



www.optimizeias.com

**DAILY PRELIMS NOTES COMPILATION
MAY 2024**

*To be the best
Learn from the best*

960017 Civil Services Marksheet
Created Time & Date: 08:09:00 AM (Tue 09-Jun, 2017)

**UNION PUBLIC SERVICE COMMISSION
MARKSHEET**

Civil Services (PRELIMINARY) Examination, 2016	
Roll Number	0029983
Name	SANTOSH PANDEY
Marks Obtained	
Paper I	144.66
Paper II	187.50

REMARKS : QUALIFIED FOR CS(MAIN) EXAMINATION, 2016

DISCLAIMER : The contents of this site is informative in nature. You are advised to verify the same from Commission's office.

**SANTOSH SIR
CRACKED ALL 6 PRELIMS**



Contents

Economy..... 9

Govt mulls new farm law to facilitate sale of inter-State agriculture produce..... 9

Exports from key labour-intensive sectors decline 12% compared to pre-pandemic levels..... 11

Why electric vehicles are at the heart of trade frictions between China and Europe..... 13

Why Vietnam wants US to change its 'non-market economy' status..... 14

At WTO, India Calls for Focus on Real-Life Trade Issues..... 15

Trade dispute with India over sugar subsidies.....	16
Why Indian agriculture may need a new export-import policy.....	17
China's share in India's industrial goods imports jump to 30% from 21% in last 15 years: GTRI	19
As US hikes China tariffs , imports hiked from China reliant Vietnam.....	20
Renew the Generalised System of Preferences (GSP)	22
UN Rice Tenders: Indian Export Curbs Under WTO Lens	22
India's Opposition to Plurilateral Pact on Investment at WTO	23
What is the current status with respect to spice exports?	25
India VIX.....	26
Reconsideration of Sachetisation of F&O Trade to Safeguard Household Savings: CEA Nageswaran	26
Tighter AIF Norms Prompt Fund Managers to Consider Offshore Routes	28
BSE Market Capitalization Tops \$5 Trillion: Implications and Concerns	29
BSE Calls Off Merger with NSE Arm at IFSC	30
Inheritance Tax: A Tool for Reducing Inequality.....	30
IMF Warns France to Cut Debt, Sees Higher Deficit	31
After RBI Bonanza, Centre to Rake in More Cash via Critical Mineral, Spectrum Auctions	32
LTCG liability to ease on cost inflation reset	34
RBI's Provisioning Norms Affect PSU Banks and Infrastructure Financers	35
Why is the RBI keeping an eye on gold loans?.....	36
RBI's Proposed Framework for Long-Gestation Project Financing.....	37
RBI's Record Surplus Transfer to the Centre for FY24	38
RBI Unveils Pravaah Portal	39
Overview of CRISIL's Credit Growth Projections for FY25	40
Summary of RBI's Financial Performance and Projections (FY24)	40
Delay in Publishing Consumer Price Index for Industrial Workers (CPI-IW) Unusual: CITU	41
India's 400-Million Casual Labour Market Needs a Structural Shift: ISF	42
India and China: A Comparative Analysis of Consumer Markets.....	43
AI-Intensive Sectors Showing a Productivity Surge, PwC Reports.....	45
Rising Interest, Falling Savings: Substantiating the Article with Data and Figures.....	45
S&P Revises India's Economic Outlook to 'Positive'	47
Environment	48
How the next government will push 'balanced fertilization'	48
Microbes, not fossil fuels, produced most new methane: study	49
Sea also rises: On understanding the Indian Ocean's local impact	50
What is carbon farming?	51
Renewable energy certificates (RECs).....	52
Analysing local environmental footprints of luxury consumption.....	52


