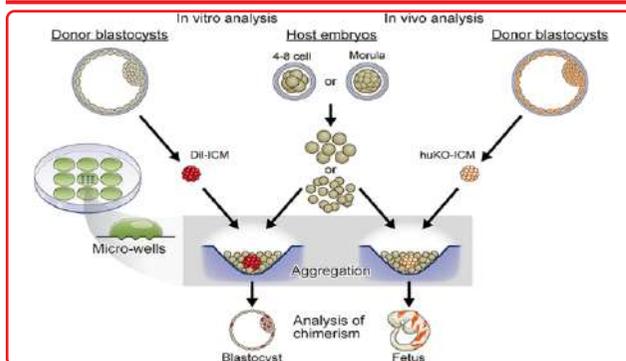
### Deployment of EV charging infrastructure:

- The International Council on Clean Transportation is recommending policies to accelerate the deployment of EV charging infrastructure, including binding installation targets aligned with the expected growth in EVs and incentives to address charging gaps.
- It estimates more than 100 million chargers will be needed across its members' jurisdictions by 2030. But as of mid-2022, only 13 percent of these public chargers were in place.
- Having readily accessible chargers helps reduce concerns about range anxiety, which in turn can help improve EV uptake rates. It also reduces the requirement for EVs to have larger batteries which makes them more affordable.

### Way Forward:

- Without a comprehensive set of consistent policies, particularly in nations embarking on their decarbonisation efforts, dependence on fossil fuels will deepen and reaching emissions reduction goals will become harder.

## CHIMAERAS HOSTS TO MULTIPLE GENOTYPES, AND MAYBE HUMAN ORGANS



### Context:

- At present, more than 3 lakh people are waiting for an organ transplant in India alone; the global number is far higher, with no respite in sight.

- There is an alarming disparity in the number of organ donors and the number of recipients and animals have played an important part in filling this gap.

### Chimaeras:

- The successful application of animal insulin and the more recent use of animal heart valves in human surgeries have saved human lives.
- Researchers have also made attempts to grow full human organs inside the bodies of animals using advancements in induced pluripotent stem cells (iPSCs) technology.
- At the same time, controversy continues to beset this field, most of it centred on the use of human iPSCs in animal embryos and the creation of chimeric animals, the results of which we are yet to fully comprehend.

### Chimaeras in nature

- A genetic chimaera is a single organism composed of cells of more than one distinct genotype (or genetic makeup). The animal kingdom has several examples of varying degrees of chimerism.
- The half-sider budgerigar, a type of common parakeet widely adopted as pets, has different colours on either side of its body due to chimerism.
- The anglerfish displays an extreme degree of symbiotic chimerism in which the male fish fuses with and is eventually absorbed into the female fish, mixing their genetic makeups into a single animal.
- Marine sponges are known to have up to four distinct genotypes in a single organism.

### Natural chimaeras among humans:

- They occur when the genetic material in one cell changes and gives rise to a clonal population of cells different from all the other cells.
- The fusion of two fertilised zygotes early in the embryonic stage can also lead to a condition in which two genetic makeups coexist in a single individual.
- Chimerism can also result from twin or multiple pregnancies evolving into a single foetus or a twin foetus being absorbed into a singleton.
- Researchers have also documented individuals living with two blood types. In fact, blood-group chimerism during multiple births is relatively common.
- Most chimaeras are detected during routine blood tests in hospitals or when family members undergo tests ahead of an organ transplant.
- Pregnant women have been known to harbour the genetic material of her foetus in the bloodstream during the pregnancy. (Such foetal DNA can be used to screen for genetic defects and congenital abnormalities using non-invasive prenatal testing.)

### Microchimerism:

- Studies have also recorded a phenomenon called microchimerism, in which traces of the foetus's genetic material are observed in mothers' tissues many years after childbirth, resulting in two different genetic materials in a single person.

- Individuals undergoing treatments like bone marrow transplants usually have their bone marrow destroyed and replaced by that from a suitable donor.
- Since the donor's bone marrow contains stem cells, they will produce blood cells that will subsequently repopulate the recipient's blood-cell repertoire.
- Eventually, the recipient will have blood cells that resemble the donor's and will be different from the genetic makeup of the recipient's other tissues resulting in a chimeric individual.
- Solid organ transplants in humans are bound to produce individuals with two unique genetic makeups as well.
- The makeup of the donor's organs will be significantly different from that of the recipient's other tissues, also resulting in chimerism.

### Chimaeras in non-human primates:

- Previously, chimaeras have been induced in laboratory settings, of rat-mouse, human-pig, and human-cow. These were in a bid to develop model systems that could 'generate' human organs of a suitable size, anatomy, and physiology.
- While rat-mouse chimerics had a near-normal lifespan, human-pig chimaeras had to be terminated in three to four weeks.
- While such studies have shown promise for growing organs destined for transplant, they are also limited by the fact that rats, mice, pigs and cows are evolutionarily distant from humans, and will pose biological and technical challenges when being used to grow human organs.

### Live chimaera in non-human primates:

- In a recent landmark study, scientists reported the successful generation of a live chimaera in non-human primates. This is the first time scientists have succeeded in producing a live infant chimeric monkey.
- In studies with *Cynomolgus* monkeys, a.k.a. long-tailed macaques (*Macaca fascicularis*), researchers extracted embryonic stem cells from one-week-old embryos. They modified the DNA in these cells to include a green fluorescent protein (GFP).
- These GFP-marked embryonic stem cells were then injected into recipient embryos that were implanted into surrogate female monkeys, which delivered six full-term offspring.
- Using detectors, the researchers located the GFP signal in the tissues of one aborted male foetus and in one live-birth male. The latter signal originated from the donor cells that had been injected into the recipient's embryo.

### Outcome:

- The chimeric monkey had to be euthanised after ten days for health reasons.
- Extensive genome-sequencing investigations conducted with its cells showed a high degree of

chimerism in its tissues, including eyes, fingernails, brain, heart, kidney, liver, gonads, and placenta.

### Way Forward:

- As such, this study opens new doors for scientists to use non-human primates to create chimaeras that could become models for basic and translational biomedical applications in the near future.

## MEET THE LANGLANDS PROGRAM, THE WORLD'S BIGGEST MATHS PROJECT



### Context:

- The Langlands Program consists of "very complicated theoretical abstractions, which can be difficult even for specialist mathematicians to grasp".
- This program was set in motion in 1967 when Dr. Langlands wrote a 17-page letter to the French mathematician André Weil with a series of tentative ideas.
- In 2018, mathematician Dr. Robert Langlands was awarded the Abel Prize, one of the highest honours for mathematicians, for "his visionary program connecting representation theory to number theory".

### Langlands Program:

- At the heart of the Program is an attempt to find connections between two far-flung areas of mathematics: number theory and harmonic analysis.
- Number theory is the arithmetic study of numbers and the relationships between them. A famous example of such a relationship is the Pythagoras theorem:  $a^2 + b^2 = c^2$ .
- Harmonic analysis is interested in the study of periodic phenomena. Unlike number theorists, who deal with discrete arithmetics (like integers), harmonic analysts deal with mathematical objects more continuous in nature (like waves).

### What's the purpose of the Program?

- In 1824, Norwegian mathematician Niels Henrik Abel proved that it was impossible to have a general formula to find the roots of polynomial equations whose highest power is greater than 4 (e.g.,  $x^5 + 2x^4 - 5x^3 - 9x^2 = 0$ ).
- An example of a general formula is the quadratic formula used to solve quadratic equations.

- Around the same time, unaware of Abel's work, French mathematician Évariste Galois arrived at the same conclusion and went a step ahead.
- In 1832, he suggested that instead of trying to find the precise roots of such polynomial equations, mathematicians could focus on symmetries between roots for an alternate route.
- Consider the polynomial equation  $x^2 - 2 = 0$ . The two roots of  $x$  in this equation are  $\sqrt{2}$  and  $-\sqrt{2}$ . Now, consider a different polynomial involving one of these roots (say,  $\sqrt{2}$ ):  $2\sqrt{2} + 2 = 2 + 2\sqrt{2}$ .
- This equation – of the form  $2 + \sqrt{2} = 2 + \sqrt{2}$ , where  $\sqrt{2} = \sqrt{2} -$  holds true for the other root as well:  $(-\sqrt{2})^2 + (-\sqrt{2}) = 2 + (-\sqrt{2}) = 2 - \sqrt{2}$ .
- So the two roots of the polynomial  $x^2 - 2 = 0$  are symmetric.
- And a Galois group is a collection of symmetries of the roots of a polynomial equation.
- The Langlands Program seeks to connect every Galois group with automorphic functions, allowing mathematicians to investigate polynomial equations using tools from calculus, and build a bridge from harmonic analysis to number theory.

### What are automorphic functions?

- Alex Kontorovich, a distinguished professor of mathematics at Rutgers University, has used the following example to illustrate the role of automorphic functions.

### Translational symmetry:

- For example, the sine function itself can be represented on a circle. If you have a piece of string shaped like the sine wave, you can also bend it to shape it like a circle.
- If a bead on the string goes from the baseline to the crest of the wave, then down all the way to the trough, and finally returns to the baseline, it would be like travelling from a point on top of the circle to the bottom and back – which is  $360^\circ$  degrees or  $2\pi$  radians.
- So the sine wave can be said to repeat itself after  $2\pi$  radians, and we can write  $f(x)$  thus:  $f(x) = f(x + 2\pi)$
- This function is said to have a translational symmetry: despite having been shifted by a factor of  $2\pi$ , the function looks the same. That  $f(x)$  has translational symmetry is a "spectacular miracle", according to Prof. Kontorovich.
- Such functions that turn back into themselves when the variables are changed by some process are called automorphic functions. The sine function is a simple example.
- The Langlands Program is an effort to connect Galois groups to these functions.

### How has the Program helped?

- In 1994, Andrew Wiles and Richard Taylor applied Langlands' conjectures to prove Fermat's last theorem. This proof had eluded mathematicians for more than three centuries.

- The Program has also helped mathematicians create new automorphic functions from preexisting ones. Such possibilities, they understand, could be crucial to prove the Ramanujan conjectures, many of which remain unsolved.

### Geometric Langlands:

- Since Dr. Langlands' letter to Dr. Weil, the Program has also evolved into its own field of mathematics. One offshoot called Geometric Langlands investigates connections between algebraic geometry and representation theory.
- Mathematicians have even conjectured connections between Geometric Langlands and physics.
- Earlier in 2023, for example, mathematicians David Ben-Zvi, Yiannis Sakellaridis, and Akshay Venkatesh found signs of electromagnetism in number theory.
- In their paper, they recast two different mathematical objects; periods and L-functions into geometric objects that physicists use to study electromagnetic waves.

## 25 YEARS OF THE INTERNATIONAL SPACE STATION



### Why in news?

- On November 20, the International Space Station passed 25 years since the first module launched into orbit.
- It is one of the world's most successful locations for international diplomacy, peace and collaboration, even in times of war.

### When did the International Space Station launch?

- The first segment of the ISS; the Zarya Control Module was Russian and launched November 20, 1998.
- Zarya supplied fuel storage and battery power, and served as a docking zone for other space vehicles arriving at the ISS.
- On December 4, 1998, the US launched the Unity Node 1 module. Together, the two modules were the start of a functioning space laboratory.
- Over the course of 42 assembly flights, the ISS became what it is today. Among the first "live-in" astronauts were Bill Shepherd of NASA and Roscosmos cosmonauts Yuri Gidzenko and Sergei Krikalev. Since then, the ISS has been continuously inhabited.

### Size of the ISS:

- The ISS is split into various spaces for living and working. It has six sleeping quarters, two bathrooms, a gym, and a 360-degree view bay window.
- It measures 109 meters (357 feet) end-to-end.
- Its solar array wingspan is also 109 m. The largest commercial aircraft, the Airbus A380, has a wingspan of 79.8 meters. And about 13 kilometers of electrical wires run through the space station.
- The ISS orbits Earth every 90 minutes at a speed of 8 kilometers per second.

### What scientific discoveries on the ISS have benefited life on Earth?

- Astronauts have conducted hundreds of scientific experiments on the ISS. Sometimes they experiment on themselves, monitoring their general health, nutrition or the effects of solar radiation.
- And sometimes they conduct experiments for scientists on Earth. These experiments have led to numerous scientific breakthroughs.
- From Alzheimer's and Parkinson's disease to cancer, asthma and heart disease, it's all been studied in space. Scientists say some medical experiments are best done in space because cells behave in microgravity more like they do inside the human body, but it's difficult to recreate such conditions on Earth.
- There have been discoveries to benefit drug development, new water purification systems, methods to mitigate muscle and bone atrophy and those that have led innovations in food production.

### How long will the ISS be operational?

- Plans for the future operation of the ISS were thrown into uncertainty with the start of Russia's invasion of Ukraine in early 2022.
- Both the European Space Agency (ESA) and national bodies withdrew from international collaborations with Russia, and Russia said it was leaving the ISS to build its own space station.
- The old and new spacefaring nations want to make an independent mark on space. They include Japan, China, India, the United Arab Emirates and others.
- The US and Europe have said they remain committed to the International Space Station through 2030.
- NASA is almost entirely focused on its Artemis program and plans to populate the moon.
- ESA is working toward a new space station, which it is calling Starlab.

## NASA SPACECRAFT FIRED A LASER AT EARTH

### Why in news?

- NASA's Psyche spacecraft, currently over 16 million kilometres away in space, successfully fired a laser signal at Earth recently.



### Mission:

- The spacecraft is on its way to a unique metal-rich asteroid, orbiting the Sun between Mars and Jupiter.
- Scientists believe this asteroid is the nickel-iron core of an early planet, studying which could provide unique insights into the impenetrable iron core of our own planet.
- Simultaneously, it will also carry out another mission that might hold the key to future space exploration.

### Space communication's data rate problem:

- Communicating with spacecraft far away from Earth poses many challenges, of which the problem of data rates might be the most critical.
- Like wireless communications on Earth, spacecraft encode data on various bands of electromagnetic frequencies. Currently, most space communication is carried out using radio waves, having the highest wave lengths but lowest frequencies in the electromagnetic spectrum.

### The electromagnetic spectrum. (Credit: NASA)

- However, higher bandwidths (range of frequencies) carry more data per second. Thus, scientists would ideally like to transmit data at the highest bandwidths possible to increase the rates of data transfer. But this throws up its own set of challenges.
- Radio waves are more widely used for communication than other electromagnetic waves primarily because of their desirable propagation properties, stemming from their large wavelength.
- What this means is that they have the ability to pass through the atmosphere regardless of weather, pass through foliage and most building materials, as well as bend around obstructions. Shorter wavelengths tend to scatter when in contact with any interference.

### DSOC Experiment:

- NASA's Deep Space Optical Communications (DSOC) experiment is pioneering the use of near-infrared laser signals for communication with spacecraft.
- Much like fibre optics replacing old telephone lines on Earth, NASA says that DSOC will allow data rates at least 10 times higher than state-of-the-art radio telecommunications systems of comparable size and power, enabling higher resolution images, larger volumes of science data, and even streaming video.

- The Psyche spacecraft is the first to carry a DSOC transceiver, and will be testing high-bandwidth optical communications to Earth during the first two years of the spacecraft's journey to the main asteroid belt.
- The tech demo achieved "first light" in the early hours of November 14 after this transceiver locked onto a powerful uplink laser beacon transmitted from the Optical Communications Telescope Laboratory at the NASA's Table Mountain Facility near Wrightwood, California.

### How does this technology work?

- The flight laser transceiver and ground-based laser transmitter will need to point with great precision. Reaching their targets will be akin to hitting a dime from a mile away while the dime is moving. A dime, or a 10 cent coin, is less than 2 cm in diameter.
- To achieve this, the transceiver aboard the spacecraft needs to be isolated from the craft's vibrations.
- Moreover, since the positions of Earth and the spacecraft will be constantly changing as the photons travel, the DSOC ground and flight systems will need to compensate, pointing to where the ground receiver and flight transceiver will be when the signal arrives.
- Lastly, given the distance between the spacecraft and Earth, new signal-processing techniques will be utilised to squeeze information out of the weak laser signals transmitted over the vastness of space.

### Why does this matter?

- In 2013, NASA's Lunar Laser Communications Demonstration tested record-breaking uplink and downlink data rates between Earth and the Moon using similar technology.
- DSOC, however, is taking optical communications into deep space, paving the way for high-bandwidth communications far beyond the Moon and over a 1,000 times farther than any optical communications test to date.
- With humanity's ambitions to travel in space, far beyond the Moon, improving communications technology is crucial.

## SOCIAL ISSUE

### PM PARTICULARLY VULNERABLE TRIBAL GROUPS DEVELOPMENT MISSION

#### Why in news?

- Recently, the Prime Minister launched the ₹24,000-crore PM-PVTG Development Mission and a Viksit Bharat Sankalp Yatra focused on government scheme saturation to the last mile in tribal districts.
- He was on a two-day visit to Jharkhand and will launch the Pradhan Mantri PVTG Development Mission on the birth anniversary of tribal icon Birsa Munda.



### Who are Particularly Vulnerable Tribal Groups?

- PVTGs are a more vulnerable group among tribal groups in India. These groups have primitive traits, geographical isolation, low literacy, zero to negative population growth rate and backwardness. Moreover, they are largely dependent upon hunting for food and a pre-agriculture level of technology.
- PVTGs also collect Non-Timber Forest Produce (NTFP) like honey, gum, bamboo and wax for consumption as well as sale. Due to their diet, these tribes often suffer diseases like anaemia, malaria, gastrointestinal disorders and skin infections.
- It is said that more developed tribal groups take advantage of the development funds, and thus, there is a need to direct more funds towards PVTGs.
- In 1973, the Dhebar Commission set up a separate category for Primitive Tribal Groups (PTGs). In 1975, the Centre identified 52 tribal groups as PTGs. In 1993, 23 more groups were added to the list. Later, in 2006, these groups were named PVTGs.
- Currently, there are 2.8 million PVTGs belonging to 75 tribes across 22,544 villages in 220 districts across 18 states and Union Territories in India.
- According to the 2011 Census, Odisha has the largest population of PVTGs at 866,000. It is followed by Madhya Pradesh at 609,000 and Andhra Pradesh (including Telangana) at 539,000.
- The largest PVTG is Odisha's Saura community, numbering 535,000.

### What is the PM PVTG Development Mission?

- The Rs 24,000-crore project is aimed at the development of the PVTGs. As part of the mission, basic facilities such as road and telecom connectivity, electricity, safe housing, clean drinking water and sanitation, improved access to education, health and nutrition and sustainable livelihood opportunities will be provided to areas where these tribal groups live as these are mostly remote, scattered and inaccessible.
- Under the scheme, several ministries will work in tandem to implement development projects.
- The schemes include Pradhan Mantri Gram Sadak Yojana, Pradhan Mantri Gramin Awas Yojana, and Jal Jeevan Mission, among others.

### Viksit Bharat Sankalp Yatra:

- Government of India is organizing Viksit Bharat Sankalp Yatra from 15th November, 2023 to 26th January, 2024 to raise awareness through outreach activities to achieve saturation of schemes.
- This will require concerted efforts across the board as well as active Jan Bhagidari to ensure that the last mile and the most vulnerable are reached effectively.

### The objectives of the Viksit Bharat Sankalp Yatra are the following:

- Reaching the unreached-reach out to the vulnerable who are eligible under various schemes but have not availed benefits so far.
- Dissemination of information and generating awareness about schemes.
- Learning from the citizens-interaction with beneficiaries of government schemes through personal stories/experience sharing
- Enrolment of potential beneficiaries through details ascertained during the Yatra.

### Phase I:

- Under the Viksit Bharat Sankalp Yatra, Department of Land Resources has planned for distribution of Abhinandan Patra/certificate to eligible villages and felicitation of Gram Panchayat/Village level functionaries like patwari/Lekhpal/Mandal etc. and Gram Panchayat functionaries like Sarpanch for achieving 99% or above in Digitization of Land Records as per schedule of Viksit Bharat Sankalp Yatra through the villages.
- A digital version of the approved certificate has been shared with the States to distribute for felicitation through communication by Secretary, DOLR to 11 States covering 103 districts to start with.
- In the first phase events relating to Viksit Bharat Sankalp Yatra and distribution of Abhinandan Patra were organized.

### HOW THE MANDATORY REPORTING PROVISION UNDER POCSO WORKS



### Why in news?

- Failure to report sexual crimes against minors is a bailable offence, the Himachal Pradesh High Court recently ruled.

### Highlights of the judgement:

- A single-judge bench allowed pre-arrest bail to a hotel manager accused of failing to report an offence committed against a minor, as mandated by Section 21 of the Protection of Children from Sexual Offences (POCSO) Act.
- He said that since the Act is silent on whether the offence is bailable or not, the nature of the offence must "be determined with reference to the Code of Criminal Procedure."
- The classification of offences under the CrPC "clearly" states that offences punishable with imprisonment of less than three years are bailable and non-cognizable. Section 21 of the POCSO Act prescribes imprisonment of 6 months to a year, thus making it a bailable offence.

### What was the case before the HC?

- In the present case, the main accused raped and recorded a video of a minor schoolgirl in a hotel in September 2022.
- He was booked by the police under Sections 376 (Rape) and 506 (Criminal Intimidation) of the Indian Penal Code, as well as under Sections 6 and 21 of the POCSO Act, which punish aggravated penetrative sexual assault and failure to report sexual crimes against children.
- Moreover, the FIR also named the manager of the hotel in which the offence was committed, owing to the mandatory reporting provision under the POCSO Act.

### POCSO and mandatory reporting:

- Section 19 of the POCSO states that anyone having "apprehension" that an offence under POCSO is likely to be committed, or knowledge that such an offence has been committed, "shall" provide such information to the Special Juvenile Police Unit (SJPU) or the police. The term "any person" also includes a child who may report an offence.
- This reporting provision becomes binding due to Section 21 of the POCSO Act, which prescribes punishment for failing to report the commission of an offence under Section 19. Imprisonment of six months to one year, or a fine, or both is prescribed under Section 21.
- However, that children cannot be held liable for failing to report the commission of a sexual offence. Similarly, children making false complaints or giving false information are also exempt from punishment under Section 22 of the Act.

### What has the SC ruled?

- In a series of decisions, the Supreme Court has held that failure to report such cases amounts to a serious crime.
- In 2013, a two-judge bench of the SC in Shankar Kisanrao Khade vs. State of Maharashtra ruled that "the non-reporting of the crime by anybody, after having come to know that a minor child below the

age of 18 years was subjected to any sexual assault, is a serious crime.”

- It put an even greater obligation on certain categories of professionals, such as medical practitioners and those in charge of educational institutions to report cases of child sexual abuse to the nearest Juvenile Justice Board, or Special Juvenile Police Unit.
- This created a conundrum for medical practitioners, since their professional ethics require them to maintain the confidentiality of their clients.