Nearly 6 million trees disappeared from farmlands: study	54
Combating forest fires in focus on Day 1 of UN forum; India Shares Revised National Forest Policy	55
Paris Summit on clean cooking in Africa ends with \$2.2 billion in global pledges.....	56
KAZA Summit 2024: Delegates renew calls to leave CITES	57
Semal trees are being wiped out in Rajasthan due to Udaipur’s Holi	59
Denotifying Pulicat Bird Sanctuary.....	60
Supreme Court orders against illegal mining in Sariska reserve	61
New study reveals extent of microplastic pollution in Ashtamudi Lake.....	62
Rhinos, elephants, pangolins, cedars, rosewoods & agarwood most affected by illegal wildlife trade: UNODC	64
Three-day synchronised elephant census in southern states from May 23.....	65
With food scarce, lion-tailed macaques come down forest canopies, enter the urban jungle	67
The baobab’s journey from Madagascar to Africa and Australia	68
The controversy over eucalyptus planting in Kerala	69
Plastic treaty talks conclude in Ottawa with little progress.....	70
Delhi’s mounting waste crisis.....	71
Geography	73
Heatwaves in several parts of India: Why has April been hotter than usual?	73
Cyclone Hidaya to slam into Tanzania south of Dar es Salaam; Ruto puts Kenya on alert	76
Cyclone Remal may make landfall along West Bengal coast on May 26: IMD	77
Southwest monsoon makes onset over Nicobar Islands: IMD	79
Warming climate intensifies flash droughts worldwide.....	80
Monsoon sets in over Kerala and northeast earlier than forecast	81
Swell waves hit coastal Kerala.....	83
Coral bleaching grips Indian coasts; Lakshadweep, Andamans are most affected	83
Freshwater quest, the likely new gold hunt.....	85
Pine needle power projects to check Uttarakhand forest fires prove to be inadequate	86
Why have Bikaner and Barmer in Rajasthan reported land sinking in the last month?	88
As right as rain – monsoon-inspired marketing ideas.....	90
Dangers of Landslide	91
Half of world’s rangelands are degraded, UN study finds: What are rangelands, why they matter.....	93
Sweet sorghum is a hardy, nutritious, biofuel crop that offers solutions in drought-hit southern Africa.....	95
Why dal imports have hit a seven-year high	96
In 1950-2015, the Hindu population dipped from 85% to 78%, and Muslims rose to 14% from 10% — PM-EAC paper.....	98
Indian forces using Kuki and Myanmar groups to wage war: NSCN.....	100
Brazil's Amazon fires off to record 2024 start as green union blames firefighting budget cut.....	103
Myanmar junta revives plans for China-backed mega-dam	104

History	105
Three Indian literary works included in UNESCO’s Memory of the World Regional Register: What is their significance?	105
Archaeologist finds first evidence of rock art in form of footprints in Mangaluru city	106
Portion of Hampi’s Virupaksha temple collapses: What is its history and the threats it faces today?	107
IR	109
How diplomatic passports, visa regimes work	109
Antarctic Parliament meets in Kochi: What’s on the table?	111
BIMSTEC acquires ‘legal personality’ after charter comes into force	113
Low-lying Maldives seeks easier funding to battle waves	115
India backs Palestine’s bid for full UN membership	116
The World Health Assembly to prepare a global toolkit for future pandemics	117
EU’s Borrell urges Israel ‘not to intimidate’, ‘threaten’ ICC judges	118
Brazil and EU urge India for timely notifications on sugar subsidies at WTO	119
How close is the World Health Organization to agreeing on pandemic response rules?	120
The question of Palestine’s U.N. membership	121
ICJ orders Israel to halt military assault in Rafah: The case and the ruling	122
What was the three-phase ceasefire deal that Hamas backed, Israel rejected as ‘soft’?	123
Polish farmers march in Warsaw against EU climate policies and the country’s pro-EU leader	125
What are India’s stakes in Iran’s Chabahar port?	126
Saudi Arabia's Vision 2030 and NEOM Project	129
Violence rages in New Caledonia as France rushes security forces to islands	130
U.S. faces strategic setback in Africa as it is set to withdraw troops from Niger	131
Burkina Faso, Mali and Niger Finalise Regional Alliance Project	133
Helicopter crash kills Iran President, Foreign Minister	135
Philippines blames China for loss of giant clams in disputed shoal and urges environmental inquiry	136
Kim Jong Un was ‘sincere’ in denuclearisation talks: former South Korea president	137
Russia wants to unilaterally change maritime border with Lithuania, Finland in Baltic Sea	139
Ireland, Spain, Norway to formally recognise Palestine	140
Gelephu Mindfulness City is a lifetime opportunity, says Bhutan PM Tshering Tobgay	141
More than 2000 buried in Papua New Guinea landslide	141
India offers \$1-million aid to disaster-hit Papua New Guinea	142
Belarus halts participation in European military treaty	143
Moldova receives U.S. aid to counter Russian influence	144
Polity	145
Supreme Court: Article 39(b) shouldn’t be read like there is no protection for private rights	145
Article 31C: Why the SC is deciding if a fundamental right still exists in a case about private property?	149
A brief history of religion-based reservations in India; the question of Muslims’ inclusion	150