### Striking a balance

- Led by Chief Justice DY Chandrachud, a three-judge SC bench in September 2022 tried to strike a balance between the mandatory reporting provision under POCSO and the confidentiality provision under the Medical Termination of Pregnancy Act, 1971.
- In *X vs The Principal Secretary, Health and Family Welfare Department, Govt of NCT of Delhi*, the bench pointed to cases where minors might approach a Registered Medical Practitioner (RMP) for a medical termination of pregnancy arising out of consensual sexual activity.
- It recognised that minors or their guardians might be wary of the mandatory-reporting requirement, to avoid entangling themselves with the legal process, and thus approach an unqualified doctor for abortion instead.
- The court said that by insisting on disclosing the minor’s name in the report under Section 19(1) of POCSO, minors may be reluctant to seek out RMPs for safe termination of their pregnancies under the MTP Act.
- Pointing to Rule 3B(b) of the Medical Termination of Pregnancy Rules 2003, as amended on October 12, 2021, which allows minors to terminate their pregnancy up to 24 weeks, the court said that to ensure its benefit to minors engaging in consensual activity, “it is necessary to harmoniously read both the POCSO Act and the MTP Act”.
- For the limited purposes of providing medical termination of pregnancy under the MTP Act, the court said that the registered medical practitioner, only on request of the minor and their guardians, can be exempted from disclosing the minor’s identity and personal details under Section 19(1) of the POCSO Act or in any criminal proceedings that may ensue from the RMP’s report under Section 19(1).

## HEALTH

### HAEMOGLOBIN ISN'T USED ONLY IN BLOOD, SCIENTISTS DISCOVER

#### Why in news?

- Textbooks have said for decades that haemoglobin is found in the red blood cells (RBCs), that it makes blood red, carries oxygen, and is essential for survival.



- A new discovery has revealed that haemoglobin isn't used by RBCs alone.
- The scientists from China have reported that chondrocytes, cells that make cartilage, the connecting tissue between bones also make haemoglobin and seem to depend on it for their survival.

#### Background:

- Feng Zhang, a pathologist had been working on bone development since 2010. In 2017, when he was studying growth plates, cartilaginous tissue at the end of certain long bones that allow the bones to become longer, he stumbled upon a few spherical blob-like structures.
- They seemed to bear an uncanny resemblance to RBCs, and they contained haemoglobin.
- He ascertained that the chondrocytes within the growth plates of newborn mice were not only producing large amounts of haemoglobin, but also that it was coalescing and forming large blobs without a membrane.
- The scientists called these blobs haemoglobin bodies, or Hedy.

#### Function of Hedy:

- The scientists used genetically modified mice, in this case mice in which the gene making haemoglobin had been removed. These mice produced almost no haemoglobin molecules and they died as embryos.
- But it turned out that if one looked closely at the growth plate cartilage tissue from these mice, most of the chondrocytes were dying.
- Removing the gene that made haemoglobin specifically in the cartilage tissue also resulted in the same outcome: cell death among the chondrocytes. It was clear that Hedy was essential for the chondrocytes to live.

#### Whether haemoglobin also carries oxygen in chondrocytes?

- In RBCs, haemoglobin carries oxygen and makes sure that different parts of the body receive the oxygen to function correctly. The scientists conducted a series of experiments to check whether haemoglobin also carries oxygen in chondrocytes.
- First, they checked if the cartilage cells showed signs of stress before dying when haemoglobin molecules were absent.

- They focused on a special type of stress called hypoxic stress, caused by low-oxygen conditions. And indeed they did: cartilage that didn't contain haemoglobin showed signs of hypoxic stress.

#### Outcome:

- Now they knew that the absence of haemoglobin caused the chondrocytes to go through some sort of low-oxygen stress. They then wanted to see how normal and haemoglobin-free chondrocytes behaved when there is little oxygen in the cells' environment.
- The researchers proceeded to test the cells in a low-oxygen, or hypoxic, environment. In the presence of haemoglobin, the cells seemed to release more oxygen. But in the absence of haemoglobin, the chondrocytes started dying.
- This further confirmed their hunch that the haemoglobin in the chondrocytes was most likely storing oxygen and supplying it to the cells when required.

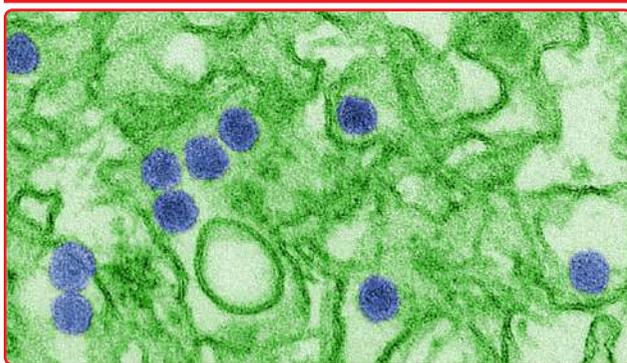
#### Haemoglobin in other places:

- In a developing growth plate, where oxygen is limited due to a lack of blood supply to the region, the chondrocytes still manage to thrive. Based on the scientists' findings, it's the haemoglobin molecules that manage to bring them the oxygen they need to survive.
- The scientists also found that cartilage in regions outside the growth plate, like the one in the ribs or the spine of mice, also contained haemoglobin.

#### Way Forward:

- The discovery of functional haemoglobin in cartilage also leads to the possibility that it plays a role in certain joint diseases.
- There are many bone deformities that develop from defects in chondrocytes.

### THE ZIKA GENOME AND INSIGHTS INTO THE ERA OF EMERGING OUTBREAKS



#### Context:

- The dengue virus and the Zika virus, together infect up to around 400 million people every year.
- The Zika virus and genomic studies of it have opened fascinating windows into our knowledge of the

infectious disease and its relevance in the context of emerging outbreaks.

#### About Zika:

- The Zika virus is a mosquito-borne flavivirus. Most infections in humans are asymptomatic or with mild symptoms, including fever, rash, and joint pain.
- The diagnosis of a Zika virus infection is mostly through genetic testing. An antibody-based test would be complicated because antibodies produced by the infection can cross-react with those of the dengue (DENV), yellow fever, and West Nile viruses.
- Researchers isolated the virus in 1947 from monkeys from the Zika forest in Uganda. The first human cases were detected in 1952 in Uganda and Tanzania. There have since been multiple outbreaks around the world, but largely confined to the tropics.

#### Zika virus's genome:

- A significant number of insights have come from the Zika virus's genome. Researchers sequenced the complete genome first in 2007.
- It has more than 10,000 bases of single-stranded RNA. The genome is also peculiar: it encodes for a large polyprotein, which is further cleaved into capsid, membrane precursor (prM), envelope, and seven non-structural proteins.
- Genomic studies have suggested that the Zika virus has two lineages: African and Asian. The lineage that wreaked havoc in the Americas is a sub-lineage with genomes similar to those of isolates from an outbreak in French Polynesia in 2013-2014.
- In a significant example of the usefulness of genetic surveillance plus sequencing, researchers in the U.S. used active surveillance of travellers to uncover a hidden outbreak in Cuba, and also established its time characteristics.

#### Zika and microcephaly:

- The small heads of children born to infected mothers has been one of the more alarming complications of a Zika virus infection.
- Earlier, based on studies with mice, researchers had suggested that a mutation in one of the precursor membrane proteins, called prM, of the Zika virus was associated with microcephaly.
- Researchers also suspected that this mutation originated during the outbreak in French Polynesia in 2013 before breaking out in South America, causing microcephaly.
- The Zika-microcephaly hypothesis also suffered when researchers recorded microcephaly in Thailand following infections of the Asian lineage of the Zika virus that lacked the mutation. Differences in the prevalence of microcephaly across geographical areas in Brazil also suggested that scientists' picture is incomplete.

**Specific microbes:**

- Zika virus and DENV infections are interesting in their own right.
- Researchers in Tsinghua University, suggested in a recent study that infections of two viruses in primates encourage specific microbes to grow on the skin by suppressing an antimicrobial peptide, RELM, on the skin.
- These microbes produce acetophenones, which are volatile molecules that could provide a chemical cue to mosquitoes, attracting them towards the individual and supporting forward transmission of the viruses.
- The researchers also reported that administering isotretinoin could upregulate RELM and reverse this phenomenon.

**Way Forward:**

- As climate change helps drive the spread of vector borne diseases, and global warming brings environmental conditions that favour them to new places, our genomic technologies and such deep insights into the molecular pathogenesis of these viruses will be an important guiding light.

### HOW WAS THE FIRST VACCINE FOR CHIKUNGUNYA APPROVED

**Why in news?**

- Recently, the world's first vaccine for chikungunya was approved by the Food and Drug Administration (FDA) in the U.S.
- The vaccine has been developed by European vaccine manufacturer Valneva and will be available under the brand Ixchiq, and has been approved for administration in people who are 18 years or older, and are at increased risk of exposure to the virus.
- It was approved using the Accelerated Approval pathway, which allows the FDA to clear certain products for serious or life-threatening conditions based on evidence of a product's effectiveness that is likely to provide clinical benefit.

**What is Chikungunya?**

- Chikungunya, is characterised by severe joint pain and impaired mobility, and comes with fever.
- It is a viral infection (CHIKV) transmitted primarily by the Aedes aegypti and Aedes albopictus mosquitoes

and has been described as "an emerging global health threat."

- Chikungunya is prevalent in Africa, Asia, and the Americas; but sporadic outbreaks have been reported in other regions.
- Since 2004, outbreaks of CHIKV have become more frequent and widespread, partly due to viral adaptations allowing the virus to be spread more easily by the Aedes albopictus mosquitoes.

**Symptoms:**

- The joint pain is often debilitating and varies in duration; it can last for a few days, but also be prolonged over months.
- Other symptoms include joint swelling, muscle pain, headache, nausea, fatigue and rash. While severe symptoms and deaths from chikungunya are rare and usually related to other coexisting health problems, it is believed that the numbers are generally underestimated, because chikungunya is often misdiagnosed as dengue or zika, as symptoms can seem similar.

**Treatment:**

- As of now, there is no cure, only symptomatic relief, with analgesics to help with the pain, antipyretics for the fever, rest, and adequate fluids.
- Prevention includes mosquito control activities, primarily falling under public health outreach and routine civic maintenance.

**What is the vaccine composition?**

- Ixchiq is administered as a single dose by injection into the muscle. It contains a live, weakened version of the chikungunya virus and may cause symptoms in the vaccine recipient similar to those experienced by people who have the disease.
- The most reported side effects by vaccine recipients were headache, fatigue, muscle pain, joint pain, fever, nausea and tenderness at the injection site.
- The effectiveness of the vaccine was based on immune response data from a clinical study conducted in the U.S. in individuals 18 years of age and older.
- In this study, the immune response of 266 participants who received the vaccine was compared to the immune response of 96 participants who received the placebo.
- The level of antibody evaluated in study participants was based on a level shown to be protective in non-human primates that had received blood from people who had been vaccinated.

### COVID 19, BRAIN DAMAGE MECHANISM UNCOVERED

**Why in news?**

- While COVID-19 continues to be active in several western countries, its severity has diminished. A vexing issue however is Long COVID, a set of long-

term health problems that linger for several months following recovery from the infection.

- A recent Harvard study comparing infected and non-infected individuals, reported a 10% risk of getting Long COVID.
- A prominent Long COVID symptom is brain fog, which involves difficulty focusing, memory impairment and challenges in decision-making.



### Key Highlights:

- A recent study from Stony Brook University in the U.S., utilising cognitive assessment tests, identified a significant intellectual decline following COVID.
- This was particularly pronounced among those with Long COVID. The exact mechanism remains unclear, but MRI studies had demonstrated shrinking of parts of the brain following COVID-19.
- In this context, researchers from the University of Queensland and Macquarie University of Australia, in collaboration with the University of Helsinki recently made some startling discoveries.
- Using specialised laboratory cells that mimic the human brain they found that infection by the SARS-CoV-2 virus resulted in individual brain cells fusing together as one. This could happen between two neurons, two glial cells or between a neuron and a glial cell. It could also involve more than two cells.

### New disease:

- By measuring the inflow of calcium ions into the cell, they further demonstrated that the process of fusion also affected their function. Instead of firing individually, the fused neurons fired all at once. This could disrupt communication between nerve cells.
- In effect, they discovered a new disease state of the brain in COVID-19, where the cells are structurally and functionally altered, yet remain alive. This is distinct from the previously known outcomes of viral infection of the brain, which are cell death and inflammation.
- Apart from SARS-CoV-2, which is known to enter the brain by disrupting the blood-brain barrier, viruses such as rabies, HIV and Nipah are also capable of infecting the brain.

### Mechanism of cell fusion:

- The scientists then went on to study the mechanism of cell fusion. When the virus infects a cell, it causes

fusion proteins to be expressed on the surface of cells. These proteins latch on to a neighbouring cell, eventually the two cells becoming one.

- Fusion of brain cells not only alters the structure of the complex, but also makes the cells dysfunctional. This process is called syncytium formation, wherein the components of one cell freely flow into others.
- Viruses use this as a clever method for cell-to-cell spread, while staying out of reach of antibodies that lurk outside the cells. COVID-19 is known to induce the same effect in lung cells.
- The SARS-CoV-2 virus uses its spike protein for cell fusion. However, the spike protein used in the vaccine, being an altered version of the original, is not fusogenic. Therefore, there is no concern of such a thing happening after vaccination.

### What's next?

- While some individuals recover after several months, the outlook has been less optimistic for a substantial number of people.
- Being an all-new disease previously unknown to man, knowledge about COVID-19 will continue to evolve.

## HOW FREE CANCER CARE ALONE WON'T HELP THE FIGHT AGAINST CANCER IN INDIA

### Why in news?

- By 2040, according to one estimate, 20 lakh people a year will be diagnosed with cancer in India. Cancer is already the third leading cause of death in India.
- The money spent by a patient on an ailment is the highest for cancer. The Pradhan Mantri Jan Arogya Yojana (PMJAY) has offered some respite by providing health insurance of ₹5 lakh per family per year.
- However, despite this support, people are financially destroyed by cancer and its treatment.
- A June 2023 study reported that even among patients availing of the PMJAY or other state-sponsored health insurance coverage, cancer treatment rendered catastrophic health expenses in more than 80% and impoverishment in more than 60% of people.



### Where do the expenses arise?

- The government provides free cancer care. These devastating costs arise in the private sector. Ideally,

one's out-of-pocket expenditure (OOPE) for health should be zero.

- But the sheer burden of the disease plus an underfunded public health system forces people to access care in the private healthcare system in India. This worsens the financial burden by adding to the direct and/or indirect OOPE.
- Direct medical OOPE includes doctor's consultation fees, cost of medicines, and medical tests, and direct non-medical OOPE includes costs of transport, accommodation, and food for people travelling to larger cities for treatment. Indirect OOPE accounts for loss of productive hours and/or income.

### What makes the fallout worse?

- Delays allow the disease to worsen, and they happen if patients have to struggle to get an early date for treatment in overburdened government hospitals.
- The financial fallout of cancer is worse when it affects the breadwinner of the family. Compared to the general population, people with cancer are at seven times greater risk of unemployment within five years after diagnosis.
- Cancer diagnosis has a similar impact on caregivers.

### Support by governments:

- Borrowing money and selling assets has been identified to be a common strategy that disproportionately affects people from rural areas. Governments have identified these issues in some parts of the country and made some efforts to address them.
- For example, in 2012, the Haryana government made transport for patients with cancer and one caregiver in public buses from their places of residence to their places of treatment free.
- Similar efforts have been made in Kerala, where patients with cancer are eligible for 50% concession on public bus tickets.
- To improve compliance with care, patients travelling to seek care in the Cachar Cancer Hospital and Research Center in Assam are given financial support for travel as well as free accommodation and food.
- In 2017, Delhi launched the Arogya Kosh scheme to reduce the burden on public health centres and avoid treatment delays. Here, residents of Delhi making less than ₹3 lakh a year are eligible to get certain tests, like ultrasound and CT scans, in private health centres for free.
- Haryana, Tripura, and Kerala have also floated a 'cancer pension' to financially assist patients with advanced-stage cancer – ₹2,500 per month in Haryana and ₹1,000 in Tripura and Kerala.

### What is a permanent solution?

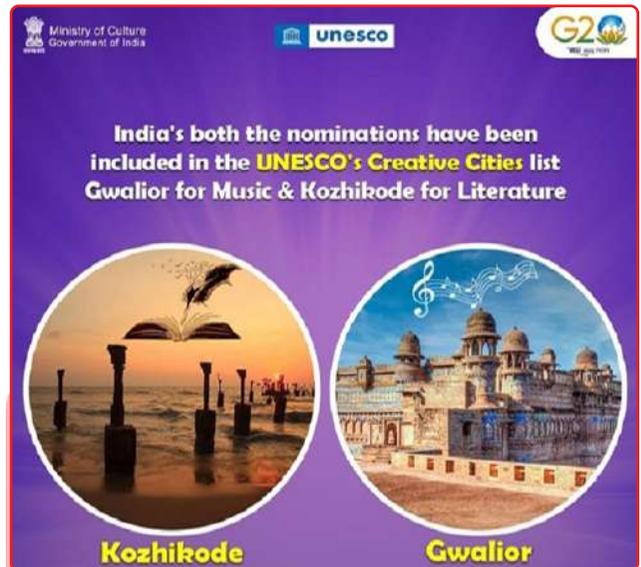
- The most obvious solution to such post-cancer problems is to open publicly funded cancer care centres in every nook and corner of India. Of course,

at this time, this sounds unrealistic and will require decades to implement.

- But the fact is that until cancer care becomes as accessible as diabetes or hypertension care, there is need to continue to provide financial support to those who are suffering, either directly or indirectly, and their families.

## CULTURE

### UNESCO NAMES KOZHIKODE CITY OF LITERATURE



### Why in news?

- The city of Kozhikode in Kerala was added in UNESCO's Creative Cities Network (UCCN) recently. Gwalior from Madhya Pradesh was also among the 55 new cities to join the network.
- These cities have been handpicked to represent seven creative fields – crafts and folk arts, design, film, gastronomy, literature, media arts, and music.
- Kozhikode was included in the category of literature and Gwalior in the category of music.

### Kozhikode's literary tradition:

- The North Kerala city of Kozhikode is home to many prominent personalities of the state's literary and cultural world.
- The city, where several leading media houses are headquartered, has hundreds of publishing banners and several libraries enriching its literary tradition.
- The first Malayalam novel Kundalatha was born in Kozhikode in 1887. It was authored by Appu Nedungadi.
- Several illustrious writers like S K Pottekkatt, Vaikom Muhammad Basheer, Uroob, Thikkodiyan, NN Kakkad, P Valsala, Akbar Kakkattil, Punathil Kunjabdulla and MT Vasudevan Nair have brought laurels for Kozhikode.

⇒ The city has also produced many film and theatre professionals in the last half a century.

### The UNESCO Creative Cities Network (UCCN):

- ⇒ The UCCN was created in 2004 to promote cooperation among cities that have identified creativity as a strategic factor for sustainable urban development.
- ⇒ It now includes 350 cities in over a hundred countries.
- ⇒ The network is aimed at leveraging the creative, social, and economic potential of cultural industries.
- ⇒ It was launched to promote UNESCO's goals of cultural diversity and strengthen resilience to threats such as climate change, rising inequality, and rapid urbanisation.
- ⇒ It encourages a culture of creativity in urban planning and solutions to urban problems.

### Indian cities in the network:

- ⇒ Apart from Kozhikode and Gwalior, Varanasi (music), Srinagar (crafts and folk arts) and Chennai (music) are part of the network.

### Objective of the CCCN:

- ⇒ The UNESCO Creative Cities Network allows member cities to recognise creativity as an essential component of urban development, notably through partnerships involving the public and private sectors and civil society.
- ⇒ It envisages to develop hubs of creativity and innovation and broaden opportunities for creators and professionals in the cultural sector. These cities have to achieve the UN agenda of sustainable development.

### Areas of action:

- ⇒ The objectives of the network are implemented both at the level of the member cities and at the international level, notably through sharing experiences, knowledge and best practices.
- ⇒ There are professional and artistic exchange programmes, research and evaluations on the experience of the creative cities, among other activities.

### The annual conference of network cities:

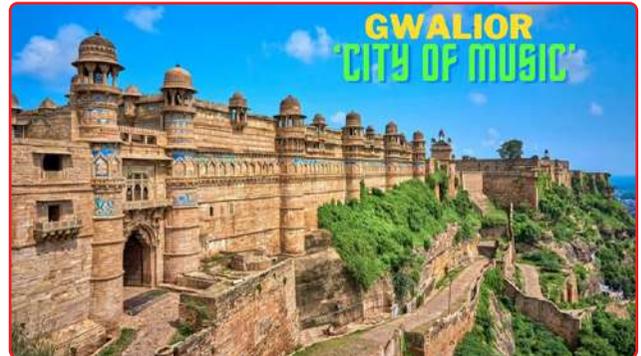
- ⇒ A highlight of the network is the annual conference of mayors and other stakeholders of network cities, which offers a unique occasion to strengthen ties between creative cities from across the world.
- ⇒ The main objective of the conference is to exchange practical information on policies and activities carried out by cities and stimulate inter-city collaborations.
- ⇒ The last conference was held in Santos, Brazil, and in 2023 conference was in Istanbul. The next conference will be held in July 2024 in Braga, Portugal.

### What members have to do?

- ⇒ Every four years, member cities are required to submit a Membership Monitoring Report, with the aim of demonstrating their steadfast commitment towards the implementation of the UCCN Mission Statement.

- ⇒ They present an action plan for the following four years, providing insights into their achievements and lessons learnt, as well as the impact of the designation.

## UNESCO DECLARES GWALIOR THE 'CITY OF MUSIC'



### Why in news?

- ⇒ The city of Gwalior in Madhya Pradesh was added to UNESCO's Creative Cities Network (UCCN) recently for its "strong commitment to harnessing culture and creativity".
- ⇒ Kozhikode from Kerala was also among the 55 new cities to join the network.

### Gwalior gharana:

- ⇒ Gwalior gharana, the oldest musical gharana and a significant chapter of Hindustani classical music's history flourished under the aegis of Raja Man Singh Tomar during the 15th century.
- ⇒ Man Singh's great grandfather Dungarendra Singh Tomar, a musician himself, attempted a revival of Indian classical music through academic interest and patronage. He is known to have gifted two music treatises in Sanskrit – Sangeet Shiromani and Sangeet Choodamani – to his friend and Sultan of Kashmir Zain-ul-Abdin. The treatises comprised detailed discussions on music and musical instruments.
- ⇒ Dungarendra also composed Vishnupadas (songs in praise of Vishnu) with a unique style of singing that he passed down to Man Singh, who ascended the throne in 1486. It's also believed that Man Singh invented dhrupad, in a classical genre sense. His Horis and Dhamars also became quite popular.
- ⇒ The king would take advice from Sufi saints, who were often musicians too. In an attempt to popularise Indian music, he replaced Sanskrit songs with those in simple Hindi.
- ⇒ Man Singh also wrote Manakutuhala (Quest for Learning), considered the first treatise of music in Hindi, helping a wider audience to understand high art performed in kings' courts. This made dhrupad more accessible, which now comprised Vishnupadas sung in ragas.

- The king also built huge music halls in his palace and held regular music sessions. His music was also popular among Sufis as well as Muslim Sultans.

### Characteristics of the Gwalior gharana:

- Before Hindustani classical music was divided into various gharanas, musical ideologies and systems where the musicians identify with a style either by lineage or by learning and following this style, Gwalior emerged as the first proper gharana of music and evolved under the Mughal rule.
- The initial ustads of the gharana included Naththan Khan, Naththan Pir Baksh and his grandsons Haddu, Hassu, and Natthu Khan.
- Khayal singing emerged from dhrupad under the aegis of Gwalior gharana while incorporating the elements of qawwali.
- Ustad Naththan Pir Baksh was one of the early masters to create khayal, the orderly system of presenting a raga which became extremely popular in the 18th and 19th centuries and remains significant even today.
- One interesting about Gwalior is the inclusion of Persian words in the pieces and concepts of bandish ki thumri (a more structured style of thumri or love song).
- Every artist who emerged from Gwalior gharana sounded different and yet there was a certain unity in the style.

### Mian Tansen:

- Mian Tansen born as Ramatanu to a poet and musician was one of Gwalior's early proteges. At the beginning of the 16th century, he trained under Swami Haridas, who practised dhrupad but the poetry was dedicated to Krishna instead of Vishnu.
- The famed Sufi saint Mohommad Ghous also had a huge impact on Tansen. While learning from Ghous, Tansen understood and honed the Gwalior gharana style and was the court musician for King Ram Chandra Singh of Rewa, Madhya Pradesh, for many years.
- The story of his musical brilliance and knowledge travelled and Akbar invited Tansen to be a part of his court musicians in the Mughal court. A Vaishnava musician, he first refused, but after Ram Chandra insisted he go, he joined the court at the age of 60.
- Abul Fazl's Ain-i-Akbari mentions 36 imperial musicians, out of which 15 were from Gwalior. Akbar's admiration for Tansen has found much place in popular culture and much of it comes from the writings about the musician.

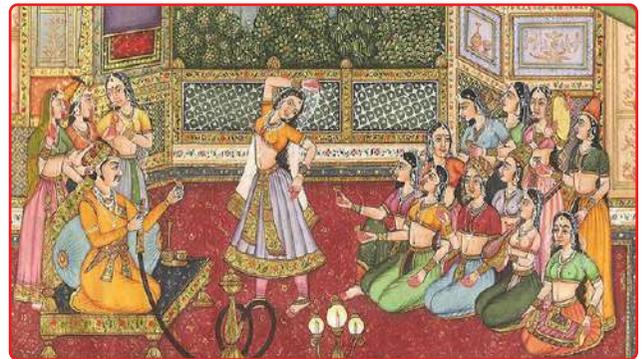
### Some notable names from the Gwalior gharana:

- The well-known names include Haddu Khan's son Bade Inayat Hussain Khan (1852-1922), Vasudeva Buwa Joshi, Balakrishnabuwa Ichalkaranjkar (1849-1926) who taught Vishnu Digambar Paluskar who

later founded the Gandharva Mahavidyalaya which continues till today, famed educator BR Deodhar and Pakistani singer Farida Khanum among others.

- The generation that came after included Pt Kumar Gandharv, Malini Rajurkar, Veena Sahasrabudde, and Dharwad-based Pt Venkatesh Kumar, whose music also has distinct touches of Kirana gayaki among others.

## INDIAN MINIATURE PAINTING TRADITION



### Why in news?

- Indian art historian and critic Brijinder Nath Goswamy, best known for his scholarship on Indian miniature painting tradition recently passed away.

### Details:

- A Padma Bhushan recipient and former IAS officer, Goswamy first came under the spotlight after the publication of his ground-breaking 1968 article, 'Pahari Painting: The Family as the Basis of Style'.
- In this he was able to unearth family lineages of renowned artists who played an essential role in the development and continuation of miniature painting, the revelation was one of his biggest contributions to the history of miniature paintings in India.

### Tradition of Indian miniature painting:

- Miniature painting is an intricate form of art involving highly detailed paintings on a small scale.

### Origin:

- The roots of the miniature painting tradition go back to the Buddhist Pala dynasty, which ruled Bengal and Bihar from the 8th century until the end of the 11th century.
- The paintings during this era existed in the form of illustrations of religious texts on Buddhism and Jainism.
- The illustrations were made on palm leaf until paper was introduced between the 11th and 13th centuries.

### Mughal period:

- The tradition didn't begin to thrive until the rise of the Mughal Empire in the early 1500s.
- It was only through the emphasis and funding provided by Humayun and his descendants that court painting in the form of Mughal miniatures came to

be seen as the highest form of sophistication and elegance.

- Mughal miniatures were not bigger than a few square inches and featured brightly coloured paintings used to illustrate manuscripts and art books. They were astonishingly accurate, with some lines painted using brushes composed of a single hair.

#### Migration to regional courts:

- The tradition of Mughal miniature began to decline during the reign of Aurangzeb. This led to the migration of skilled miniaturists to the princely courts of Rajasthan and lower Himalayan hill kingdoms of North India and the plains of Punjab.
- It's in places like Himachal Pradesh, Jammu and Tehri-Garhwal that a new tradition of miniature painting took birth and came to be known as Pahari painting, Rajasthan too witnessed the rise of different schools of miniature painting.
- Pahari paintings featured both religious and secular subjects. Detailed paintings based on religious epics such as Mahabharat and Ramayana, Puranas, and Gita were frequently painted in the style.

#### Deccan painting:

- Miniature painting also flourished in the Deccan region between the 16th and 19th centuries. It emerged after the break-up of the Bahmani Sultanate in 1520.
- Known as Deccan painting, the style initially developed independent of Mughal influences and took cues from European, Iranian and Turkish influences.
- Deccani miniature paintings showcased illumination and decoration of text from the Holy Quran and the Surahs. Indigenous art forms and romantic elements were later amalgamated into this art form.

#### B.N. Goswamy's about miniature paintings:

- Goswamy in his 1968 article, which focused on Pahari painting, illustrated that the style of paintings didn't depend on in which state they were being produced. The style was dependent on the family of painters.
- He then went on to reconstruct the entire family networks of some of the most renowned Indian miniature families, including that of Pandit Seu, who worked in Himachal Pradesh's Guler, and his sons, Nainsukh and Manaku (together they dominated one of the most exciting periods of Pahari painting), as well as their numerous artist grandchildren.
- The historian did this by "employing a combination of detective work and intuition, he managed to marry the evidence from inscriptions on the back of miniatures with 18th-century pilgrim records kept in the Ganges holy town of Haridwar.
- Although he initially focused on the artists of the Punjab hills, he gradually broadened his research scope by including more regions from northern to southern India.

- He has succeeded in reconstructing whole dynasties of previously obscure artists, given them names, and restored their identities and honour.

## MISCELLANEOUS

### WHAT LED ICC TO SUSPEND SRI LANKA CRICKET?



#### Why in news?

- Recently, the International Cricket Council (ICC) suspended Sri Lanka Cricket (SLC) over government interference.

#### What was the 'government interference'?

- In the immediate aftermath of Sri Lanka's disastrous ninth-place finish in the 2023 World Cup in India, as a result of which it missed out on qualifying for the 2025 Champions Trophy, Sri Lanka's Sports Minister Roshan Ranasinghe sacked the SLC board and chose former captain Arjuna Ranatunga to head an interim committee.
- However, Sri Lanka's Court of Appeal issued a two-week stay order and reinstated the SLC regime.
- Sri Lankan parliament unanimously passed a resolution seeking the cricket board's removal, perhaps the final straw in ICC's eyes.
- The SLC and the government have, in fact, been at loggerheads for a considerable time, with Mr. Ranasinghe accusing the cricket bosses of maladministration and corruption, and SLC, in turn, criticising the government of unnecessary meddling.

#### What are ICC rules on govt. interference?

- According to article 2.4, clause D of the ICC Memorandum & Articles of Association, each member must at all times "manage its affairs autonomously and ensure that there is no government (or other public or quasi-public body) interference in its governance, regulation and/or administration of Cricket in its Cricket Playing Country (including in operational matters, in the selection and management of teams, and in the appointment of coaches or support personnel)."
- While there is no bar on politicians holding office, the ICC requires that all decision-making rests with an

executive body whose office-holders are determined via free and democratic elections.

- ⇒ On the day of the suspension, Sri Lanka's sports minister has had the role of ratifying all national teams, as per the nation's sports law, which has been in place since 1973.

#### How will the suspension affect Sri Lanka?

- ⇒ The ICC Memorandum & Articles of Association states that "any Member that has its membership suspended shall, unless the Board of Directors decides otherwise in its absolute discretion, and for the period of such suspension, be deprived of all of its rights as a Member (whether set out in these Articles of Association or otherwise), including its right to receive distributions of surplus ICC revenues, its right

to participate in events sanctioned by the ICC and its right to attend and vote at meetings."

- ⇒ When Zimbabwe was de-recognised, all cricketing activity in the country was shut down and funds frozen.
- ⇒ When Sri Lanka was partially sanctioned in 2014-15, ICC had placed the funds due to the island nation in an escrow.

#### What's next?

- ⇒ The Sri Lankan government will approach the ICC's dispute resolution committee, an ICC body that reviews appeals from boards on membership matters.
- ⇒ In case of a failure, the ministry would knock on the doors of the International Olympic Committee-authorised Court of Arbitration for Sport in Lausanne, Switzerland.

Under the Guidance of  
**Dr. S. S. Pandey**

IAS



PCS

An honest effort  
Since 2004

DIKSHANT **SCHOLARSHIP** PROGRAMME

# UPPCS PRE-2024 TEST SERIES (ONLINE/OFFLINE)

Module Wise- 8 Test

Full GS- 6 Test

Full CSAT- 5 Test

START FROM:

**10**  
DECEMBER

ADMISSION

OPEN

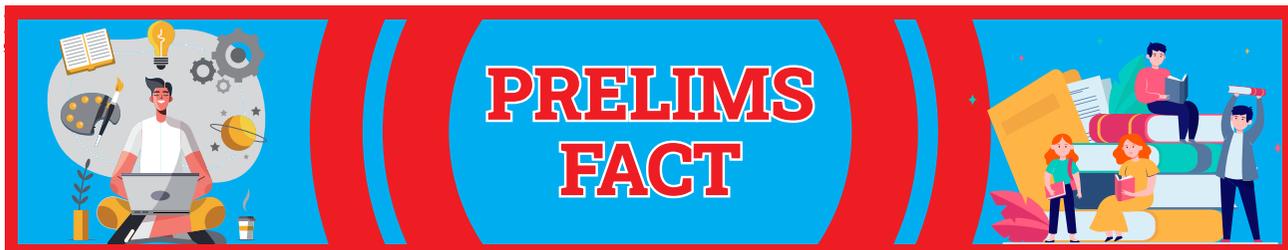


CALL US:

7428092240



9810386285



## POLITY & GOVERNANCE

### UPSC TIGHTENS RULES FOR APPOINTMENT OF STATE POLICE CHIEFS



#### Why in news?

- ⇒ Only police officers with at least six months of service left before retirement will be considered for appointment as the Director-General of Police (DGP) of a State, the Union Public Service Commission (UPSC) said in amended guidelines.
- ⇒ The Empanelment Committee constituted by the UPSC will not assess Indian Police Service (IPS) officers on Central deputation for a State DGP's post if the Union Ministry of Home Affairs (MHA) says that "it will not be possible to relieve the officers".
- ⇒ The amendments make explicit what have been considered unwritten norms, even as some States have appointed DGPs on the verge of retirement, and many States have appointed acting DGPs to avoid due process.

#### Key Highlights:

- ⇒ The guidelines were revised to discourage States from appointing "favourite officers" about to retire, in a bid to extend their tenure.
- ⇒ The guidelines also allow officers with 25 years of experience to be appointed as a DGP, against the earlier requirement of a minimum 30 years of service.
- ⇒ The number of shortlisted officers cannot exceed three, but may consist of less than three officers in "exceptional circumstances". Officers will not be included in the panel unless they themselves are willing.

#### Background:

- ⇒ The amended UPSC guidelines come in the wake of several States, choosing to appoint acting DGPs

instead of regular DGPs, bypassing the requirement to go through the UPSC-selected panel of eligible officers.

- ⇒ States such as Uttar Pradesh, Punjab, Andhra Pradesh, and Telangana have all appointed "in-charge" DGPs, or DGPs with "full additional charge". In fact, Uttar Pradesh has not had a full-time DGP since 2022.
- ⇒ Former Punjab DGP V.K. Bhawra has moved the Central Administrative Tribunal against the appointment of Gaurav Yadav as acting DGP by the Aam Aadmi Party government in the northern State.

### BIHAR HOUSE PASSES BILL RAISING CEILING ON CASTE QUOTA TO 65 PERCENTAGE



#### Why in news?

- ⇒ The Bihar Assembly recently unanimously passed a Bill to increase reservation for Backward Classes, Extremely Backward Classes, Scheduled Castes, and Scheduled Tribes from the existing 50% to 65%.
- ⇒ Together with the 10% Economically Backward Class (EWS) quota, the Bill will push reservation in Bihar to 75%, well past the 50% ceiling set by the Supreme Court.

#### Key Highlights:

- ⇒ As per the Bihar Reservation Amendment Bill, quota
  - for Extremely Backward Class (EBC) will be raised from the existing 18% to 25%;
  - for Backward Class (BC) from 12% to 18%;
  - for Scheduled Caste (SC) from 16% to 20%; and
  - for Scheduled Tribe (ST), the quota will be doubled, from 1% to 2%.
  - The existing 3% reservation for BC women has been scrapped.
- ⇒ Bills providing for the same increase in reservation in educational institutions and government jobs, which were drafted based on the recent caste survey in the

State, too were passed unanimously through voice vote in the State Assembly.

#### What's next?

- The amended Bill will now be sent to the Governor for his assent before it becomes a law.

### SPEEDY DISPOSAL OF CASES AGAINST LAWMAKERS



#### Why in news?

- The Supreme Court recently issued guidelines to monitor the speedy disposal of criminal cases against Members of Parliament (MPs) and Members of Legislative Assemblies (MLAs).
- Among the guidelines issued to High Courts across the country, the court called for the setting up of a "special bench" to monitor criminal cases against legislators as well as suo motu registration of such cases by HCs.

#### What is this case?

- The directions were given by a Chief Justice of India-led bench while acting on a plea filed by advocate Ashwini Kumar Upadhyay.
- The plea filed in August 2016 sought speedy disposal of cases involving lawmakers.
- It also sought a lifetime ban on convicted politicians, including sitting legislators, from contesting elections rather than subjecting them to the six-year ban, as laid down under Section 8(3) of the Representation of People Act, 1951.
- Section 8 of the RP Act, 1951, mainly deals with the disqualification of lawmakers on conviction for certain offences.

#### What does the RP Act say?

- Introduced by Dr BR Ambedkar in the Parliament, the Representation of the People Act, 1951, provides for the conduct of elections to the houses of parliament and the legislatures of each state, the qualifications and disqualifications for membership of those houses, corrupt practices, and other offences taking place at or in connection with the elections.
- Although there are several provisions that deal with disqualification under the RPA, Section 8 specifically deals with disqualification of legislators

on conviction for offences like promoting enmity between two groups, bribery, and undue influence, along with hoarding, profiteering, or adulteration of food or drugs.

- While the SC in its ruling addressed the first aspect of Upadhyay's plea seeking speedy disposal of cases against MPs and MLAs, it kept open the issue of replacing the 6-year ban with a lifetime one.

#### Highlights of the judgement:

- The bench laid down guidelines for monitoring the early disposal of pending cases against lawmakers.
- Among these was the registration of suo motu cases by the chief justices of various high courts across the country to monitor the quick disposal of pending criminal cases against legislators.
- Adding that such cases can be heard by a CJ-led special bench or a bench designated by her, the court said that such cases can also be listed at regular intervals, if necessary. The special bench may also call upon the advocate general or prosecutor to assist the court.
- Stating that it would be difficult to lay down uniform guidelines for trial courts across the country to dispose of such cases, the court left it to the high court to devise measures to effectively monitor such cases.
- Further, the court said that priority shall be given to cases against lawmakers that are punishable with death or life imprisonment. Besides this, cases punishable with five years imprisonment or more will also be prioritised.

### AAINA DASHBOARD FOR CITIES PORTAL LAUNCHED



#### Why in news?

- The 'AAINA Dashboard for Cities' portal has been made live by Ministry of Housing and Urban Affairs (MoHUA).
- The Urban Local Bodies (ULBs) across the country can participate in this pioneering initiative to voluntarily submit their key data on a regular basis, through a simple, easy-to-fill, data entry form on the portal.

#### Key Objectives:

- The primary objectives of the AAINA Dashboard are to help cities to

- a) see how they are faring vis-à-vis other cities,
  - b) inspire them by pointing to possibilities and areas of improvement and
  - c) providing opportunity to learn and engage with frontrunners.
- ⇒ While not ranking the ULBs, the AAINA dashboard would serve as a tool for comparing similarly placed cities and promoting peer learning among cities.

#### Pillars:

- ⇒ The Dashboard will present the data submitted by the ULBs on the basis of indicators across five broad pillars namely,
  - a) Political & Administrative Structure
  - b) Finance
  - c) Planning
  - d) Citizen Centric Governance and
  - e) Delivery of Basic Services.

#### Robust database:

- ⇒ The ULBs will submit their data, including audited accounts, and self-reported performance metrics by logging in to the dashboard's portal.
- ⇒ ULBs would be free to update the information initially provided by them, anytime on the portal as per need.
- ⇒ The Dashboard has been envisaged as a permanent platform for ULB related data that would be updated on a regular basis.
- ⇒ With active cooperation of all ULBs, the 'AAINA Dashboard for Cities' aims to create a robust database of the key performance metrics of Urban Local Bodies, which could be accessed by all stakeholders, and subsequently would open for public view once it gets populated.

#### Handling:

- ⇒ The Ministry through Digital India Corporation will provide handholding support to ULBs / States in the data submission process on a need basis.

### CENTRE ASKS STATES TO USE TRACKING DEVICES ON PRISON INMATES RELEASED ON PAROLE



#### Why in news?

- ⇒ The Union Home Ministry has said States may use tracking devices on prison inmates when they are released on parole.

- ⇒ It also called for segregation of hardened criminals from other category of criminals.

#### Model Prisons and Correctional Services Act, 2023:

- ⇒ The suggestion is part of the Model Prisons and Correctional Services Act, 2023.
- ⇒ It says that prisoners may be granted prison leave on the condition of their willingness to wear electronic tracking devices for monitoring the movement and activities of such prisoners.
- ⇒ Any violation by the prisoner will attract cancellation of prison leave, in addition to disqualification from any prison leave being granted in future, as may be prescribed under the rules.
- ⇒ The Act said that appropriate and advanced security infrastructure and procedures shall be in place for the high-risk prisoner ward in all central and district prisons.
- ⇒ It also asks the States to digitise the prison administration and integrate the database with the Interoperable Criminal Justice System.

#### Implementation in J&K:

- ⇒ Earlier, the Jammu and Kashmir Police introduced GPS tracker anklet for monitoring a terror accused out on bail.

### PARLIAMENTARY PANEL ON CRIMINAL LAW BILL LEAVES DECISION ON DEATH PENALTY TO CENTRE



#### Why in news?

- ⇒ The proposed Bharatiya Nyaya Sanhita (BNS) Bill, 2023, which seeks to replace the British-era Indian Penal Code (IPC), has increased the number of crimes which can attract the death penalty from 11 to 15, says a parliamentary panel report.

#### Abolition of the death penalty:

- ⇒ India has in the past voted against a United Nations General Assembly's draft resolution on the abolition of the death penalty.
- ⇒ A study conducted by the National Law University, Delhi, the Annual Statistics Report 2022, published by Project 39A shows that till December 31, 2022, as many as 539 prisoners had been on death row in India, the highest since at least 2016.

- The parliamentary panel, headed by BJP member Brij Lal, recommended that the matter be left to the Union government to consider.

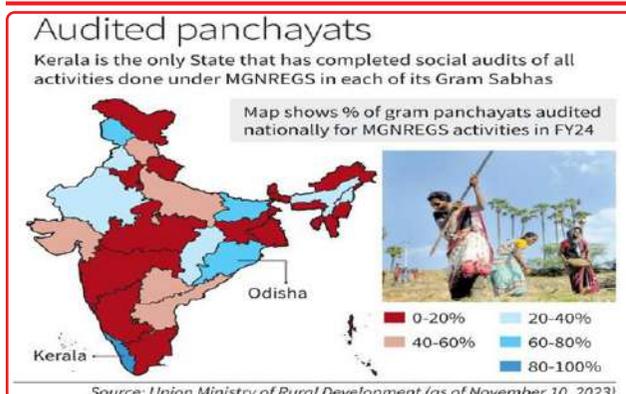
#### Dissent notes:

- Three Opposition members; P. Chidambaram and Digvijaya Singh of the Congress and Derek O'Brien of the Trinamool Congress submitted dissent notes against the provision.
- Mr. Singh said while the government had hailed the Bills as a move towards shedding the colonial nature of criminal laws, the Bills still retained the colonial spirit of the current laws and punishments for some offences had been made harsher and the death penalty had been added for at least four new crimes such as mob lynching, organised crime, terrorism and rape of a minor.
- According to the data, the Supreme Court has affirmed the death penalty in only seven cases in the last six years. While the imposition of the penalty itself causes distress and trauma, the wait before the sentence is set aside or confirmed causes distress many times more. It has been established that death penalty is no deterrent to serious crime.
- Mr. O'Brien, the Trinamool leader, said that based on national statistics, it can be observed that 74.1% of individuals on death row in India come from economically disadvantaged backgrounds.

#### Rarest of rare case:

- The domain experts submitted before the committee that the "rarest of rare case" doctrine should be defined in more objective terms, if the death penalty has to be retained.
- On the lines of 'Sentencing Councils' in the United Kingdom, the experts opined that the quasi-judicial boards should be made to exercise probation, commutation and remission to provide greater scope for victims to have a say; and timelines should be indicated for mercy petitions to be heard and disposed of.

### MGNREGS AUDIT CROSSES 50 PERCENT LOCAL BODIES IN JUST SIX STATES



#### Why in news?

- Of the 34 States and Union Territories, only six have completed social audit of works done under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) in more than 50% of gram panchayats.

#### Corruption:

- High rate of corruption is one of the primary complaints against the scheme and social audit is the inbuilt anti-corruption mechanism in the Act.
- These numbers are sourced from the Management Information System (MIS) on Social Audit maintained by the Union Ministry of Rural Development.

#### Social audit:

- Section 17 of the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) says the gram sabha "shall monitor the execution of works".
- Each State has social audit units which are supposed to work independent of the implementing authorities.
- The auditing standards laid down by the Comptroller and Auditor General were issued only on December 19, 2016. Under these, every Social Audit Unit is entitled to funds equivalent to 0.5% of the MGNREGA expenditure incurred by the State in the previous year.
- The audit involves quality checks of infrastructure created under the MGNREGA and checking for financial misappropriation in wages and procedural deviations.