In Supreme Court, Centre says it sends CBI to States for probes	151
Reservation within Constitutional bounds	153
What is the legal position on live-in relationships?	155
Over 300 people become Indian citizens under the CAA	155
State cannot acquire property without proper procedure: Supreme Court	156
Supreme Court limits ED’s power to arrest PMLA accused	158
What happens during remand harrings? This is what a study suggests	159
What are the rules on contesting seats?	160
Supreme Court denies interim order on booth-wise voter data	161
Nothing ‘corrupt’ if promises in manifesto work out eventually for public’s financial benefit: SC	161
Why can accused persons in prison contest polls but not vote?	162
T.N. will protect its rights in inter-State water disputes	163
Sounding the gavel on curative jurisdiction	164
Charges framed against Brij Bhushan: what does this mean in legal process?	165
Do marriages need to be registered? What happens if they are not?	166
Why Supreme Court ruled that a lawyer cannot be sued for providing faulty ‘service’	168
Karnataka govt seeks cancellation of MP Prajwal Revanna’s diplomatic passport	169
UAPA tribunal upholds MHA ban against seven Meitei extremist organizations	170
The Karnataka HC ruling on EPF benefits	171
How is India streamlining the pharma sector?	172
Kerala Governor declines Ordinance on ward delimitation citing Model Code of Conduct	173
Schemes	174
2024 Lok Sabha polls: Housing schemes and promises to voters	174
An overview of the AMRUT scheme	176
Prejudiced past and forsaken future: the DNTs’ battle for dignity	177
Science and tech	178
What is Artificial General Intelligence (AGI), and why are people worried about it?	178
What is DigiLocker and does it keep your data safe?	179
On the importance of regulatory sandboxes in artificial intelligence	181
GPT-4o, OpenAI’s newest AI model that makes ChatGPT smarter and free for all	182
The use of AI in drug development	183
Why is the European Union probing Facebook and Instagram?	184
Leading AI firms pledge ‘responsible’ tech development	185
How Europe’s AI convention balances innovation and human rights	186
Russia accuses U.S. of seeking to weaponise outer space	187
The value of attributing extreme events to climate change	189
Azad Engineering bags contract for advanced turbo gas generator engine from DRDO lab GTRE	191

Why are Indian spices facing the heat?	191
A computer science conundrum that could transform healthcare	193
Covid virus is still here. Why aren't more people falling ill?.....	194
A mouth bacteria has starring role in colorectal cancer: study.....	196
Understanding the science behind magnetic resonance imaging.....	197
MDH-Everest row: FSSAI raises default limit for pesticides in spices but will that impact your health?	198
How the Widal test clouds India's sense of its typhoid problem.....	199
With 56.4% of India's total disease burden linked to unhealthy diets, what new nutrition guidelines prescribe	200
All about FLiRT, the new COVID-19 variants	203
Could bird flu turn into the next pandemic?.....	204
Early clinical trial sheds light on regulatory T cell therapies	205
Will cattle be the next evolutionary lab for flu host-switching?	206
30-year study links ultra-processed food to higher risk of early death	208
What FLiRT, a new set of Covid-19 variant detected in the US, could mean for spring and summer.....	210
First human recipient of pig kidney transplant dies	211
The challenge of extra-pulmonary TB.....	213
Spices Board discussing the setting of ETO Limits with CODEX.....	214
General, central obesity linked to higher risk of colorectal cancer	215
Can humans get H5N1 infection by consuming raw milk?.....	217
Don't use calcium carbide to ripen fruits, orders FSSAI.....	218
Women with no sexual autonomy twice likely to get STIs: study.....	219
WHO updates Bacterial Priority Pathogens List to combat antimicrobial resistance.....	220
Balancing two forms of SNCA protein could help manage Parkinson's, study finds	222
SII ships first set of malaria vaccine doses to Africa.....	223
X chromosome revival in older women increases autoimmune disease risk	224
Glenmark to commercialize BeiGene's oncology drugs in India	225
The 'chilling cover-up' of the U.K.'s infected blood scandal	226
Why COVID vaccine safety needs scrutiny.....	227
How an altered protein and fussy neurons conspire to cause microcephaly	228
The Tobacco Epidemic in India	229
The rise of pediatric inflammatory bowel disease in India	231
Particles called quarks hold the key to the final fate of some stars	232
The Eta Aquariid meteor shower and how it can be spotted	233
Significance of Boeing Starliner's first crewed test flight on May 7.....	235
Why is the launch of Boeing's Starliner significant?	236
Aurora lights in India: What caused them to be visible even from Ladakh?.....	238
Nissar Satellite will monitor tectonic movements to Centimeter Accuracy: S.Somnath.....	239

More solar storms brewing after last week's aurorae as Sun 'wakes up'	240
An overlooked molecule could solve the Venus water mystery	243
Why has NASA launched a tiny satellite to measure heat lost from Earth's poles?	243
New light-based tool could cut cost of spotting viral infections	245
Venus has more volcanoes than previously known, new analysis finds.....	246
Startup agnikula launches world first rocket with 3d printed engine	247
Can the newly discovered organelle help engineer plants to fix nitrogen?.....	247
This worm develops food habits and its offspring 'inherit' them	249
Why was Singapore flight turbulence severe?	251
What are colours and how do people understand them?	254



LAQSHYA 2025

UNION PUBLIC SERVICE COMMISSION
MARKSHEET


TESTIMONIAL

”
Test was great.
Definitely better
than any other
coaching centres

ISHITA KISHORE

AIR -1, CSE 2022

Student of
LAQSHYA Program



Civil Services (PRELIMINARY) Examination , 2016


Roll Number	0029983
Name	SANTOSH PANDEY
Marks Obtained	
Paper I	144.66
Paper II	107.50