#### Key Highlights:

- Kerala is the only State to cover 100% gram panchayats.
- Other than Kerala, the States to cross the 50% mark are Bihar (64.4%), Gujarat (58.8%), Jammu and Kashmir (64.1%), Odisha (60.42%) and Uttar Pradesh (54.97%).
- Only three States have covered 40% or more villages; Telangana (40.5%), Himachal Pradesh (45.32%) and Andhra Pradesh (49.7%).
- Other than Telangana, the numbers are really low in Madhya Pradesh (1.73%), Mizoram (17.5%) Chhattisgarh (25.06%), and Rajasthan (34.74%).

#### Concerns:

- The Centre has, multiple times, reminded the States that if the social audits are not conducted regularly, then the funds under the MGNREGS will be withheld.
- The States complain that the audit is delayed because the Centre does not release the funds for the social audit units, which work independent of the State governments, in time.
- There are recurrent complaints of delayed salaries for the village-level auditors.

## ECONOMY

### DAY NRLM AND SIDBI SIGNED MOU

#### Why in news?

- Deendayal Antyodaya Yojana - National Rural Livelihood Mission (DAY-NRLM) under the Ministry

of Rural Development and the Small Industries Development Bank of India (SIDBI) recently signed a Memorandum of Understanding (MOU).

- This strategic partnership brings together the expertise of DAY-NRLM and SIDBI to create a transformative initiative aimed at promoting women-led enterprises among experienced members of Self Help Groups (SHGs).



#### Mandate:

- The primary focus of this collaboration is to demonstrate on-the-ground activities that establish a reliable and sensitive support structure for the capacity enhancement of women entrepreneurs (WEs).
- Furthermore, it aims to institutionalize standard protocols, systems, and procedures for streamlined access to formal finance, as well as the development of a comprehensive framework for new financial products and schemes.

#### Key outcomes expected from this collaboration are:

- Enhanced capacity and ability of State Rural Livelihood Missions (SRLM) teams to promote the graduation of seasoned SHG members into micro-entrepreneurs
- The establishment of a reliable and sensitive support architecture for women-led enterprises, involving a network of field cadres, mentors, and experts
- The implementation of standardized protocols within DAY-NRLM to support women-led enterprises
- The formation of partnerships with financial institutions and a network of financiers
- The design and implementation of new financial schemes, such as credit guarantees and interest subventions
- The creation of clear, scalable models for promoting women-led enterprises which can be replicated nationwide

#### Way Forward:

- By combining the strengths of DAY-NRLM and SIDBI, this initiative seeks to open up new avenues for women entrepreneurs, ultimately contributing to the economic growth and prosperity of the nation.

## MAJOR ACTION TO CURB FILM PIRACY AS INDUSTRY FACES LOSSES OF RS. 20,000 CRORE ANNUALLY DUE TO PIRACY



#### Why in news?

- In a stringent measure aimed at checking film piracy, the government has appointed nodal officers to order taking down pirated content from digital platforms.
- The decision coming in the wake of the Cinematograph Amendment Bill 2023 passed in Parliament recently was announced by the Ministry of Information & Broadcasting.

#### Why it matters?

- As of now there is no institutional mechanism to directly take action on pirated filmic content except legal action under Copyright Act and IPC.
- With the proliferation of internet and almost everyone interested to watch filmic content for free, there has seen a boom in piracy. The above action would allow instant action by Ministry of Information and Broadcasting in case of piracy and will provide relief to the industry.

#### Key Highlights:

- These officers have been appointed in the Ministry of I&B and offices of Central Board of Film Certification headquarter in Mumbai and its regional offices in major film production centres.
- The Act aimed to curb film piracy, a measure which has been a long-standing demand of the film industry and the appointment of nodal officers is a major step in that direction.
- The Act has been amended after 40 years to incorporate provisions against film piracy, including digital piracy after the last significant amendments were made in 1984.
- The amendment includes strict punishment of minimum 3 months imprisonment and fine of Rs. 3 lakh which can be extended up to 3 years imprisonment and fine upto 5% of the audited gross production cost.

#### Who can apply?

- An original copyright holder or any person authorised by them for this purpose can apply to the Nodal Officer to take down pirated content.

- If a complaint is raised by a person who does not hold the copyright or is not authorised by the copyright holder, the Nodal Officer can hold hearings on a case to case basis to decide the genuineness of the complaint before issuing the directions.
- After receiving directions from the Nodal Officer under the law, the digital platform will be obliged to remove such internet links hosting pirated content within a period of 48 hours.

### Cinematograph (Amendment) Act, 2023:

- The Cinematograph (Amendment) Act, 2023 (12 of 2023) passed by the Parliament in the Monsoon Session of 2023 addressed the issues relating to film certification, including the issue of unauthorized recording and exhibition of films and film piracy by transmission of unauthorized copies on the internet and imposes strict penalties for piracy.
- These amendments are in harmony with the existing laws that address the issue of film piracy, viz. the Copyright Act, 1957 and the Information Technology Act (IT) 2000.
- The newly inserted section 6AB of the Cinematograph Act, 1952 provides that no person shall use or abet the use of an infringing copy of any film to exhibit to the public for profit at a place of exhibition which has not been licensed under this Act or the rules made thereunder; or in a manner that amounts to the infringement of copyright under the provisions of the Copyright Act, 1957 or any other law for the time being in force.
- Further, the newly inserted section 7(1B)(ii) in the Cinematograph Act provides that the Government may take suitable action for removing/disabling access to such an infringing copy exhibited/hosted on an intermediary platform in a manner in contravention to the section 6AB referred to above.

### GOI AND ADB SIGN 400 MILLION DOLLAR LOAN TO SUPPORT URBAN SERVICES



#### Why in news?

- The Government of India has signed a \$400 million policy-based loan with Asian Development Bank (ADB) to support its urban reform agenda for creating

high quality urban infrastructure, improving service delivery, and promoting efficient governance systems.

#### Sub-programme 2:

- It is a loan agreement for the Sub-programme 2 of the Sustainable Urban Development and Service Delivery Programme.
- While Sub-programme 1 approved in 2021 with a financing of \$350 million established national-level policies and guidelines to improve urban services, Sub-programme 2 is supporting investment planning and reform actions at the state and urban local body (ULB) levels.
- Sub-programme 2 supports the reforms initiated by the states and the ULBs in operationalising the national flagship programme of Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2.0 targeted for universal access of water supply and sanitation.
- The sub-programme also supports other mission objectives for ensuring urban water security through reducing water losses, recycling treated sewage for non-domestic use, rejuvenation of water bodies, and maintaining sustainable ground water level.

#### Salient features:

- The programme envisages integrated urban planning reforms to control urban sprawls and foster systemic and planned urbanisation through enhancing the entire ecosystem of legal, regulatory, and institutional reforms along with capacity building of ULBs and community awareness.
- Specifically, ULBs will promote modernisation of building bylaws, land pooling, urban agglomeration, and comprehensive urban mobility planning through transit-oriented development to help cities become well-planned centres of economic growth.
- Such integrated planning processes will incorporate climate and disaster resilience, promote nature-based solutions, improve urban environment, and improve cities' financial sustainability through generation of additional revenues.

#### Way Forward:

- This will substantially help cities to mobilise innovative financing such as commercial borrowings, issuance of municipal bonds, sub sovereign debts, and public-private partnerships to bridge significant deficits in urban infrastructure investments.

### GOVT CONSTITUTES COMMITTEE TO DRAFT SAFETY PLEDGE FOR E-COMM PLATFORMS

#### Why in news?

- The government has constituted a committee to draft the safety pledge for e-commerce platforms as it seeks to prevent the sale of unsafe goods to consumers through online marketplaces.



⇒ The panel, which includes members from major e-commerce platforms, voluntary consumer associations, industry bodies and National Law Universities, will submit its report in two weeks.

### Key Highlights:

- ⇒ The meeting began with a presentation by the Department of Consumer Affairs, emphasising the importance of safety of goods for consumers and the provisions under the Consumer Protection Act, 2019 to prevent the sale of unsafe goods to consumers.
- ⇒ International examples of safety pledge being implemented in other jurisdictions such as the European Union (EU), Japan, Australia, South Korea, and Canada were also discussed. The sale of safe goods to consumers is among the strong principles of the Consumer Protection Act, 2019.
- ⇒ 'Consumer rights' recognized under Section 2(9) of the Act include the right to be protected against the marketing of goods, products or services which are hazardous to life and property. Further, consumer commissions are empowered under the Act to pass directions to entities to not offer hazardous or unsafe goods for sale.
- ⇒ The department is actively collaborating with the European Commission to adopt best international practices aimed at detecting and preventing the sale of unsafe goods to consumers on online platforms.
- ⇒ The product safety pledge is a voluntary commitment by online platforms with respect to the safety of goods sold to consumers. The pledge aims to better protect consumers from the risk of purchasing unsafe products available for sale on e-commerce platforms.
- ⇒ The proposed principles of the safety pledge for e-commerce platforms include detecting and preventing the sale of unsafe products, cooperating with statutory authorities responsible for product safety, raising consumer product safety awareness amongst third-party sellers and empowering consumers on product safety issues.

### Way Forward:

- ⇒ The safety pledge aims to raise standards across all online marketplaces operating in India.

## UP, BIHAR REPLACE KERALA AS TOP CONTRIBUTOR OF WORKFORCE TO GCC COUNTRIES



### Why in news?

- ⇒ There has been a significant pattern shift in migration of Indian workers to the six Gulf Cooperation Council (GCC) countries; Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates with Kerala, typically the biggest contributor of blue-collar workers, seeing a 90 per cent drop.
- ⇒ The vacuum so caused has been filled by Uttar Pradesh and Bihar, which have emerged as top contributors, shows a study by UAE-based organisation, Huntr.

### Migration pattern:

- ⇒ Overall, there has been a 50 per cent increase in migration of blue-collar Indian workers to the GCC countries in first seven months of 2023.
- ⇒ The top five states by the number of workers sent to GCC, according to the Huntr study, have been Uttar Pradesh, Bihar, Kerala, West Bengal, and Tamil Nadu.
- ⇒ The preferred destinations for labour migration remain Saudi Arabia, the UAE, Qatar, Kuwait, and Oman.

### Profile of the migrating workforce:

- ⇒ The workforce migrating to the GCC countries are typically aged 20-40 years, in the prime of their working age.
- ⇒ The migrating workforce has been traditionally dominated by men, but there is a substantial increase in participation of women, especially in sectors such as hospitality.
- ⇒ The migrant workers' qualifications and educational backgrounds differ while there also are individuals with skills tailored for specific job roles, according to the study.
- ⇒ Most of the migrant workers belong to low-income families with an aspiration to improve their financial situation with jobs in Dubai.

### Challenges & Way Forward:

- ⇒ The blue-collar workers often grapple with challenges such as financial and contractual issues, which collaborative efforts between India and the UAE

- are diligently addressing to ensure fair recruitment practices.
- Concurrently, the UAE government's initiatives enhance the legal rights and working conditions of blue-collar workers, while skill enhancement and career growth are actively supported through partnerships between Huntr and non-profit organisations.

### INTERNATIONAL TROPICAL TIMBER COUNCIL CONCLUDES



#### Why in news?

- The 59th International Tropical Timber Council (ITTC), concluded recently.
- The session was held in Thailand to decide the future of IITC, whether it should continue and how to proceed.

#### About IITC:

- The IITC is the governing body of the International Tropical Timber Organisation (ITTO), which aims to promote sustainable management and conservation of tropical forests.
- It meets at least once a year to discuss a wide-ranging agenda aimed at promoting sustainable tropical forest management and the trade of sustainably produced tropical timber.

#### Key Highlights:

- The council concluded with five decisions, with the European Union expressing concern about the state of the world's forests in the backdrop of climate change and biodiversity.
- The countries agreed to endorse eight projects related to sustainable forest management and related objectives.
- The session also approved and adopted a budget of \$7.1 million for the coming financial year 2024-25.
- The work programme for 2024-25 was also adopted, which included a request to the executive director to collaborate closely with members of the Collaborative Partnership on Forests and other partners on implementation.
- The council also approved a trial measure that will allow ineligible members to submit project proposals and concept notes.

- Members who have fallen behind on their financial contributions and are thus ineligible will be allowed to submit one project and concept note for every two years of arrears paid.

#### What's next?

- The Council is expected to make a decision by June 1, 2024, on its extension for three years, until 2029.

### INDIA BECOMES CHAIR OF INTERNATIONAL SUGAR ORGANISATION (ISO) FOR 2024



#### Why in news?

- In its 63rd council meeting, International Sugar Organisation (ISO), headquartered in London, has announced India to be the Chair of the organisation for 2024.

#### Details:

- India has been the largest consumer and second largest producer of sugar in the world.
- With about 15% share in global sugar consumption and about 20% production of sugar, Indian sugar trends affects the global markets profusely.
- This leading position makes India as the most suitable nation to lead International Sugar Organisation (ISO) which is the apex international body on sugar and relating products having about 90 countries as members.

#### Indian sugar industry:

- With Brazil in the Western Hemisphere, India is the market leader in Eastern Hemisphere for sugar market.
- Now, being the 3rd largest country in the world in ethanol production after USA and Brazil, India has shown commitment towards green energy and its capability to twist the challenges of surplus sugar in domestic market to solution of fossil fuels imports and a tool to meet COP 26 targets for India.
- It is remarkable that ethanol blending percentage in India has increased from 5% in 2019-20 to 12% in 2022-23 while the production has increased from 173 crore litres to more than 500 crore litres during the same period.
- National Sugar Institute, Kanpur has spread its wings and is collaborating with many countries including

Indonesia, Nigeria, Egypt, Fiji etc. for sharing the latest technologies in the sector and best practices.

## SECURITY

### HINDUSTAN AERONAUTICS AND SAFRAN LAUNCH JV FOR HELICOPTER ENGINES



#### Why in news?

- Hindustan Aeronautics Ltd (HAL) has incorporated a joint venture (JV) with France-based Safran Helicopter Engines under the name 'Safhal Helicopter Engines Pvt Ltd'.
- The JV will design, develop, certify, produce, sell and support helicopter engines.
- The first opportunities identified are engines for the Indian Multi-Role Helicopter (IMRH) and Deck-Based Multi-Role Helicopter (DBMRH).

#### Safran-HAL Aircraft Engines facility:

- Safran-HAL Aircraft Engines facility is a 50/50 joint venture between French aerospace company Safran Aircraft Engines and state-owned defence PSU HAL.
- It was inaugurated in a Special Economic Zone near the Kempegowda International Airport in July 2022.
- The plant manufactures complex piping mostly for the LEAP engine.

#### Details:

- They would jointly develop industrial cooperation in manufacturing ring forgings for commercial aircraft engines.
- These products, which HAL and Safran will jointly produce in Bengaluru, will power the Airbus A320 Neo family and the Boeing 737 Max single-aisle airliners.

#### Background:

- HAL and Safran Helicopter Engines already have multiple partnerships, including the Shakti engine, which powers HAL-produced helicopters, including the Dhruv, Rudra and the Light Combat Helicopter (LCH). Over 500 Shakti engines have already been produced.
- Safran has been operating in India for 65 years and has 10 facilities and 750 employees nationwide.

### SURYA KIRAN XVII



#### Why in news?

- The 17th edition of Joint Military Exercise Surya Kiran will be conducted in Pithoragarh, Uttarakhand from 24th November to 07th December 2023.

#### Details:

- It is an annual event and conducted alternatively in the two countries.
- The Indian Army contingent comprising of 354 personnel is being led by a Battalion from the KUMAON Regiment. The Nepal Army contingent is represented by Tara Dal Battalion.

#### Focus:

- Aim of the exercise is to enhance interoperability in jungle warfare, counter terrorism operations in mountainous terrain and Humanitarian Assistance and Disaster Relief under United Nations Charter on peace keeping operations.
- The exercise will focus on employment of drones and counter drone measures, medical training, aviation aspects and also environment conservation.
- Through these activities, the troops will enhance their operational capabilities, refine their combat skills and strengthen their coordination in challenging situations.

#### Way Forward:

- The exercise will provide a platform for soldiers from India and Nepal to exchange ideas and experiences; share best practices and foster a deeper understanding of each other's operational procedures.
- The exercise aims to achieve shared security objectives and foster bilateral relations between two friendly neighbours.

### EXERCISE MITRA SHAKTI 2023

#### Why in news?

- The ninth edition of Joint Military exercise "Exercise MITRA SHAKTI-2023" commenced recently in Aundh (Pune).
- The exercise is being conducted from 16th to 29th November 2023.



### Scope:

- The aim of the exercise is to jointly rehearse conduct of Sub Conventional operations under Chapter VII of United Nations Charter.
- The scope of the exercise includes synergising joint responses during counter-terrorist operations. Both sides will practice tactical actions such as raid, search and destroy missions, heliborne operations, etc.
- In addition, Army Martial Arts Routine (AMAR), combat reflex shooting and Yoga will also form part of the exercise curriculum.

### Key Highlights:

- It involve employment of Drones and Counter Unmanned Aerial Systems besides helicopters.
- Drills to secure helipads and undertake casualty evacuation during counter-terrorist operations will also be rehearsed jointly by both sides.
- Collective efforts will focus on achieving an enhanced level of interoperability amongst the troops and reduce the risk of life and property while keeping the interests and agenda of the UN at the forefront during peace keeping operations.
- Both sides will exchange views and practices of joint drills on a wide spectrum of combat skills that will facilitate the participants to mutually learn from each other.

### Way Forward:

- Sharing of best practices will further enhance the level of defence cooperation between Indian Army and Sri Lankan Army.
- The exercise will also foster strong bilateral relations between the two neighbouring nations.

## ENVIRONMENT

### ISA TO PROVIDE 10 MILLION DOLLAR TO THE GSF

### Why in news?

- The International Solar Alliance (ISA) announced that the Global Solar Facility (GSF) is set to receive a capital contribution of \$35 million dollars.

### About GSF:

- The Global Solar Facility (GSF) is designed to catalyze solar investments in underserved segments and

geographies across Africa, unlocking commercial capital in the process.



- In 2022, the ISA Assembly approved the Global Solar Facility, which is expected to attract private capital to flow into off-grid solar projects, rooftop solar projects, and productive use solar projects.
- This financing vehicle, bolstered by payment guarantees, insurance, and investment funds, aims to
  - a) mitigate project risks,
  - b) provide technical assistance to address regulatory gaps,
  - c) reduce currency risks, and
  - d) resolve contractual and financial uncertainties in the solar energy sector.
- The Government of India is considering a \$25 million investment as capital contribution in the GSF in addition to \$10 million coming from the ISA. Bloomberg Philanthropies and CIFF have also committed their support to the GSF.

### Diversifying investments in solar energy in Africa:

- The ISA highlighted the need for diversifying investments in solar energy in Africa for mitigating climate change and a balanced energy transition.
- Despite its vast solar potential, Africa possesses only 1.3% of the world's installed solar capacity (11.4 GW out of 849 GW in 2021). With nearly 600 million people in Africa lacking access to electricity, there exists a compelling case for distributed solar power projects.
- Following the approval and launch of GSF at COP27, the ISA Secretariat has been conducting discussions with potential investors including member countries, development finance institutions, pension funds, and potential investment managers from across the world.
- The ISA has signed Memorandum of Understanding (MOUs) with Multi-Lateral Investment Guarantee Fund (MIGA), Africa 50, West African Development Bank (BOAD) for facilitating investments through the GSF in Africa.

### What's next?

- After Africa, the GSF aims to expand to regions such as Asia, Latin America and the Middle East, where the Regional Facilities will be tailored to meet specific requirements.

⇒ In the future, GSF plans to invest in innovative technologies to enhance solar energy efficiency, support startups for faster solar energy implementation, and explore emerging solar energy sectors.

### INDIA HOSTS THE 6TH SESSION OF THE INTERNATIONAL SOLAR ALLIANCE ASSEMBLY



#### Why in news?

⇒ The Sixth Assembly of the International Solar Alliance (ISA) was hosted at Bharat Mandapam, in New Delhi.

#### Details:

- ⇒ It was presided over by the Union Minister for Power and New & Renewable Energy in his capacity as the President of the ISA Assembly.
- ⇒ Ministers from 20 countries and delegates from across 116 Member and Signatory countries participated in the Assembly.

#### Viability Gap Funding:

- ⇒ Renewable energy sources have the potential to supply 65 percent of the world's total electricity by 2030 and decarbonise 90 percent of the power sector by 2050.
- ⇒ The 6th Assembly of ISA has decided to increase viability gap funding for projects from 10% up to 35%. "The ISA has a programme for VGF so that viability gap funding is available for projects in developing countries."
- ⇒ The grant provided under the mechanism is USD 150,000 or 10% of the project cost (whichever is lower), per country per project.

#### Four projects set up with ISA's assistance were inaugurated. These projects are:

- a) Solarisation of the Parliament building of the Republic of Malawi
- b) Solarisation of two rural health care centres in the Republic of Fiji, with an 8-kW solar PV system and 20-kWh battery storage capacity for each health centre
- c) Installation of 1 solar powered cold storage of capacity 5 MT for the benefit of agricultural stakeholders at La Digue Island, Republic of Seychelles

d) Solarisation of the Nawai Junior Secondary school (JSS) in the Republic of Kiribati, with a 7 kW Solar PV rooftop system paired with a 24-kWh BSS

#### About ISA Assembly:

- ⇒ The Assembly is the apex decision-making body of ISA, in which each Member Country is represented. This body makes decisions concerning the implementation of the ISA's Framework Agreement and coordinated actions to be taken to achieve its objective.
- ⇒ The Assembly meets annually at the ministerial level at the ISA's seat. It assesses the aggregate effect of the programmes and other activities in terms of deployment of solar energy, performance, reliability, cost, and scale of finance.
- ⇒ The Sixth Assembly of the ISA is deliberating on the key initiatives of ISA on three critical issues energy access, energy security, and energy transition.

### DELHI CHOKES ON POLLUTION, WHAT IS AQI AND HOW IS IT MEASURED



#### Why in news?

⇒ As the air pollution continued to get worse in Delhi-NCR and surrounding areas, the Air Quality Index (AQI) has once again come under the spotlight.

#### Details:

- ⇒ AQI is a number, which is a measure of air quality. The higher the AQI, the worse the air.
- ⇒ The colour-coded AQI index was launched in India in 2014, and it helps the public and the government understand the condition of the air and what subsequent measures are to be taken to combat the situation, based on its severity.
- ⇒ There are six categories of AQI, namely 'Good' (0-50), 'Satisfactory' (50-100), 'Moderately polluted' (100-200), 'Poor' (200-300), 'Very Poor' (300-400), and 'Severe' (400-500).

#### What is the AQI and how does it calculate pollution?

⇒ Launched by the central government in 2014 as part of the Swachh Bharat campaign, the AQI was to help simplify the common understanding of pollution.

- An expert group comprising medical professionals, air quality experts, academia, advocacy groups, and others was constituted and a technical study was awarded to IIT Kanpur. IIT Kanpur and the Expert Group recommended an AQI scheme.
- The AQI transforms complex air quality data of various pollutants into a single number (index value), nomenclature and colour. The pollutants measured include PM 10, PM 2.5, Nitrogen Dioxide, Ozone, Carbon, etc.
- There are six or eight pollutants in the affected air and each of these pollutants is given a weight based on a formula. That weight depends on the kind of impact it has on human health.
- Monitoring stations across the country assess these levels.

### What is the impact of these pollutants?

- Among the more harmful pollutants are those of a smaller size, such as particulate matter (PM) 2.5, which is an atmospheric particulate matter of a diameter smaller than 2.5 micrometres (or around 3 per cent of the diameter of a human hair).
- It causes respiratory problems and reduces visibility. The particles can only be detected with the help of an electron microscope because they are so small.
- Due to their size, the PM 2.5 particles can easily bypass the nose and throat and can easily enter the circulatory system.
- The particles can also lead to chronic diseases such as asthma, heart attack, bronchitis and other respiratory problems.

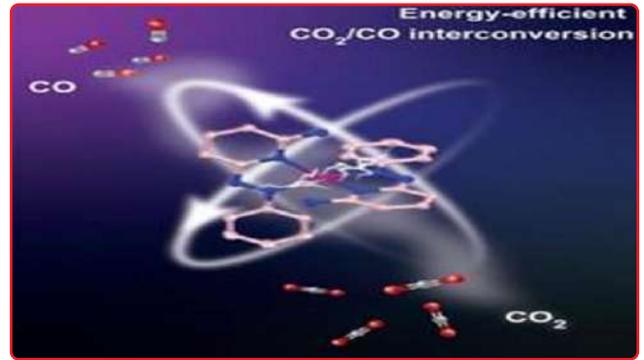
### How does the AQI influence government policy?

- Based on the levels, the governments in areas like Delhi announce measures.
- As the AQI in NCR dipped to the 'severe' category, stage 3 of the Graded Response Action Plan was set in motion.
- The GRAP has specifically been instituted for emergency measures that kick in to prevent further deterioration of air quality in Delhi-NCR.
- A central panel directed authorities to prohibit the use of diesel four-wheelers that are not BS-VI compliant, as well as the entry of trucks in Delhi. Petrol cars can continue to ply as usual.

## NEW TECHNOLOGY FOR CONVERTING CO<sub>2</sub> TO CO HOLDS POTENTIAL FOR CARBON IN THE STEEL SECTOR

### Why in news?

- A new energy-efficient carbon dioxide capture technology that converts carbon dioxide to carbon monoxide under electro catalytic conditions under ambient temperatures in the presence of water has been developed with potential for application in the steel sector.



### Details:

- In efforts to support India's goal for net-zero emissions by 2070, the National Centre of Excellence in Carbon Capture and Utilisation (NCoE-CCU) at IIT Bombay is actively working towards developing novel, scalable and affordable pathways on capturing CO<sub>2</sub> from various emission sources, and converting it into usable chemicals or permanent storage, representing a crucial pathway for greenhouse gas mitigation.
- In a significant development, it has been granted a patent for CO<sub>2</sub> to carbon monoxide (CO) conversion technology.

### CO in steel industry:

- Carbon monoxide (CO) is a widely used chemical in the industry especially in the form of syn gas.
- In the steel industry, CO is an essential ingredient for converting iron ores to metallic iron in blast furnaces. Currently, CO is generated by partial oxidation of coke/coal, which leads to a significant production of CO<sub>2</sub> as an end product of this process.
- If this emitted CO<sub>2</sub> can be captured and converted into CO, it can lead to a circular economy in this process while reducing the carbon footprint and associated costs.

### Conversion technology:

- The process for CO<sub>2</sub> to CO conversion that is widely in use currently occurs at elevated temperatures (400-750 °C), and the presence of the equivalent amount of H<sub>2</sub> is necessary for driving this reaction forward making it an energy-intensive process.
- The newly developed process by IIT Bombay's NCoE-CCU requires only minimal energy as it can proceed under ambient temperatures (25-40 °C) in the presence of water.
- The energy required for this electrocatalysis reaction can be harnessed directly from a renewable energy source (in the form of a solar panel or windmill), which ensures a carbon-neutral operating scenario for a facile CO<sub>2</sub> to CO conversion.

### Applications:

- This technology holds promise for various industrial applications and is being actively pursued for scaling up through the recently incubated start-up UrjanovaC Private Limited for potential application in the steel sector.

- In addition, another aqueous-based CO<sub>2</sub> capture and conversion to calcium carbonate technology emerging from the activities of the DST-supported NCoE-CCU is also licensed to UrjanovaC Private Limited incubated through SINE at IIT Bombay.

### FOSSIL FUEL PLANS OF MAJOR PRODUCERS NOT ALIGNED WITH PARIS AGREEMENT GOALS, WARNS UNEP REPORT



#### Why in news?

- None of the 20 major fossil fuel-producing countries, including India, have committed to cutting down on their dependence on coal, oil and gas production to align with the goal of limiting warming to 1.5 degrees Celsius, according to a new United Nations Environment Programme (UNEP) report.
- Major producer governments are planning on producing around 110 per cent and 69 per cent more fossil fuels in 2030 than would be consistent with the goal of limiting warming to 1.5°C and 2°C, respectively, it stated. Of the 20 such governments, 17 have pledged to go Net Zero.

#### Details:

- More than 80 experts assessed the fossil fuel production gap, the difference between governments' planned or projected fossil fuel production and the actual global production levels consistent with limiting global warming to 1.5°C or 2°C.
- The report looked at the production gap of 20 major producer countries responsible for 82 per cent of production and 73 per cent of consumption of the world's fossil fuel supply.
- These include Australia, Brazil, Canada, China, Colombia, Germany, India, Indonesia, Kazakhstan, Kuwait, Mexico, Nigeria, Norway, Qatar, the Russian Federation, Saudi Arabia, South Africa, the United Arab Emirates, the United Kingdom (UK) and the United States (US).

#### India's pledge:

- India has pledged to achieve Net-Zero emissions by 2070. India expects to see a planned increase of 10.7 exajoules or EJ (an EJ is equal to 277.8 terawatt hours) in national coal production for 2030 relative to

2021. No data was available for oil and gas generation in the country.

- India also has plans for significant increases in coal production through 2030 and will prioritise self-reliance, viewing the coal industry as key to generating income and employment
- The US is expected to decrease coal production for 2030 relative to 2021 by 5.1 EJ. Planned oil and gas generation are projected to go up by 5.2 EJ and 2.5 EJ by the end of the decade compared to 2021 levels, respectively.

#### Natural Gas:

- Developed countries view natural gas as a bridge fuel for electricity generation, as it could reduce greenhouse gas emissions if it replaced coal.
- However, experts have warned that natural gas does not guarantee zero emissions and, in most places, it will be more expensive than renewable energy.
- Countries overlook upstream emissions from gas extraction and transport, such as fugitive emissions (leaks and irregular releases of gas) and venting (intentional releases). Together, they account for about 25 per cent of the full life-cycle emissions of natural gas.

#### China's coal production:

- China is projected to see a 5.3 EJ decline in planned coal production in 2023 relative to 2021.
- The long-term decline in global production is led by China, whose domestic coal production is estimated to decrease steeply between 2030 and 2050 in alignment with the country's 2060 carbon-neutrality goal.
- China is on track to double its wind and solar energy capacity by 2025 instead of 2030, and India earmarked over \$4 billion for clean energy in its national budget.

#### Risks of relying on technologies:

- The report also warned of the risks of relying on technologies such as carbon capture and storage (CCS) and carbon dioxide removal.
- The former deals with capturing carbon dioxide (CO<sub>2</sub>) at emission sources, such as power stations and then storing it underground, while the latter involves using technologies to remove the greenhouse gas from the atmosphere.
- Further, around 80 per cent of pilot projects involving these technologies have ended in failure over the past three decades. Even if all the planned global CCS facilities become operational, they can lower less than a per cent of 2022 global CO<sub>2</sub> emissions.
- Given these uncertainties, the report called for a near-total phase-out of coal production and use by 2040 and a combined reduction in oil and gas production and use by 75 per cent by 2050 from the 2020 levels.

#### Way Forward:

- The authors of the report urged nations to phase out all fossil fuels at the 28th Conference of Parties

(COP28) to the UN Framework Convention on Climate Change in Dubai.

- They stressed the need to establish near- and long-term targets to reduce the use of three fossil fuels. COP 26 and COP 27 focussed only on coal.

### KERALA FORMS ORGANIC FARMING MISSION TO BOOST AGRICULTURE



#### Why in news?

- The Kerala government has created an Organic Farming Mission to encourage the adoption of sustainable organic and climate-smart farming practices in the State.

#### Aim:

- The mission aims at expanding organic farming to 5,000 hectares in the next five years through an annual target of 1,000 ha.

#### Key Highlights:

- In farms run by the Agriculture Department, at least 10% of the area will be set aside for organic farming. Another mandate of the mission is to make sure that selected beneficiaries/farms of organic farming schemes pursue the system at least for five years.
- The mission will take steps to expand the system for certification, branding, and marketing of organic agricultural products from Kerala.
- An organic farming protocol, which is in sync with protocols prevalent at the national and international levels, will be implemented as part of the activities.
- The mission will also focus on value addition of organic products.

### DELHI MOST POLLUTED CITY IN WORLD, SWISS SURVEY

#### Why in news?

- Recently, three Indian metropolises figured on the list of the most polluted cities in the world compiled by the Swiss air purifier company IQAir.
- Delhi was the most polluted city in the world with an air quality index (AQI) of 287 followed by Lahore, Pakistan, at 195. Mumbai, at 153, and Kolkata, 166, were among the top 10.



#### IQAir:

- The IQAir's AQI measures data from 109 countries, and the readings change hourly. It follows a U.S. methodology and varies slightly from the Indian one.
- The values are a measure of the quantities of PM (particulate matter) 2.5, considered most harmful for respiratory health.

#### Severe category:

- Though pollution from firecrackers are short-lived compared with those from persistent sources such as vehicle emission and waste and biomass burning, the spike in pollutants has a pronounced effect on health.
- Air pollution in parts of Delhi was 30 times the safe limits prescribed by the World Health Organization (WHO), contributed in part by the firecrackers.
- Air pollution in the "severe" category "affects healthy people" and "seriously impacts those with existing diseases".

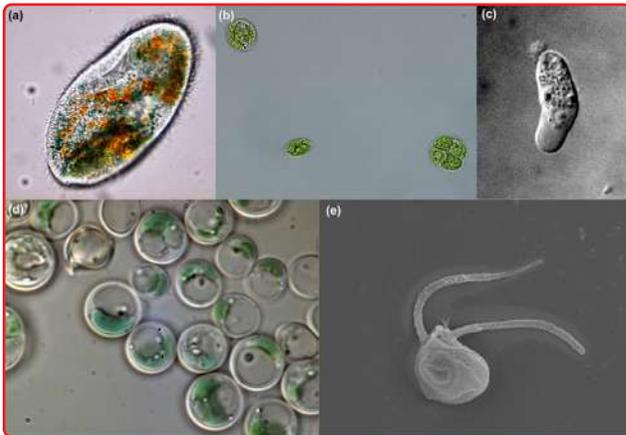
#### PM 2.5:

- Another joint analysis analysed all-India pollution levels on Deepavali day in several cities, reported that the highest average PM 2.5 pollution was reported from Patna, Bihar, at 206 microgram per cubic metre.
- Just as the IQAir ranking, it too reports Delhi as being the most polluted city on the day after Deepavali.
- Bengaluru reported the lowest levels of PM 2.5 among 11 cities analysed and their figures were lower than 2022 Deepavali (October 24).

### MOLECULAR MECHANISM BEHIND INTRIGUING GREEN ALGA SURVIVING IN EXTREME CONDITIONS

#### Why in news?

- A young researcher has divulged the secret of how one of the smallest green algae called Picocystis Salinarum survives the harshest of conditions by resorting to physiological adaptation to highly saline-alkaline/hyperosmotic conditions.
- This may pave the way for a promising future candidate for biotechnological applications like microalgal bioproducts and increasing salt tolerance in plants.



### Carbonates:

- Carbonates are of great interest to geoscientists, biologists, and climatologists due to their significance in the global carbon cycle.
- The process of biologically converting inorganic carbon into organic carbon, known as carbon fixation, is widely recognized as the paramount biogeochemical transformation on our planet.

### Background:

- What intrigued the Faculty from the Department of Earth Sciences, Pondicherry University was the mystery behind the capability of one organism called *P. salinarum* found in hypersaline soda lake Sambhar, Rajasthan, to survive extreme environments.
- Though the alga had been widely found in saline-soda lakes around the world, it was spotted for the first time in India only in the Sambhar Lake.

### Key Highlights:

- They probed the molecular mechanisms of adaptation in such polyextreme conditions. This they carried out through studying the changes in protein abundances through a high-throughput label-free quantitation based quantitative proteomics method.
- They provided the first insights into the proteome of extremophilic alga *P. salinarum* revealing its tailored regulatory mechanisms for osmotic adaptation and proliferation in polyextreme conditions in soda lakes unraveling the basis of resilience in this not so known organism.
- The unique organism apparently enhances photosynthesis and ATP synthesis along with chaperone proteins as key response to high salinity-alkalinity.
- Enhanced photosynthetic activity exhibited by *P. salinarum* in highly saline-alkaline condition is noteworthy as photosynthesis is suppressed under hyperosmotic conditions in most photosynthetic organisms.

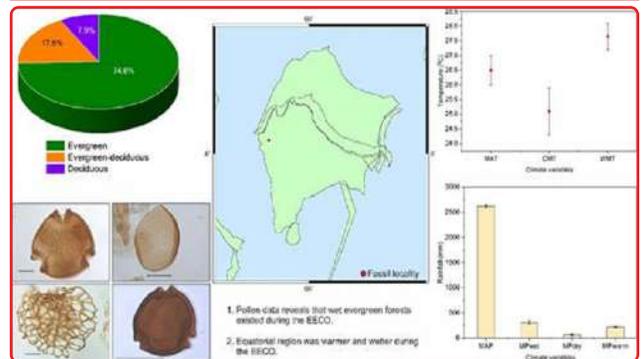
### Way Forward:

- This discovery positions *P. salinarum* as a promising candidate for biotechnological applications and as

a model organism for deciphering the molecular mechanisms of osmotic adaptation.

- They harnessed the unique characteristics of this microalga for bicarbonate-based integrated carbon capture and biomass production.

## HIGH RAINFALL AFFORDED RESILIENCE TO TROPICAL RAINFORESTS AROUND 50 MILLION YEARS AGO



### Context:

- High rainfall helped the survival of equatorial rainforests at a time when Earth was globally warm and atmospheric carbon dioxide concentration was a whopping more than 1000 ppmv, around 50 million years ago.
- The mechanism in which biota survives adverse conditions is still poorly known. The existing palaeoclimate data of mid- and high latitudes suggest large fluctuations in rainfall at around 50 million years ago.
- Scientists are trying to explore the palaeoclimate data to probe the mysteries of survival under adverse conditions.

### Recent research:

- Scientists of Birbal Sahni Institute of Palaeosciences (BSIP), have quantified the terrestrial equatorial climate of around 50 million years ago using plant proxy. They reconstructed climate data and found that a significantly high rainfall was present during that time.
- The scientists have estimated that the high rainfall, most likely, increased the plant's water use efficiency and afforded resilience to survive and remain functional under extremely warm and elevated carbon dioxide concentration at around 50 million years ago.
- It was earlier known that the Earth was around 13°C warmer than present and carbon dioxide concentration was more than 1000 ppmv during this time.
- This drastically affected the survival of mid- and high latitude forests due to changes in the hydrological cycle, but the equatorial forests survived successfully.

**Significance:**

- It revealed for the first time, the mechanism of survival of equatorial forests when the Earth was much warmer than the present.
- The study has also helped focusing on developing a calibration file from the low-latitude regions which will be useful in the quantification of seasonal deep-time terrestrial climate.

**Way Forward:**

- Tracing the mystery of the survival of the rainforests – the biodiversity hotspots of the world is the Key to understanding climatic and biotic changes occurring at present and in the future.

### KADALUNDI SHRINKING MUDFLAT ECOSYSTEM KEEPS BIRDS AWAY

**Why in news?**

- Kadalundi, a village on the southwest coast in Kozhikode district of Kerala, had about 8 hectares of nutrient-rich inter-tidal mudflats in the early 2000s.
- Today, the expanse of mudflats in the estuary of the Kadalundipuzha river has reduced to about 1 hectare. This too is gradually being covered with sand, depriving prey to thousands of shorebirds that migrate from colder climes in winter to the village.

**Why it matters?**

- Researchers point out that if the mudflats are not protected and restored, Kadalundi will vanish from the global map as a prominent destination of migrant shorebirds in a few years.
- It is the abundance of prey such as polychaetes and crustaceans in the mudflats that attract a wide variety of migrant shorebirds to Kadalundi from places such as Siberia, Ladakh, Mongolia, and Scotland.

**Expansion of mangroves:**

- The efforts are on to popularise ecotourism in the Kadalundi-Vallikunnu Community Reserve (KVCR) by widening the expanse of mangroves.
- The 154-hectare KVCR had less than 50 hectares of mangroves until a few years ago, but these trees that thrive in salt water have proliferated so fast that they currently occupy more than 60 hectares.

- The sedimentation of sand on mudflats not only brings down the amount of prey there, but also helps mangroves easily proliferate. The viviparous mangroves of Kadalundi have been displaying an aggressively invasive behaviour.
- The mangrove lobby has been raising carbon sequestration as the key environmental factor for its promotion.

**Holistic approach:**

- Studies show that wetlands and grasslands have the capacity to sequester more carbon than many types of forests. Haphazard tree planting without proper understanding is never advisable.
- It is crucial to adopt a holistic approach that prioritises the protection of intact ecosystems and focuses on restoring the functionality of degraded ecosystems.

**Preference to mudflats:**

- The mangroves of Kadalundi never attract shorebirds coming from colder regions. They prefer open mudflats where they are safe from predators.
- The migrant birds with great site fidelity are now finding an alternative on the beaches of neighbouring coasts.

### GUJARAT GETS A STATE FISH

**Why in news?**

- The black-spotted croaker, or the ghol fish was declared the state fish of Gujarat recently.

**Why was the ghol chosen?**

- The Gujarat government chose the ghol because of its economic value and its uniqueness.
- The fish is usually found in the Indo-Pacific region that stretches from the Persian Gulf to the Pacific Ocean.
- The declaration will enable Gujarat to be a part of its conservation efforts.

**What is the commercial importance of this fish species?**

- The meat of the fish is exported as frozen fillet or whole fish to European and Middle-Eastern countries.
- Its air bladder, which is cut open from the stomach and dried is mainly exported to China, Hong Kong and other Asian countries where it is in high demand for its medicinal values.

### How much fish does Gujarat export?

- During the year 2021-22, the total fish production of Gujarat was estimated at 8.74 lakh tonne, worth Rs 11,221 crore.
- Of this, 2.3 lakh tonne of fish and fish products worth Rs 5,233 crore were exported.

## SCIENCE & TECHNOLOGY

### CHANDRAYAAN 3 CARRIED NUCLEAR TECHNOLOGY TO MOON



#### Context:

- Chandrayaan-3's Propulsion Module, which carried the Vikram lander and Pragyan rover to the Moon, is powered by nuclear technology.
- Two radioisotope heating units (RHU) that generate one watt of energy are onboard the module, which is currently orbiting the Moon.
- The functioning of this heating unit paves the way for future nuclear-based missions that last live longer on the Moon.

#### What is radioisotope heating unit?

- A Radioisotope Heating Unit (RHU) is a device that generates heat by harnessing energy produced from the radioactive decay of a specific isotope.
- The primary function of an RHU, when installed on a spacecraft, is to provide a reliable and long-lasting source of heat for various components and instruments on the craft to keep them warm in the coldness of space.
- It is particularly important for missions that operate in extremely cold environments, such as outer space or other celestial bodies, where traditional heating methods such as electrical heaters might not survive.
- The Propulsion Module orbiting the Moon has two such units that were installed for experimental and demonstration purposes. ISRO aims to build on its success now.

#### What is it made of?

- The RHU contains a radioactive isotope, commonly plutonium-238 (Pu-238) in the form of plutonium dioxide (PuO<sub>2</sub>). This isotope decays over time.

- The decay process is exothermic, meaning it releases heat energy as it decays and that amount is predictable.
- This heat is harnessed and used to maintain the temperature within the spacecraft or specific components, such as scientific instruments, fuel tanks, or critical electronics.

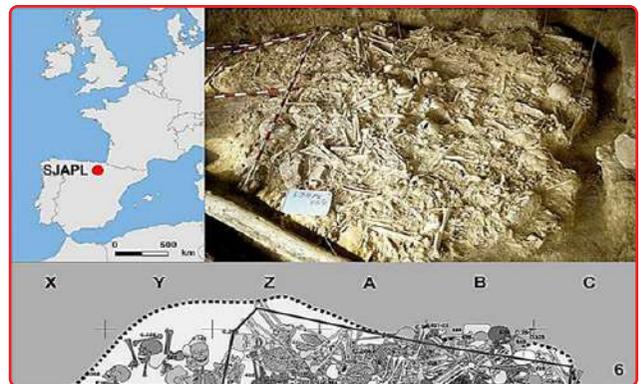
#### Why is it used?

- A big advantage of using a Radioisotope Heating Unit is that it gives a longer life to the mission. Plutonium-238, for example, has a half-life of about 87.7 years, which means it can provide a steady source of heat for many decades.
- Another advantage is that RHUs are highly reliable because they do not rely on moving parts or external power sources. This makes them ideal for unmanned missions that must endure harsh conditions over long periods.

#### RHU in other space programs:

- ISRO is not the first to make use of this nuclear-based technology. The Mars rovers, like Curiosity and Perseverance, have used RHUs to keep their critical components warm in the frigid Martian environment.
- The heat generated by these units not only ensures the proper functioning of onboard instruments and systems but also helps to extend the operational life of the spacecraft, enabling them to conduct valuable scientific research over many years.
- Meanwhile, these units have also been used in moving spacecraft like Voyager-1 and Voyager-2, which have been functioning for the last 50 decades and currently travelling in interstellar space, outside the Solar System.

### LARGER SCALE WARFARE MAY HAVE OCCURRED 1,000 YEARS EARLIER



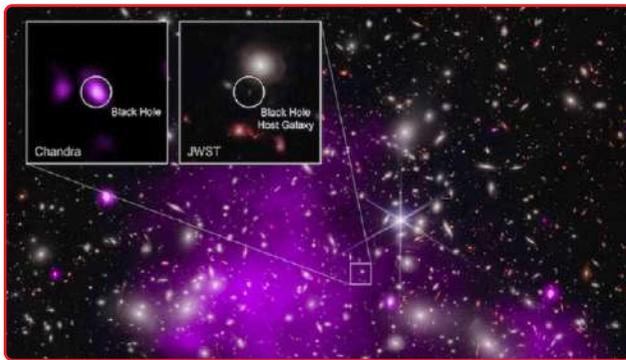
#### Why in news?

- A re-analysis of more than 300 sets of 5,000-year-old skeletal remains excavated from a site in Spain suggests that many of the individuals may have been casualties of the earliest period of warfare in Europe, occurring over 1,000 years before the previous earliest known larger-scale conflict in the region.



- ⇒ Experts say present coverage for Kavach is only 1,500 km and at this rate, it may take many years to ensure Kavach even on high-density routes as Railways has a total route length of 68,000 kms.
- ⇒ Current Kavach coverage includes the 1,400 km stretch in South Central Railway and 200 to 250 km routes from Delhi to Mumbai and Delhi to Kolkata where it is still under testing in patches, installed in 100 kms here and there, not in continuous sections and not operational.
- ⇒ Currently the Indian Railways has allotted ₹4,000 crore under the Signalling and Telecom budget head which includes ₹2,000 crore under the Rashtriya Rail Sanraksha Kosh (RRSK) fund which implements Kavach.

### INDIAN ASTRONOMER DISCOVERS BLACK HOLE THAT COULD FIT 100 MILLION SUNS INSIDE IT



#### Why in news?

- ⇒ Recently, an Indian astronomer has detected the most distant black hole ever seen in X-rays, using NASA's Chandra X-ray Observatory and James Webb Space Telescope.
- ⇒ The black hole's mass is estimated to fall between 10 and 100 million Suns.

#### Details:

- ⇒ The black hole, found in a galaxy named UHZ1, is at an early stage of growth that has never been observed before, with its mass being similar to that of its host galaxy.
- ⇒ This significant finding could potentially explain how some of the first supermassive black holes in the universe formed.
- ⇒ The research team, led by Akos Bogdan from the Center for Astrophysics at Harvard & Smithsonian, discovered the black hole in the direction of the galaxy cluster Abell 2744, located 3.5 billion light-years from Earth.
- ⇒ However, data from the Webb telescope revealed that the galaxy is much more distant than the cluster, at 13.2 billion light-years from Earth when the universe was only 3% of its current age.

#### Key Highlights:

- ⇒ The observations with Chandra showed the presence of intense, superheated, X-ray-emitting gas in this galaxy, a trademark for a growing supermassive black hole.
- ⇒ The light from the galaxy and the X-rays from gas around its supermassive black hole are magnified by about a factor of four by intervening matter in Abell 2744 due to gravitational lensing, enhancing the infrared signal detected by Webb and allowing Chandra to detect the faint X-ray source.
- ⇒ They found strong evidence that the newly discovered black hole was born massive, with its mass estimated to fall between 10 and 100 million Suns, based on the brightness and energy of the X-rays.
- ⇒ This mass range is similar to that of all the stars in the galaxy where it lives, which contrasts with black holes in the centers of galaxies in the nearby universe that usually contain only about a tenth of a percent of the mass of their host galaxy's stars.

#### Way Forward:

- ⇒ This discovery is crucial for understanding how some supermassive black holes can reach colossal masses soon after the Big Bang.

### KRISHI, THE FIRST EVER AI POWERED SOLUTION FOR AUTOMATED AGRICULTURAL NEWS MONITORING AND ANALYSIS



#### Why in news?

- ⇒ Department of Agriculture and Farmers Welfare (DA&FW) in collaboration with Wadhvani Institute for Artificial Intelligence (Wadhvani AI) developed Krishi 24/7.

#### Salient features:

- ⇒ It is the first-ever AI-powered solution for automated agricultural news monitoring and analysis, with support from Google.org.
- ⇒ Krishi 24/7 will aid DA&FW to identify relevant news, generate timely alerts, and take prompt action to protect farmers' interests and promote sustainable agricultural growth through improved decision-making.

- The introduction of Krishi 24/7 addresses the need for an efficient mechanism to identify and manage agricultural news articles of interest to aid timely decision-making.
- The tool scans news articles in multiple languages and translates them into English.
- It extracts essential information from news articles, such as headline, crop name, event type, date, location, severity, summary, and source link, ensuring that the ministry receives timely updates on relevant events published on the web.

#### Significance:

- It is intended to provide a near real time monitoring of the news articles on Agri ecosystem published online which will assist the DA&FW to identify news of interest and provide a comprehensive mechanism to shortlist events, create alerts, and take timely action.

### NASA TO LAUNCH PEREGRINE LANDER TO MOON IN DECEMBER



#### Why in news?

- Astrobotic Technology, a Pittsburgh-based space robotics company, is set to launch its Peregrine Lander to the Moon on United Launch Alliance's (ULA) new Vulcan rocket.
- The spacecraft will launch from the Cape Canaveral Space Force Station in Florida. This will mark the inaugural flight of ULA's Vulcan rocket.

#### Peregrine Mission One:

- The Peregrine Mission One aims to land on the Moon in early 2024, carrying a variety of payloads from NASA and commercial entities.
- These payloads are designed to advance scientific knowledge, exploration capabilities, and commercial development of the Moon.
- The mission is part of NASA's Artemis program, which seeks to return humans to the lunar surface and establish a sustainable presence there.

#### Instruments onboard:

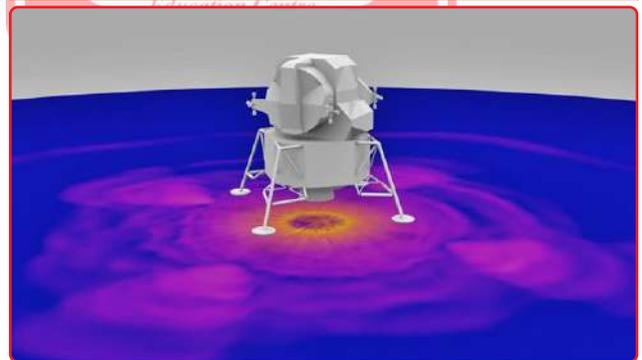
- The Peregrine Lander is equipped with a next-generation propulsion system that includes five main engines responsible for all major spacecraft maneuvers, including trans-lunar injection, trajectory correction, lunar orbit insertion, and powered descent.

- Additionally, four clusters of attitude control thrusters maintain the lander's orientation throughout the mission.
- The lander has been designed to deliver payloads precisely and safely to both lunar orbit and the lunar surface.
- Payloads can be mounted in various configurations according to their specific needs, either above or below the decks, inside or outside of enclosures, and can remain attached or be deployed upon reaching the lunar surface.

#### CLPS Initiative:

- This mission is part of NASA's Commercial Lunar Payload Services (CLPS) initiative, which works with several American companies to deliver science and technology to the lunar surface.
- Companies of varying sizes bid on delivering payloads for NASA, encompassing everything from payload integration and operations to launching from Earth and landing on the Moon's surface.
- Under the Artemis program, commercial deliveries will perform science experiments, test technologies, and demonstrate capabilities to help NASA explore the Moon and prepare for future human missions.
- CLPS contracts are indefinite delivery, indefinite quantity contracts with a cumulative maximum contract value of \$2.6 billion through 2028.

### AFTER CHANDRAYAAN 3, NASA TO STUDY EFFECTS OF ROCKETS ON MOON SURFACE



#### Why in news?

- When Chandrayaan-3 landed on the surface of the Moon, it blew away over two tonnes of soil from the lunar surface, NASA is now looking to study the effect of rockets on the surface of the Moon.

#### Challenges:

- NASA's ambitious Artemis program has a critical technical challenge to overcome, mastering the complexities of landing on the Moon's surface with larger, more powerful landers than those used during the Apollo missions.
- The Moon's lack of atmosphere and its uneven terrain, littered with craters and boulders, make for a treacherous landing environment.

- The gravitational pull must be counteracted by firing rocket engines during descent, a maneuver that becomes increasingly risky with the larger scale of Artemis landers.
- These engines emit supersonic plumes of hot gas that can kick up dust and debris, potentially obstructing visibility, damaging equipment, and destabilizing the lander itself.

### Plume-surface interactions (PSI):

- To address these challenges, NASA researchers at the Marshall Space Flight Center in Huntsville, Alabama, have developed sophisticated software tools designed to predict how these engine plumes interact with the lunar regolith.
- Understanding plume-surface interactions (PSI) is crucial for ensuring safety and success of both human and robotic missions.
- These new tools are part of an effort to minimise risks associated with lunar landings and takeoffs. They help predict potential cratering and visual obscuration caused by the intense forces exerted on the Moon's surface.
- This is particularly important as NASA aims to establish a sustained human presence on the Moon, where the stability of landers and the well-being of astronauts are paramount.

### Simulations:

- A recent simulation produced by the team at NASA Marshall provided insights into the PSI during the Apollo 12 mission. The simulation, which closely matched the actual events of the landing, was run on the Pleiades supercomputer at NASA's Ames Research Center in California.
- Over several weeks, it generated terabytes of data, offering a detailed look at the predicted shear stress on the lunar surface during the last half-minute of the lander's descent.

### Way Forward:

- The results of these simulations are not just academic exercises; they are being actively used to inform the design and operation of the Human Landing System and other initiatives under the Artemis umbrella.

## SCIENTISTS HAVE FOUND EVIDENCE WHY SOME PLANETS ARE SHRINKING

### Why in news?

- Recently, the using data from NASA's retired Kepler Space Telescope have found evidence suggesting why some exoplanets are shrinking in size.
- Exoplanets are planetary bodies that have been discovered outside the solar system. So far, over 5000 exoplanets have been detected.

### Details:

- The research indicates that the cores of certain sub-Neptune planets may be pushing their atmospheres away, leading to a reduction in planet size.



- The universe is home to an array of exoplanets, ranging from small, rocky worlds to massive gas giants. However, astronomers have identified a puzzling scarcity of planets with diameters between 1.5 and 2 times that of Earth, creating a "size gap" between rocky super-Earths and gaseous sub-Neptunes.
- This study suggests that this gap is not coincidental but rather the result of atmospheric loss in less massive sub-Neptunes.

### Key Highlights:

- Researchers propose that if a sub-Neptune lacks sufficient mass, its gravitational pull may be too weak to retain its atmosphere, causing it to diminish to super-Earth size.
- Two primary mechanisms are thought to drive this atmospheric loss: core-powered mass loss and photoevaporation. The new evidence supports the former, where radiation from a planet's hot core gradually forces the atmosphere outwards.
- Conversely, photoevaporation occurs when a star's intense radiation strips away a planet's atmosphere, likened to a hairdryer melting an ice cube.
- While photoevaporation is believed to happen within the first 100 million years of a planet's existence, core-powered mass loss likely occurs around the 1 billion-year mark.

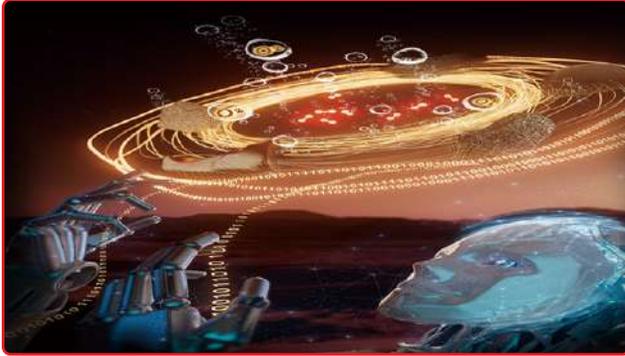
### Observations made:

- To investigate these theories, they examined data from the K2 mission, focusing on the relatively young star clusters Praesepe and Hyades.
- Their findings showed that nearly all stars in these clusters still possess sub-Neptune planets, suggesting that their atmospheres have not been eroded by photoevaporation. This observation points to core-powered mass loss as the more plausible explanation for the observed size gap.

### Way Forward:

- The study's implications extend beyond solving a cosmic puzzle; understanding the evolution of exoplanet atmospheres can provide insights into the potential habitability of distant worlds.
- The research is ongoing, and future studies will further test these theories.

## AI POWERED CHEMIST MAKES OXYGEN FROM MARTIAN METEORITES



### Why in news?

- Oxygen-producing materials made from meteorites found on Mars have been produced using a robotic artificial intelligence (AI)-chemist.
- The research provides a proof-of-concept for generating oxygen and may have implications for future manned missions to Mars.

### Why it matters?

- Potential future manned missions to Mars will require oxygen as it is essential to human activity on the planet, being used in rocket propellants and life-support systems.
- One of the ways to make these potential missions more cost-effective in the long term and less complex would be to use resources already present on the planet to create oxygen, rather than transport materials from Earth.
- Recent evidence of water on Mars and analysis of the elemental composition of meteorites found on the planet could provide an opportunity to make catalysts using Martian resources.

### AI-chemist:

- Researchers from the University of Science and Technology of China, developed a robotic AI-chemist that is able to create catalysts that can be used to produce oxygen from Martian materials without human intervention.
- Using a machine-learning model derived from both first-principles data and experimental measurements, this method automatically and rapidly identifies the optimal catalyst formula from more than three million possible compositions.

### Key Highlights:

- They selected five different categories of meteorites that come from or have been confirmed to exist on Mars, which were analysed by the robotic AI-chemist.
- The robotic AI-chemist was able to convert the meteorites into chemical compounds and make catalysts from these compounds before testing the catalysts' oxygen production performance.

- This process was repeated by the robot until the best catalyst had been found, which they suggest could have taken 2,000 years of human labour. This catalyst could operate under simulated Martian conditions.

### Way Forward:

- This robotic AI-chemist allows for the automated production of catalysts using Martian meteorites, which may lead to a way for humans to make oxygen on Mars in the future.

## SPACEX LOSES CONTACT WITH STARSHIP ROCKET IN NEW TEST FLIGHT



### Why in news?

- SpaceX's next-generation spacecraft Starship, developed to carry astronauts to the moon and beyond in the coming decades, set off in a repeat test launch from southern Texas recently.
- The launch presumed to have failed minutes after the ship reached space.

### What happened?

- The rocket took off successfully, but Starship's booster exploded shortly after it separated from the ship. The rest of the spacecraft appeared to continue on track.
- It said had received data that will help it improve for the next launch.

### What changes did SpaceX make ahead of the launch?

- The first attempt to launch the massive two-part rocket system, which consists of the Starship spacecraft and a Super Heavy booster, measuring a combined 397 feet (121 meters), failed spectacularly back in April when the rocket blew up four minutes after launch.
- An internal fire damaged Starship's engines and computers, causing it to stray off course, and that an automatic-destruct command was activated some 40 seconds too late.
- Back on the ground, the launch pad was shattered by the force of the blast-off, which also sparked a 3.5-acre (1.4-hectare) brush fire, although no-one was injured.
- Since then, the launch pad has been reinforced with a massive water-cooled steel plate, one of dozens of corrective measures that the US Federal Aviation

Administration required before granting a launch license.

### Primary objective:

- The primary mission objective this time around is to get Starship off the ground in Texas and into space, just shy of reaching orbit, before plunging back through Earth's atmosphere for a splashdown off the coast of Hawaii.
- Starship's towering first-stage booster, propelled by 33 Raptor engines, produces 16.7 million pounds (74.3 meganewtons) of thrust, making it twice as powerful as the Saturn V rocket that sent the Apollo astronauts to the moon half a century ago.

### What's next?

- SpaceX plans to conduct a series of test flights of the Starship Super Heavy rocket before using it to transport humans to space.

## TANTALUM, THE RARE METAL FOUND IN SUTLEJ



### Why in news?

- A team of researchers from the Indian Institute of Technology (IIT), Ropar has found the presence of tantalum, a rare metal, in the Sutlej river sand in Punjab.
- The presence of tantalum is significant not only for Punjab but also India as the metal is widely used in electronics and semiconductors.

### What is tantalum?

- Tantalum is a rare metal with the atomic number 73.
- It's grey, heavy, very hard, and one of the most corrosion-resistant metals in use today.
- It possesses high corrosion resistance because when exposed to air, it forms an oxide layer that is extremely difficult to remove, even when it interacts with strong and hot acid environments.
- When pure, tantalum is ductile, meaning it can be stretched, pulled, or drawn into a thin wire or thread without breaking.
- It is almost completely immune to chemical attack at temperatures below 150°C, and is attacked only by hydrofluoric acid, acidic solutions containing the fluoride ion, and free sulphur trioxide.

- Tantalum also has an extremely high melting point, exceeded only by tungsten and rhenium.

### When was tantalum first discovered?

- Tantalum was discovered by Anders Gustaf Ekenberg, a Swedish chemist, in 1802 in minerals obtained from Ytterby, Sweden.
- Initially, it was thought Ekenberg had found only a different form of niobium, an element that is chemically similar to tantalum.

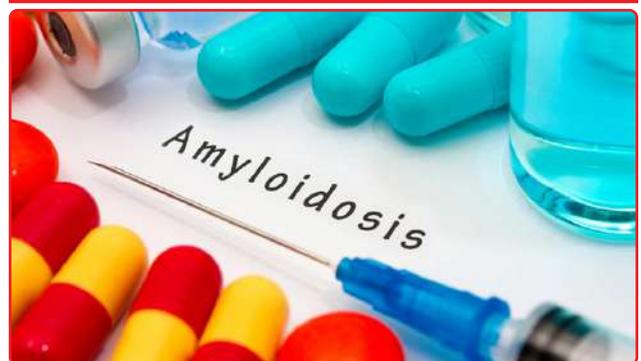
### How did tantalum get its name?

- The rare metal has been named after a Greek mythological figure Tantalus, the rich but wicked king of a town above Mount Sipylus in Anatolia. Tantalus is best known for the terrible punishment he received from Zeus after the former tried to serve his son at a feast with the gods.
- The king was banished to the underworld, where he forever stood in a pool of water with clusters of fresh fruit hanging overhead. Whenever he tried to drink the water, it receded. Whenever he tried to pick the fruit, the branches drew back.

### What are the uses of tantalum?

- Tantalum is most prominently used in the electronic sector. The capacitors made from tantalum are capable of storing more electricity in smaller sizes without much leakage than any other type of capacitor.
- This makes them ideal for use in portable electronic devices such as smartphones, laptops, and digital cameras. *Education Centre*
- As tantalum has a high melting point, it is frequently used as a substitute for platinum, which is more expensive.
- The rare metal is also used to make components for chemical plants, nuclear power plants, aeroplanes and missiles.
- Tantalum does not react with bodily fluids and is used to make surgical equipment and implants, like artificial joints.

## SCIENTISTS FABRICATE 2D PROTEIN MONOLAYER THAT CAN HELP TO STUDY DISEASES LIKE AMYLOIDOSIS



**Why in news?**

- Recently, a 2D protein monolayer was fabricated by scientists by assembling lysozyme molecules, model protein in studying diseases like Amyloidosis.

**What is Amyloidosis?**

- Amyloidosis is a rare disease that occurs when a protein called amyloid builds up in organs.
- This amyloid buildup can affect the working of organs like heart, kidneys, liver, spleen, nervous system and digestive tract.
- Lysozyme, a protein present in mucosal secretions and a principal component of airway fluid can be regarded as a model protein in studying diseases like Amyloidosis which ultimately leads to multi-organ dysfunction.

**Key Highlights:**

- Scientists from the Institute of Advanced Study in Science and Technology, Guwahati (IASST), have assembled lysozyme molecules as a 2D monolayer at the interface of pure aqueous subphase.
- They used the 2D protein monolayer to understand the behaviour of lysozyme molecules at air-water as well as at air-solid interface with the help of a technique called Langmuir-Blodgett (LB) technique.
- The physical properties of lysozyme molecules at air-water interface were investigated under the variation of surface pressure and subphase pH conditions in the study recently published in the RSC Advances under the reputed RSC publishers.
- The compressible behaviour of lysozyme monolayers were correlated to the stripe-like domains formed with increase in surface pressure.

**Key Observations:**

- Lysozyme molecules at the air-water interface and their structural or conformational changes in variable pH conditions can be considered as a model system to study Amyloidosis disease, which occurs because of the misfolding and agglomeration of lysozyme molecules.
- The closely packed lysozyme monolayers formed at the air-water and air-solid interfaces by the LB method will be helpful in studying different chemical and physical properties in 2D in the vicinity of protein environment.
- The deposited LB films of lysozyme may also be considered as protein nanotemplates to crystallize proteins of interest.

---

### LOWER OXYGEN AT HIGH ALTITUDES INCREASES LIFESPAN IN AGEING MICE

---

**Why in news?**

- The lower oxygen content at high altitudes increases lifespan significantly in ageing mice, according to a recent study.

**Why study hypoxia?**

- It is the first study to demonstrate that oxygen restriction, or continuous hypoxia, can extend lifespan in an ageing mammal.
- Previous reports on oxygen restriction lengthening lifespan have come from mammalian cells grown in Petri dishes, yeast, and in less complex lab animals such as roundworms and fruit flies.
- This line of research has been encouraged at least in part, by the naked mole rat: a rodent that spends most of its life in an oxygen-deficient burrow with a lifespan much longer than scientists have been able to predict based on its size or evolutionary history.

**What was the study design?**

- For its experiments, they worked with a strain of mutant mice that age prematurely and have a shorter lifespan, of fewer than six months.
- The strains they used "also responds powerfully to the best-known intervention to extend lifespan across organisms – caloric restriction." Caloric restriction, or dietary restriction without malnutrition, first described in 1935, is the gold-standard for increasing lifespan in diverse species like yeast, roundworms, fruit flies, mice, and rats.
- To test the effect of low oxygen level on these mice, they housed them in hypoxic chambers with an oxygen concentration of 11%, similar to that at the base camp of Mt. Everest. They achieved hypoxic conditions by diluting the air with nitrogen.

**Outcome:**

- The median lifespan of mice living with normal oxygen at 21% of the atmosphere, a.k.a. normoxia was about 16 weeks. But mice living in hypoxic conditions had a median lifespan of 24 weeks, or 50% longer.
- The animals housed in hypoxic conditions also displayed better neurologic function than their counterparts living in normoxic conditions.
- Sixteen-week-old mice living in normoxia had neurologic debility, measured by a motor performance test, while mice maintained in hypoxic conditions performed the test significantly better.

**How does hypoxia work?**

- They examined whether hypoxia prompted the mice to restrict their diets. But they found that the

hypoxic mice ate slightly more food than those living in normoxia, ruling out dietary restriction as the fundamental underlying mechanism.

- Looking for differently expressed genes, DNA damage repair, and changes in signalling pathways didn't provide any definitive clues either.

#### Way Forward:

- The study provides valuable insights into the potential of hypoxia to enhance healthy lifespan.
- The findings open up new avenues for exploring the mechanisms underlying hypoxia's impact on lifespan and hold promise for potential interventions in the future.

### GENERIC DRUGS FOR 4 RARE DISEASES MADE AVAILABLE IN INDIA



#### Why in news?

- Providing relief to patients with rare diseases across India, the Union Health Ministry has made available generic drugs to support the care and treatment of four ailments:
  - Tyrosinemia-Type 1,
  - Gauchers Disease,
  - Wilson's Disease, and
  - the Dravet-Lennox Gastaut Syndrome.
- This means that the cost of these drugs will be slashed by between 60 and 100 times of their current market value.

#### Rare disease:

- A rare disease is a health condition of particularly low prevalence that affects a small number of people.
- It collectively afflicts 6% to 8% of the population in any country at any given time, so India could have 8.4 crore to 10 crore such cases.
- Nearly 80% of these diseases are genetic in nature.

#### What's next?

- The Ministry is in the process of making available drugs for more rare diseases, including Phenylketonuria and Hyperammonemia, over the next few months.

## SOCIAL ISSUES

### LEAVE BENEFITS FOR WOMEN IN ARMED FORCES MADE UNIFORM



#### Why in news?

- Defence Minister has recently approved a proposal to grant maternity, childcare and child adoption leave to women soldiers, sailors, and air warriors on a par with the officers.
- The move was in line with Ministry's vision of "inclusive participation" of all women in the armed forces, irrespective of their ranks.
- The measure would improve the working conditions for women in the military as it would help them balance their professional and family lives in a better manner.

#### Background:

- At present, women officers get maternity leave of 180 days with full pay for each child, subject to a maximum of two children.
- Childcare leave of 360 days is granted in total service career (subject to the child being less than 18 years of age) to women officers.
- Child adoption leave of 180 days is granted after the date of the valid adoption of a child below one year of age.
- The extension of leave rules will go a long way in dealing with women-specific family and social issues relevant to the armed forces.

#### Inclusion of women:

- In line with the government's commitment towards utilising "Nari Shakti" (women power), the three services have spearheaded a paradigm shift with the inclusion of women as soldiers, sailors and air warriors.
- From being operationally deployed in Siachen to being posted on warships as well as dominating the skies, Indian women are breaking barriers in almost every field in the armed forces.
- In 2019, a significant milestone was achieved through recruitment of women in the Indian Army as soldiers in the Corps of Military Police.

## COLORS TO SUPPORT THE 'BETI BACHAO, BETI PADHAO' INITIATIVE



### Why in news?

- ⇒ COLORS, India's leading Hindi GEC, recently announced its collaboration with the Ministry of Women and Child Development's 'Beti Bachao, Beti Padhao' initiative, to address the issue of girl child abandonment, through the launch of its new fiction show Doree.
- ⇒ Television as a medium has played a huge role in holding a mirror to society and led to many women becoming agents of change.

### Key Highlights:

- ⇒ With an aim to bring societal change and address the gender bias against girl child, through this association COLORS aims to raise awareness about the social evil of girl child abandonment.
- ⇒ In addition to launching a primetime show on the subject, as part of this association, COLORS will promote the 24-hour emergency toll free Child helpline number (1098) for those seeking assistance for any abandoned girl child across the nation.
- ⇒ Doree aims to generate popular conversation and thereby raise awareness on the issue of girl child abandonment.

### About Ministry of Women and Child Development:

- ⇒ The Ministry for Women and Child Development works towards holistic development of women and children.
- ⇒ The Ministry is implementing its various schemes and programmes through its 3 Missions viz, Mission Saksham Anganwadi and Poshan 2.0 for improving nutrition indicators in the country, Mission Vatsalya for protection and welfare of children and Mission Shakti for safety, security and empowerment of women.
- ⇒ BBBP is one of the flagship schemes under Mission Shakti that aims towards protection and empowerment of the girl child.

### About COLORS:

- ⇒ 'COLORS' is Viacom18's flagship brand in the entertainment space in India.

- ⇒ COLORS, launched on 21st July 2008, offers an entire spectrum of emotions to its viewers.

## JAL DIWALI WOMEN FOR WATER, WATER FOR WOMEN CAMPAIGN LAUNCHED



### Why in news?

- ⇒ The Ministry of Housing and Urban Affairs (MoHUA) unveiled a progressive initiative "Women for Water, Water for Women Campaign" under its flagship scheme - Atal Mission for Rejuvenation and Urban Transformation (AMRUT).
- ⇒ It was launched in partnership with the Ministry's National Urban Livelihood Mission (NULM). Odisha Urban Academy is the knowledge partner.
- ⇒ This campaign celebrates "Jal Diwali" from 7th November till 9th November, 2023.

### Key Highlights:

- ⇒ The campaign aims to provide a platform for inclusion of women in water governance.
- ⇒ They will be given first-hand knowledge about water treatment processes through visits to Water Treatment Plants (WTPs) in their respective cities.
- ⇒ These visits will elucidate the vital procedures involved in delivering clean and safe drinking water to households.
- ⇒ Additionally, women will gain insight into water quality testing protocols which ensure that citizens get water of the required quality.
- ⇒ The overarching goal of the campaign is to instill a sense of ownership and belonging among women towards water infrastructure.

### Phase I:

- ⇒ The phase I of "Women for Water, Water for Women Campaign", "Jal Diwali" shall witness participation from all States/ UTs (barring the 5 States under Model Code of Conduct), with an expected participation of more than 15,000 SHG women, nationwide.

### The focus areas of the campaign include:

- Familiarizing the women with functioning of Water Treatment Plants & water testing facilities
- Promote inclusivity & involvement through souvenirs & articles created by Women SHGs
- Familiarizing & educating the women about AMRUT scheme & its impact on water infrastructure

d) The anticipated outcomes of the campaign include increased awareness and knowledge on water treatment, sense of ownership and responsibility, promotion of inclusivity, empowerment of SHGs, positive community impact and model for future initiatives.

#### Way Forward:

- The campaign aims to address issues of gender equality by promoting inclusivity and diversity in sectors traditionally dominated by men.

### SC CALLS FOR COLLABORATIVE EFFORTS TO BRING CHILDREN INTO THE ADOPTION POOL



#### Why in news?

- The Supreme Court recently said that children living in childcare institutions whose parents had not visited them for over a year or had “unfit” parents or guardians should be identified and brought into the adoption pool.
- The court defined an “unfit guardian” as someone who is “unable or unwilling for parenting, indulging in drug or alcohol abuse, known to have abused or neglected the child, having a criminal record, in need of care themselves, mentally unsound, etc”.

#### Guidelines:

- A Bench headed by Chief Justice of India turned its focus on a finding by the Central Adoption Resource Authority (CARA) that many children were living in institutions for over a year with undetermined legal status.
- It said the district functionaries should make collaborative efforts to bring more such children into the adoption pool.
- The court ordered the States and Union Territories to begin a bi-monthly drive to identify children in the orphaned-abandoned-surrendered (OAS) category in the institutions, starting from December 7, 2023.
- The court also directed the States and Union Territories to compile data on potential children for adoption, especially among those languishing in the childcare institutions, and hand over the details to the CARA Director, and the Secretary with the Ministry of Women and Child Development, by January 31.

#### Data on OAS children & adoptive parents:

- A State-wise breakdown of the figures provided by CARA, represented by Additional Solicitor- General Aishwarya Bhati, showed that 2,146 children were available for adoption as on October 28, 2023.
- As opposed to this, about 30,669 prospective adoptive parents have been registered for in-country adoption as of October 2023.
- They have to wait for between three to four years for getting ‘a healthy and young child’ due to the huge mismatch in the number of registered prospective adoptive parents and children available for adoption.
- Further, it also emerged in court that out of 760 districts in the country, only 390 districts have specialised adoption agencies. Adding to these reasons for delay in the adoption process is the fact that prospective adoptive parents “prefer” children up to the age of two for adoption.
- CARA’s tabulation indicates that 69.4% of registered PAPs opt for children in the age group of zero to two years; 10.3% in the age group of two to four years.

### BIHAR URGES CENTRE FOR 65 PERCENT QUOTA IN 9TH SCHEDULE TO SEEK LEGAL SHIELD



#### Why in news?

- The Bihar government decided to urge the Centre to incorporate the hiked reservation for deprived castes from 50 to 65 per cent in state government jobs and educational institutions in the 9th schedule of the Constitution, so that it is guaranteed immunity from legal scrutiny.
- The Ninth Schedule of the Constitution includes a list of Central and state laws that cannot be challenged in courts.
- In 1992, the Supreme Court capped reservations for the backward classes at 50 per cent.

#### Background:

- The state government issued gazette notifications for raising the quota for deprived castes to 65 per cent, after Governor Rajendra Vishwanath Arlekar gave his assent to two bills, paving the way for implementing the new reservation system.
- Following a caste survey in Bihar, the state government tabled an analysis of it in the assembly.

The House then passed two bills - Bihar Reservation of Vacancies in Posts and Services Amendment Bill and the Bihar Reservation (Admission in Educational Institutions) Amendment Bill - to increase the quota.

- The bills sought a hike in the quota for Scheduled Castes (SC) from 16 to 20 per cent, Scheduled Tribes (STs) from 1 to 2 per cent, extremely backward castes (EBCs) from 18 to 25 per cent and other backward classes (OBCs) from 15 to 18 per cent to elevate the total quantum of caste-based reservations from 50 to 65 per cent.

#### About Ninth Schedule:

- The Ninth Schedule contains a list of central and state laws which cannot be challenged in courts. Currently, 284 such laws are shielded from judicial review. Most of the laws protected under the Schedule concern agriculture/land issues.
- The Schedule became a part of the Constitution in 1951, when the document was amended for the first time. It was created by the new Article 31B, which along with 31A was brought in by the government to protect laws related to agrarian reform and for abolishing the Zamindari system.
- While 31A extends protection to 'classes' of laws, 31B shields specific laws or enactments.
- The First Amendment added 13 laws to the Schedule. Subsequent amendments in 1955, 1964, 1971, 1974, 1975, 1976, 1984, 1990, 1994, and 1999 have taken the number of protected laws to 284.

### UP GOVERNMENT LAUNCHES SAFE CITY PROJECT TO ENSURE WOMEN'S SAFETY



#### Why in news?

- The government of Uttar Pradesh has launched a Safe City Project to enhance the safety of girls and women in the state.

#### Details:

- Through the Safe City Project, the government will ensure surveillance through CCTV at the entry and exit points of 17 municipal corporations along with government and non-government schools, madrassas, colleges and universities in Gautam Buddha Nagar.

- The private coaching institutes in these cities are closely monitored to avoid the gathering of troublemakers and reduce the cases of molestation.
- The government has also issued guidelines for the safety of girls in private coaching institutes prohibiting late evening classes.

#### Key Highlights:

- In the initial phases, the government has identified 17 municipal corporations and over 2500 schools of Gautam Buddha Nagar for the installation of CCTV cameras. Out of these, CCTVs are installed in 1692 schools, while the process of installation in the remaining schools is going on a war footing.
- There are around 26,568 CCTVs installed in these institutions, including 68 recognised government schools, 646 aided schools and 1786 unaided schools. CCTVs have been installed in these schools' classrooms, corridors, and entry and exit gates.
- Under the Safe City Project, 5505 cameras were installed in 162 higher educational institutions, including 21 in state degree or PG colleges, 85 in aided degree/PG colleges, 49 in unaided degree/PG colleges and 7 in state universities.
- The regional office of Lucknow and colleges do not come under the Safe City Project.
- Along with the above-mentioned institutes, CCTV cameras will also be installed in 17 municipal corporations and 606 in the coaching institutes of Gautam Buddha Nagar.
- Around 866 cameras have already been installed in 418 coaching institutes, the process of installing cameras in the remaining 188 coaching institutes is going on. The Urban Development Department will integrate the CCTV cameras with the control room of the city.

### HEALTH

#### IIT GUWAHATI DISCOVERS MODIFIED GRAPHENE OXIDE POTENTIAL IN MEDICINE



#### Why in news?

- Researchers at the Indian Institute of Technology (IIT) Guwahati have developed cost-effective

experiments for modifying graphene oxide that can be used by other academic institutions to train personnel needed for cutting-edge projects in semiconductors, nanoelectronics, healthcare and quantum technologies.

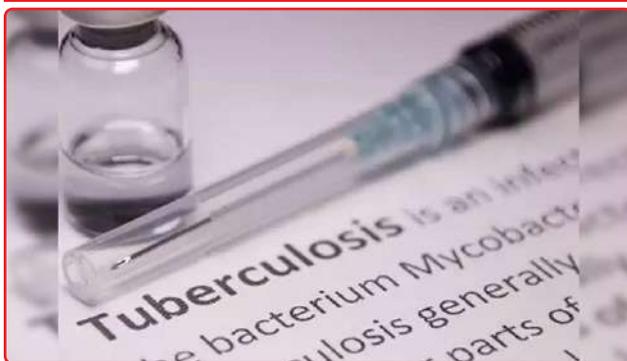
### Graphene Oxide:

- Graphene is an exceptionally strong material and possesses outstanding electrical and thermal conductivity.
- Its oxidised form, called Graphene Oxide (GO), offers a large surface area and low cytotoxicity, making it suitable for medical applications.
- GO can be further engineered through defects, doping and functional modifications, which enhance its optical and electrical properties for improved biomedical sensing applications.
- The IIT-Guwahati researchers are focusing on a specific functional modification of graphene involving the attachment of an amino acid, Cysteine or simple amine group, attachment over graphene.

### Way Forward:

- The team's extensive knowledge of Graphene-based materials has led to the development of innovative laboratory experiments designed to provide students with hands-on skills and inspire them to explore the possibilities of advanced materials.
- These experiments are integrated into a Biomedical Science and Engineering (BMSE) course at the Jyoti and Bhupat Mehta School of Health Sciences and Technology.

## WHO ACKNOWLEDGES INDIA SUCCESS IN DECLINING TB INCIDENCE



### Why in news?

- The World Health Organization released its Global TB Report 2023 recently.
- According to the report, India has made tremendous progress in improving case detection and reversed the impact of COVID-19 on the TB programme.
- The treatment coverage has improved to 80% of the estimated TB cases, an increase of 19% over the previous year.

### Interim report:

- In the Global TB Report 2022, the World Health Organisation (WHO) and the Ministry of Health & Family Welfare, Government of India, had agreed to publish the data for India as "Interim" with an understanding that the WHO would work with the technical team of the ministry, to finalize the figures.
- Following this, there were more than 50 meetings between the technical teams of WHO and the Ministry of Health & Family Welfare, wherein Indian team presented all the newer evidence generated, the in-country mathematical modelling developed including the data from Ni-kshay portal which captures the lifecycle of every TB patient during the course of their treatment.

### Highlights:

- India's efforts have resulted in reduction of TB incidence by 16% in 2022 (from 2015) almost double the pace at which global TB incidence is declining (which is 8.7%).
- The mortality of TB has also reduced by 18% during the same period in India and globally.
- The World Health Organization has made a downward revision of the TB mortality rates from 4.94 lakhs in 2021 to 3.31 lakhs in 2022, a reduction of over 34%.
- India's intensified case detection strategies have resulted in the highest ever notification of cases in 2022, during which, over 24.22 lakh TB cases were notified, surpassing the pre-COVID levels.

### Key initiatives:

- The key initiatives launched and scaled up by the government like specialised active case finding drives, scaling up of molecular diagnostics to block levels, decentralization of screening services through Ayushman Bharat Health & Wellness Centres and private sector engagement have resulted in significantly bridging the gap in missing cases.
- The Pradhan Mantri TB Mukht Bharat Abhiyan has received a tremendous response across the country with over 1 lakh Ni-kshay Mitras from all walks of life coming forward to adopt over 11 lakh TB patients.
- Under Ni-kshay Poshan Yojana about Rs 2613 Cr have been disbursed to over 95 lakh TB patients since its launch in 2018.
- Newer patient centric initiatives like Family Care Giver Model and Differentiated Care have been introduced to ensure further reduction in mortality and improvement in treatment success rates.

### Way Forward:

- India has taken bold steps to prioritize TB elimination efforts with investing additional resources to the National TB Elimination Programme being implemented under the aegis of the National Health Mission.

## FRESH CHINA OUTBREAK ATTRIBUTED TO MULTIPLE KNOWN PATHOGENS



### Why in news?

- China has set at rest fears surrounding its recent outbreak of a mysterious pneumonia-like illness and informed the World Health Organization (WHO) that there has been a general increase in respiratory illnesses due to multiple known pathogens in some parts of the country.

### Details:

- The Chinese government claimed there was no detection of any unusual or novel pathogens or unusual clinical presentations, including in Beijing and Liaoning.
- Since mid-October, the region reported an increase in influenza-like illnesses compared to the same period over the last three years
- Chinese health authorities blamed the increase in outpatient consultations and hospital admissions of children on Mycoplasma pneumoniae since May, and respiratory syncytial virus (RSV), adenovirus and influenza virus since October.
- They, however, admitted that the rise in cases is being seen earlier than usual in this season, but claimed this was not unexpected given the lifting of COVID-19 restrictions.

### Influenza like illness:

- Among the winter-spring seasonal peak during 2014-2018, in northern China, there was an increase in influenza activity from December to May.
- Surveillance data provided by the National Influenza Centre in China to the WHO's FluNet revealed that influenza-like illnesses (ILI) exceeded usual levels for this time of the year and are increasing in the country's northern provinces.
- The viruses identified commonly were of A (H3N2) and B/Victoria lineage.
- According to WHO's risk assessment, there is not enough information available to characterise the overall rise in cases of respiratory illnesses seen in children.

### Recommendations:

- The WHO recommended vaccines against influenza and maintaining appropriate social distancing from people who are ill, getting tested and medical care as needed, wearing masks as appropriate; ensuring good ventilation, and practicing regular hand washing.
- WHO advised against any travel or trade restrictions, except in the case of people with symptoms. Should people fall ill during travel or afterward, they are advised to get medical help and share their travel history with their healthcare provider.

## MISCELLANEOUS

### NATIONAL EFFICIENT COOKING PROGRAMME LAUNCHED



### Why in news?

- Recently, Energy Efficiency Services Limited (EESL), a joint venture of Public Sector Undertakings under Ministry of Power, launched its groundbreaking National Efficient Cooking Programme (NECP) and Energy Efficient Fans Programme (EEFP).
- These initiatives are aimed at revolutionizing cooking practices in India and emphasizing on the importance and urgency of energy efficient fans.

### Details:

- The National Efficient Cooking Programme (NECP) introduces induction-based cook-stoves, offering a cost advantage of 25-30% over traditional cooking methods, promising both energy savings and cost-effective cooking solutions.
- By deploying 20 Lakh Induction cook-stoves across India, EESL seeks to reduce the environmental impact of cooking methods, ensuring cleaner air and improved health for citizens.
- The Energy Efficient Fans Programme (EEFP) focuses on deploying energy-efficient BLDC fans, with the goal of distributing 1 crore ceiling fans.

### About National Efficient Cooking Programme (NECP):

- National Efficient Cooking Programme" (NECP) is a subset of the Clean Cooking Scheme. NECP focuses on Non-Solar/Electricity-based Induction Cookstoves,

aligning with the Go- electric initiative by the Ministry of Power.

- ⇒ EESL has already initiated efforts to promote clean and safe electric cooking to support India's Go-electric campaign and contribute to carbon mitigation goals.
- ⇒ The induction cooktop market's rapid growth is driven by its efficiency, technology, and aesthetic appeal.

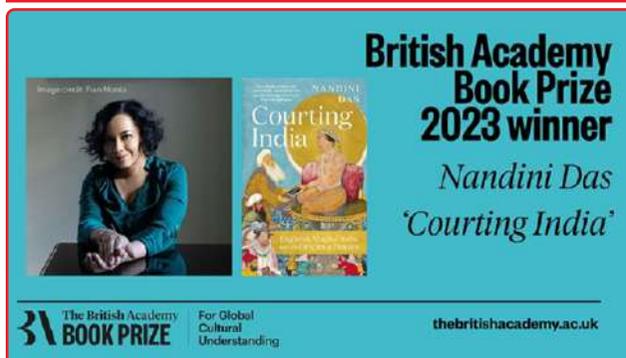
#### Energy Efficient Fans Programme (EEFP):

- ⇒ EESL has been actively dedicated to encouraging the adoption of energy-efficient appliances, such as LED bulbs, tube lights, and high-performance fans.
- ⇒ Beginning January 1, 2023, the Bureau of Energy Efficiency (BEE) has mandated that ceiling fans must bear star labels.
- ⇒ The annual ceiling fan market in India comprises approximately 4.4 crore units.
- ⇒ Conventional fans typically consume 75-80W, whereas contemporary 5-star fans consume only 28-32W, and 3-star fans use 40-45W. The adoption rate of 5-star energy- efficient fans stands at a mere 5%, indicating substantial potential for energy conservation.
- ⇒ The program for deploying one crore ceiling fans was initiated during the G20 Summit in Goa in July 2023.

#### About Energy Efficiency Services Limited:

- ⇒ Energy Efficiency Services Limited (EESL), operating under the Ministry of Power, is a leading Energy Service Company.
- ⇒ Their portfolio encompasses energy-efficient products like LED bulbs, tube lights, fans, air conditioners, streetlights, and electric vehicles.

### AUTHOR NANDINI DAS WINS 2023 BRITISH ACADEMY BOOK PRIZE



#### Why in news?

- ⇒ Indian-born author Nandini Das has been named the winner of the 2023 British Academy Book Prize for Global Cultural Understanding.

#### Why she has been chosen?

- ⇒ She got awarded for her book 'Courting India: England, Mughal India and the Origins of Empire'.

- ⇒ As a Professor in the English faculty at the University of Oxford, she has sought to present a new perspective on the origins of empire through the story of the arrival of the first English ambassador in India, Sir Thomas Roe, in the early 17th century.

#### About British Academy Book Prize:

- ⇒ The British Academy Book Prize, formerly known as the Nayef Al-Rodhan Prize, was established in 2013 to reward and celebrate the best works of non-fiction that demonstrate rigour.
- ⇒ It is a leading international non-fiction award with a prize money of £25,000.

### TREMORS REVEAL GAPS IN EMERGENCY ALERT SYSTEM



#### Why in news?

- ⇒ When tremors hit Delhi and surrounding areas following the 6.4 magnitude earthquake in Nepal and the 5.6 magnitude aftershock, the government and private early alert systems did not reach many of the people who could feel palpable tremors.

#### Details:

- ⇒ The National Disaster Management Authority (NDMA)'s Cell Broadcast Alert System (CBAS) has been tested in recent weeks to send out mass alerts when natural disasters strike, but it did not do so.
- ⇒ Meanwhile, Google did not send out alerts in the national capital, even though tremors were felt in both instances here.

#### Android Earthquake Early Warning system:

- ⇒ The Android Earthquake Early Warning system supplements the government's efforts on earthquake alerts and aims to provide people with advance notice that can help them stay safe.
- ⇒ It warns users only if the shaking in their area can expect to cross a value of 3.5 on the Modified Mercalli Intensity (MMI) Scale, a measurement of shaking during earthquakes that serves as an alternative to the Richter scale.
- ⇒ At an MMI value of three ("weak" shaking), the United States Geological Service's description of the scale says that tremors are felt "quite noticeably by persons indoors, especially on upper floors of buildings," and

at four ("light" shaking), the tremors are felt "indoors by many, outdoors by a few".

- The tremors in both cases, in New Delhi, appear to have been in the lower end of these two MMI values, meaning Google did not send alerts to everyone who felt shaking, as the intensity did not seem as risky in places like Delhi.

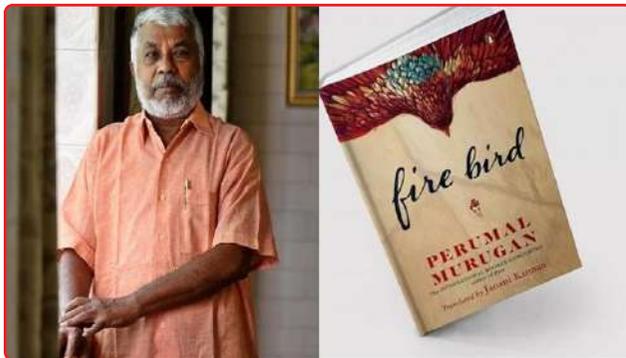
#### CBAS:

- As for the CBAS, which is the alert system that works through telecom operators, no alerts went out anywhere in North India, even in places near the Nepal border where shaking was intense.

#### What is CBAS?

- The Cell Broadcast Alert System represents a cutting-edge technology that empowers us to disseminate critical and time-sensitive disaster management messages to all mobile devices within specified geographical areas, regardless of whether the recipients are residents or visitors.
- This ensures that crucial emergency information reaches as many individuals as possible promptly. Government agencies and emergency services employ Cell Broadcast to keep the public informed about potential threats and to provide vital updates during critical situations.
- Common applications of Cell Broadcast include delivering emergency alerts such as severe weather warnings (e.g., Tsunamis, Flash Floods, Earthquakes), public safety messages, evacuation notices, and other critical information.

### TAMIL WRITER PERUMAL MURUGAN WINS 2023 JCB LITERARY PRIZE



#### Why in news?

- Tamil writer Perumal Murugan's novel 'Fire Bird', translated into English by Janani Kannan, won the 2023 JCB Prize for Literature.
- The book was published by Penguin Random House India.

#### About JCB Literary Prize:

- The JCB Literary Prize award carries Rs 25 lakh to the author and an additional Rs 10 lakh to the translator.
- JCB Prize was established in 2018.

- It is awarded annually to a distinguished work of fiction by an Indian writer working in English or translated fiction by an Indian writer.
- It has been called "India's most valuable literature prize".

#### About Perumal Murugan:

- Murugan has written 12 novels, six collections of short stories, six anthologies of poetry, and many non-fiction books.
- Ten of his novels have been translated into English, which include 'Seasons of the Palm', 'Current Show' and 'One Part Woman'.

### FIRST-EVER KHELO INDIA PARA GAMES



#### Why in news?

- Recently, the Union Minister of Youth Affairs and Sports, announced the first-ever Khelo India Para Games which will be held in New Delhi from 10th December to 17th December.
- A total of 7 disciplines will be held across three SAI (Sports Authority of India) Stadiums.

#### Background:

- The Khelo India Scheme has remained a game-changer for Indian sports.
- The Khelo India Games have played a pivotal role in the scheme with a total of 11 Khelo India Games held since 2018 – 5 Khelo India Youth Games, 3 Khelo India University Games, and 3 Khelo India Winter Games have been successfully conducted.

#### Details:

- Over 1350 participants from across 32 states and union territories including the Services Sports Control Board are expected to participate in the maiden Khelo India Para Games.
- It will witness para athletes vie for honours in 7 disciplines including para athletics, para shooting, para archery, para football, para badminton, para table tennis, and para weight lifting.
- The events will be held across 3 SAI stadiums – the IG Stadium, Shooting Range in Tughlaqabad, and the JLN Stadium.

**Way Forward:**

- ⇒ Indian para athletes have won an unprecedented 111 medals at the recently concluded Asian Para Games in Hangzhou.
- ⇒ The Khelo India Para Games will aim to provide continuity to the para athletes with the annually held event.

### IMA, NURSES ASSOCIATION HONOURED WITH INDIRA GANDHI PEACE PRIZE

**Why in news?**

- ⇒ The Indira Gandhi Prize for Peace, Disarmament and Development, 2022 was jointly awarded to the Indian Medical Association and the Trained Nurses Association of India as representatives of the COVID-19 warriors in the country.
- ⇒ Former Vice-President Hamid Ansari presented the award to Sharad Kumar Agarwal, president, Indian Medical Association, and Roy K. George, president, Trained Nurses Association of India.

**About the award:**

- ⇒ The Indira Gandhi Prize for Peace, Disarmament and Development, is the prestigious award accorded annually by Indira Gandhi Memorial Trust.
- ⇒ It is given to individuals or organisations in recognition of creative efforts toward promoting international peace, development and a new international economic order; ensuring that scientific discoveries are used for the larger good of humanity, and enlarging the scope of freedom.
- ⇒ The prize carries a cash award of 2.5 million Indian rupees and a citation.
- ⇒ A written work, in order to be eligible for consideration, should have been published.



Under the Guidance of  
**Dr. S. S. Pandey**

IAS 



दीक्षांत PCS

An honest effort  
Since 2004

## DIKSHANT SCHOLARSHIP PROGRAMME

# UPPCS PRE-2024 (हिंदी माध्यम (HYBRID BATCH))

बैच आरंभ:

**12** **6:00**  
दिसंबर PM



**CALL US:**

 7428092240  
 9810386285



## PRACTICE QUESTION FOR UPSC PRELIMS EXAM

1. Consider the following statement regarding Scabies:
  1. It is a parasitic infestation caused by a mite.
  2. They reproduce on the surface of the skin.
  3. It is non-contagious disease.
 Choose the correct option from the codes given below:
 

a) 1 and 2	b) 2 and 3
c) 1 and 3	d) 1, 2 and 3
  
2. Consider the following statement regarding Republic of Dagestan:
  1. It is a province in Ukraine.
  2. It is situated in the eastern part of the North Caucasus.
  3. It has Georgia and Chechnya to the west and Azerbaijan to the south.
 Choose the correct option from the codes given below:
 

a) 1 and 2	b) 2 and 3
c) 1 and 3	d) 1, 2 and 3
  
3. Consider the following statement regarding Debrigarh Wildlife Sanctuary:
  1. It has a dry deciduous forest that attracts a host of birds during the winters.
  2. It is located in Odisha.
 Choose the correct option from the codes given below:
 

a) 1 Only	b) 2 Only
c) 1 and 2	d) None of the above
  
4. Consider the following statement regarding Black Stork:
  1. It breeds in swampy, coniferous, and mixed forests.
  2. It is mainly found in Europe, Asia, and African countries.
  3. Conservation status by IUCN is Least concern.
 Choose the correct option from the codes given below:
 

a) 1 and 2	b) 2 and 3
c) 1 and 3	d) 1, 2 and 3
  
5. Consider the following statement regarding Lambadi community:
  1. They are also known as Banjaras.
  2. They are mostly found in Telangana, Andhra Pradesh, Tamil Nadu, and Karnataka.
  3. They had their own script.
 Choose the correct option from the codes given below:
 

a) 1 and 2	b) 2 and 3
c) 1 and 3	d) 1, 2 and 3
  
6. Consider the following statement regarding British Academy Book Prize:
  1. This was formerly known as the Nayef Al-Rodhan Prize.
  2. The British Academy is the UK's national academy for humanities and social sciences.
  3. Alia Trabucco Zerán is the winner of this award in 2023.
 Choose the correct option from the codes given below:
 

a) 1 and 2	b) 2 and 3
c) 1 and 3	d) 1, 2 and 3
  
7. Consider the following statement regarding the State Food Safety Index:
  1. The steepest fall in scores over five years was seen in Chhattisgarh.
  2. The worst drop has been recorded in the 'Food Testing Infrastructure' parameter.
  3. The 'Human Resources and Institutional Data' parameter, was given the third highest weightage of 18 per cent in 2023.
 Choose the correct option from the codes given below:
 

a) 1 and 2	b) 2 and 3
c) 1 and 3	d) 1, 2 and 3
  
8. Consider the following statement regarding White Hydrogen:
  1. White hydrogen is also referred to as "natural," "gold" or "geologic" hydrogen.
  2. It causes no CO<sub>2</sub> emissions when used as a fuel.
 Choose the correct option from the codes given below:
 

a) 1 Only	b) 2 Only
c) 1 and 2	d) None of the above
  
9. Consider the following statement regarding Propane:
  1. It is an alkane, which means it consists of only single covalent bonds.
  2. It is the third member of the paraffin series.
  3. It is commercially available as liquefied propane.
 Choose the correct option from the codes given below:
 

a) 1 and 2	b) 2 and 3
c) 1 and 3	d) 1, 2 and 3

- a) 1 and 2                      b) 2 and 3  
c) 1 and 3                      d) 1, 2 and 3
10. Consider the following statement regarding Awaous Motla:
- The species belongs to the family 'Awaous'.
  - It is a fish with a vibrant yellow-coloured body.
  - It is collected from Ganges River only.
- Choose the correct option from the codes given below:
- a) 1 and 2                      b) 2 and 3  
c) 1 and 3                      d) 1, 2 and 3
11. Consider the following statement regarding Dudhwa Tiger Reserve:
- It is located on the Indo-Nepal border in Uttar Pradesh.
  - Suheli and Mohana streams flows through this reserve.
  - The vegetation is tropical Rainforest.
- Choose the correct option from the codes given below:
- a) 1 and 2                      b) 2 and 3  
c) 1 and 3                      d) 1, 2 and 3
12. Consider the following statement regarding Pavana River:
- It is situated in Karnataka.
  - It originates from the Western Ghats.
  - A dam is built on this river at Pavana Nagar, called the "Pavana Nagar Dam".
- Choose the correct option from the codes given below:
- a) 1 and 2                      b) 2 and 3  
c) 1 and 3                      d) 1, 2 and 3
13. Consider the following statement regarding Gundla Brahmeswaram Wildlife Sanctuary:
- It is located in Andhra Pradesh.
  - The Gundlakamma River stretches across the sanctuary.
- Choose the correct option from the codes given below:
- a) 1 Only                      b) 2 Only  
c) 1 and 2                      d) None of the above
14. Consider the following statement regarding Galapagos Islands:
- It is situated in the Pacific Ocean.
  - It is distributed on either side of the Equator.
  - Mount Azul is the highest point of this Islands.
- Choose the correct option from the codes given below:
- a) 1 and 2                      b) 2 and 3  
c) 1 and 3                      d) 1, 2 and 3
15. Consider the following statement regarding Yucatan Peninsula:
- It separates the Gulf of Mexico to the north and west and the Caribbean Sea to the east
  - Its extent into Pacific Ocean.
- Choose the correct option from the codes given below:
- a) 1 Only                      b) 2 Only  
c) 1 and 2                      d) None of the above
16. Consider the following statement regarding Methanol:
- It is also called wood alcohol, or wood spirit.
  - This fuel is generally produced by steam-reforming natural gas to create synthesis gas.
  - It does not mix with water.
- Choose the correct option from the codes given below:
- a) 1 and 2                      b) 2 and 3  
c) 1 and 3                      d) 1, 2 and 3
17. Consider the following statement regarding Adaptation Gap Report:
- The report is published by UNESCO.
  - The aim of the reports is to inform national and international efforts to advance adaptation.
  - It complements the Emissions Gap Report series.
- Choose the correct option from the codes given below:
- a) 1 and 2                      b) 2 and 3  
c) 1 and 3                      d) 1, 2 and 3
18. Consider the following statement regarding Kaleshwaram Lift Irrigation project:
- It is a multipurpose irrigation project on the Godavari River.
  - It is claimed to be the world's largest multi-stage and multi-purpose lift irrigation project.
- Choose the correct option from the codes given below:
- a) 1 Only                      b) 2 Only  
c) 1 and 2                      d) None of the above
19. Consider the following statement regarding Twin Engine Deck Based Fighter (TEDBF):
- Designed specifically for carrier-based operations.
  - It will be equipped with various homegrown Indian weapon systems and avionics.
  - It will be a single engine aircraft carrier.
- Choose the correct option from the codes given below:
- a) 1 and 2                      b) 2 and 3  
c) 1 and 3                      d) 1, 2 and 3
20. Consider the following statement regarding Energy Efficiency Services Limited:
- It was formed to create and sustain market access to energy efficient technologies.
  - It is also leading the market-related activities of the National Mission for Enhanced Energy Efficiency (NMEEE).
  - It is promoted by the Ministry of Environment, Forest and Climate Change (MoEFCC).



















109. Consider the following statement regarding Deepor Beel:

1. It is a perennial freshwater lake located in Assam.
2. It was recognised as a Ramsar Site in 2002.
3. It is a staging site on migratory flyways.

Choose the correct option from the codes given below:

- |            |               |
|------------|---------------|
| a) 1 and 2 | b) 2 and 3    |
| c) 1 and 3 | d) 1, 2 and 3 |

110. Consider the following statement regarding 16 Psyche:

1. It is currently orbiting the Sun between Mars and Jupiter.
2. It is made up of gold, silver, and nickel deposits, making it metal-rich.
3. It is also the third largest asteroids in our solar system.

Choose the correct option from the codes given below:

- |            |               |
|------------|---------------|
| a) 1 and 2 | b) 2 and 3    |
| c) 1 and 3 | d) 1, 2 and 3 |

111. Consider the following statement regarding Farlowichnus rapidus:

1. It was a very fast reptile.
2. It lived during the early Cretaceous period.
3. The new species of dinosaur was a herbivorous animal.

Choose the correct option from the codes given below:

- |            |               |
|------------|---------------|
| a) 1 and 2 | b) 2 and 3    |
| c) 1 and 3 | d) 1, 2 and 3 |

112. Consider the following statement regarding Sangai:

1. It is subspecies of deer that is critically endangered to Mizoram.
2. It is also known as dancing deer.
3. It is found only in Keibul Lamjao National Park

Choose the correct option from the codes given below:

- |            |               |
|------------|---------------|
| a) 1 and 2 | b) 2 and 3    |
| c) 1 and 3 | d) 1, 2 and 3 |

113. Consider the following statement regarding Credit Guarantee Trust for Micro and Small Enterprises (CGTMSE) Scheme:

1. It is a joint set up by MSME and SIDBI.
2. It is instrumental in providing guarantee cover to collateral facility.

Choose the correct option from the codes given below:

- |            |                      |
|------------|----------------------|
| a) 1 Only  | b) 2 Only            |
| c) 1 and 2 | d) None of the above |

114. Consider the following statement regarding Deepfakes:

1. It is a compilation of artificial images and audio put together with machine-learning algorithms.
2. The term combines the deep learning concept with something fake.
3. It is difficult to identify as false.

Choose the correct option from the codes given below:

- |            |               |
|------------|---------------|
| a) 1 and 2 | b) 2 and 3    |
| c) 1 and 3 | d) 1, 2 and 3 |

115. Consider the following statement regarding Radio Galaxy:

1. They are radio luminous galaxies.
2. They are much bigger than most of the other galaxies in the universe.
3. Radio galaxies are driven by thermal emissions.

Choose the correct option from the codes given below:

- |            |               |
|------------|---------------|
| a) 1 and 2 | b) 2 and 3    |
| c) 1 and 3 | d) 1, 2 and 3 |

### PRACTICE QUESTION FOR UPSC MAINS EXAM

1. Climate finance is essential for trust in climate change negotiations, especially in COP 28. What are the concerns of developing nations related to disparities between pledged amounts and actual commitments and what are the ways to address these issue?
2. What event brought about a paradigm shift in the way the U.S. looked at the Israel? What is the basis of the 'the special relationship' between the two countries? How do pro-Israeli forces exert a strong influence in the U.S. public sphere?
3. Discuss the role of Biosphere Reserves as Pockets of hope in the face of the climate crisis.
4. Air pollution has worsened in Delhi in the last decade. While the smog's presence is more pronounced in the winter months, policymakers must bear in mind that it is a continuous concern throughout the year. Comment.
5. How many countries voted for a resolution calling for an 'immediate, durable and sustained humanitarian truce' in the Israel-Hamas conflict at the United Nations General Assembly? What has been India's historical stance on Palestine?
6. Data show that India is home to some of the most polluted cities in the world. The overall development strategy of urban development in India needs a paradigm shift. The need now is to turn to sustainable and "ecological urbanization". Comment.
7. What is mixed member proportional (MMP) system? Discuss how a split voting system allows voters to choose candidates based on merit while ensuring that their party preference determines legislative composition?

8. In light of high import dependencies and export bans imposed by resource-rich countries, countries need to create secure critical mineral supply chains. Comment and discuss.
9. When was the decision to establish a loss and damage fund taken and in which Conference of Parties did member states take concrete steps to bring this fund to fruition? What is the role of the Transitional Committee? Have the meetings by this committee been successful?
10. The World Food Programme has identified the Odisha Millets Mission as one of the best practices that can be replicated in other countries. Discuss how it offers key learnings to other governments on getting the momentum going on millets?
11. India's digital public infrastructure (DPI) model is a key offering to the world and is being considered, adopted or adapted by nations at varying stages of development. Comment.
12. What is the Forest (Conservation) Amendment Act, 2023? What did the 31-member Joint Parliamentary Committee decide with respect to the amendment Bill tabled in Parliament? Why do the Central and State governments insist on the right to convert forest land for non-forest purposes?
13. Discuss how as portable sources of electric power, batteries are at the foundation of convenience and sustainability? What led to the invention of the electric battery? What are the types of batteries?
14. In not finding room for same-sex marriages in the Special Marriage Act, the Supreme Court misinterpreted the Constitution and failed to look at its own precedents. Comment.
15. Why are the Commission for Scheduled Castes and the National Commission for Scheduled Tribes against sub-categorising? What are the legal challenges?
16. It is high time to consider a Production Linked Incentive scheme and other such incentives for boosting domestic manufacturing of critical components, particularly space electronics in India. Comment.
17. What's happening in the border States of the northeast because of the civil war in Myanmar? How have ethnic organisations responded to the junta crackdown?
18. What are the options before a Governor when they receive a Bill for assent from the State Legislative Assembly? Do Governors have powers of discretion and when can they use it?
19. The Indian military's strategic embrace of emerging technologies, encompassing AI, cyber, and unmanned systems, should not be imagined as a 'plug and play'. Fully realising the potential of emerging technologies in the military requires altering existing organisations and approaches. Comment.
20. What does the 'new and additional finance' clause in the United Nations Framework Convention on Climate Change mean? Why do rich and developed economies want to keep the definition of climate finance vague?
21. There is a strong link between animal cruelty and child abuse and there is an urgent need to investigate it further in the Indian context. Discuss and comment.
22. How has the principle of 'common but differentiated responsibilities' affected global climate policies since the UNFCCC in 1992? Why have the disproportionate historical carbon emissions of developed countries impacted the global carbon budget? What stance should India adopt at COP 28 regarding its fair share of the carbon budget?
23. Discuss how the intersection of climate vulnerability and agricultural importance places India at a unique juncture where climate-smart agriculture (CSA) adoption is not merely desirable but essential.

## PRACTICE QUESTION FOR UPSC PRELIMS EXAM

### ANSWER KEY

- |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1. (a)   | 2. (b)   | 3. (c)   | 4. (d)   | 5. (a)   | 6. (a)   | 7. (b)   | 8. (c)   | 9. (d)   | 10. (a)  |
| 11. (a)  | 12. (b)  | 13. (c)  | 14. (d)  | 15. (a)  | 16. (a)  | 17. (b)  | 18. (c)  | 19. (d)  | 20. (a)  |
| 21. (a)  | 22. (b)  | 23. (c)  | 24. (d)  | 25. (a)  | 26. (a)  | 27. (b)  | 28. (c)  | 29. (d)  | 30. (a)  |
| 31. (a)  | 32. (b)  | 33. (c)  | 34. (d)  | 35. (a)  | 36. (a)  | 37. (b)  | 38. (c)  | 39. (d)  | 40. (a)  |
| 41. (a)  | 42. (b)  | 43. (c)  | 44. (d)  | 45. (a)  | 46. (a)  | 47. (b)  | 48. (c)  | 49. (d)  | 50. (a)  |
| 51. (a)  | 52. (b)  | 53. (c)  | 54. (d)  | 55. (a)  | 56. (a)  | 57. (b)  | 58. (c)  | 59. (d)  | 60. (a)  |
| 61. (a)  | 62. (b)  | 63. (c)  | 64. (d)  | 65. (a)  | 66. (a)  | 67. (b)  | 68. (c)  | 69. (d)  | 70. (a)  |
| 71. (a)  | 72. (b)  | 73. (c)  | 74. (d)  | 75. (a)  | 76. (a)  | 77. (b)  | 78. (c)  | 79. (d)  | 80. (a)  |
| 81. (a)  | 82. (b)  | 83. (c)  | 84. (d)  | 85. (a)  | 86. (a)  | 87. (b)  | 88. (c)  | 89. (d)  | 90. (a)  |
| 91. (a)  | 92. (b)  | 93. (c)  | 94. (d)  | 95. (a)  | 96. (a)  | 97. (b)  | 98. (c)  | 99. (d)  | 100. (a) |
| 101. (a) | 102. (b) | 103. (c) | 104. (d) | 105. (a) | 106. (a) | 107. (b) | 108. (c) | 109. (d) | 110. (a) |
| 111. (a) | 112. (b) | 113. (c) | 114. (d) | 115. (a) |          |          |          |          |          |



**FREE COACHING  
& SCHOLARSHIP PROGRAMME**

# **UPSC**

# **GENERAL STUDIES**

**FOUNDATION COURSE FOR IAS**

**ENGLISH MEDIUM**

**HYBRID BATCH**

**ONLINE**

***NEW BATCH***

**OFFLINE**

**Class Starts 19 DEC @ 5:30 PM**

**Admission Open**

## **FEATURES**



### **CLASSROOM PROGRAMME**

24 Months/14 Months  
1200-1500 Hrs. Classes  
300 Hrs. NCERT Video  
& 150 Hrs. PT Booster  
Classes on App



### **STUDY MATERIALS**

Latest, Updated &  
Exam Oriented  
Study Materials  
10,000 Pages  
(50 Booklets)



### **CURRENT AFFAIRS**

200 Hrs.+ Classes on  
Important Issues  
for 2 Yrs.  
& 3 Years Monthly  
Magazine Subscription



### **WORKBOOK (MAINS)**

16 workbooks provides  
opportunity to review  
and extend your  
classroom learnings



### **UNIT TEST (PRE+MAINS)**

32 unit test improves  
knowledge, skills,  
& aptitude for  
prelims & mains exam



### **DAILY CLASS TEST**

250 Prelims and 200 Mains  
Test is used to check the  
quality of knowledge gained  
& started executing



### **CURRENT AFFAIRS PRE TEST**

Through 100 tests you will get  
right approach for  
current affairs MCQs  
and their relevance in  
the UPSC exam



### **MENTORSHIP PROGRAMME**

Individual doubt clearance  
by faculties/experts to  
increase confidence and  
exposure on  
different perspectives



### **COURSE VALIDITY**

4 Years/3 Times Course  
Validity will help to increase  
your confidence and  
preparation for your exam