REMARKS : QUALIFIED FOR CS(MAIN) EXAMINATION, 2016

- ◆ NCERT BOOK TEST - 10
- ◆ ADVANCE BOOK TEST - 15
- ◆ MONTHLY CURRENT AFFAIRS TEST - 15
- ◆ ENTIRE YEAR IMP QUESTION TEST (SUBJECT-WISE) - 8
- ◆ OPTIMA FULL LENGTH STIMULATED TEST - 7
- ◆ CSAT FULL LENGTH TEST - 10
- ◆ WEEKLY CURRENT AFFAIRS SESSION - 100 HRS
- ◆ STATIC MAP SESSIONS - 50 HRS
- ▶ **TOTAL NO. OF TEST - 65**

Now open for Registration

Join NOW



Join Telegram Channel
<https://t.me/OPTIMIZEIAS>

Team Optimize IAS

+91-8235035145

+91-8235035144

What do our CSE 2022 TOPPER say?

Thank you sir.

The [DPN notes](#) were very comprehensive and useful. I used it to supplement my newspaper knowledge. It really helped in dealing with the current affairs portion of the prelims exam, since you compile it from so many sources.

Would recommend students to maintain their own digital notes using that source.

After I didn't clear first prelims, I joined your [mains master notes](#) which helped me identify key areas for note making.

Thank you sir for your relentless effort in updating these notes.

They're helpful for the aspirants.



Ishita Kishore

AIR 1, CSE2022

Ishita has been a student of
ONE YEAR LAQSHYA PRELIMS MENTORSHIP
MAINS MASTER MENTORSHIP

CRACK

UPSC CSE 2025

BEST PERSONALIZED MENTORSHIP PROGRAM



UNION PUBLIC SERVICE COMMISSION MARKSHEET	
Civil Services (PRELIMINARY) Examination , 2016	
Roll Number	0029983
Name	SANTOSH PANDEY
Marks Obtained	
Paper I	144.66
Paper II	107.50

REMARKS : QUALIFIED FOR CS(MAIN) EXAMINATION,2016

Arjuna Prime 2025

- 1 Prelims Cum Mains Integrated Daily Plan
- 2 Entire GS Concept Sessions- Pre Cum Mains
- 3 Mains Master Notes GS 1 2 3 4 (Static)
- 4 LAQSHYA PRELIMS MENTORSHIP
- 5 Daily Current Affairs and Answer writing
- 6 Essay Guidance
- 7 Ethics by Ex Civil Servants
- 8 Interview mentorship by Ex- Civil Servants

ALL 6 PRELIMS QUALIFIED
4 MAINS QUALIFIED
STATE PCS QUALIFIED

*To be the best
Learn from the best*



AIR 1, CSE 2022

student of
ONE YEAR PRELIMS MENTORSHIP -LAQSHYA PROGRAM
MAINS MENTORSHIP -MAINS MASTER NOTES PROGRAM

JOIN NOW

Economy

Govt mulls new farm law to facilitate sale of inter-State agriculture produce

Sub: Economy

Sec: Agri

The Indian government is considering the **introduction of a new farm law to facilitate inter-State trading of agricultural produce, enabling farmers to sell their products online to distant markets beyond their State boundaries.**

This initiative aims to **establish an independent regulatory authority responsible for framing the rules and regulations, including the fees for inter-State trading.** The law will not interfere with intra-State trading, which will remain under the control of local governments.

Key Provisions and Context

- **Revival of a 2012 Plan:**
 - The current proposal revives a plan from 2012 that **was shelved due to decision-making delays**, despite having been approved by the Law Ministry at that time.
- **Constitutional Basis:**
 - The proposed law is **grounded in Article 307 of the Indian Constitution, which allows Parliament to appoint an authority for facilitating the freedom of trade and commerce across India** (Articles 301-304).
- **Independent Regulatory Authority:**
 - An independent body will be established to **oversee inter-State agricultural trade**, ensuring that appropriate rules and regulations are in place.
- **Enhanced Trading Platforms:**
 - The law is expected to **boost transactions on the government's e-NAM platform**, enhancing farmers' ability to access better markets and prices for their produce.
- **Learning from Past Experience:**
 - Given the backlash against the farm laws introduced during the COVID-19 pandemic, which were later repealed, **the government plans to engage in wider consultations with stakeholders to avoid similar issues.**

Potential Benefits

- **Increased Market Access:**

- Farmers will have the **opportunity to sell their produce directly to buyers in other States, potentially securing better prices** and reducing reliance on local Agricultural Produce Marketing Committee (APMC) yards.
- **Economic Efficiency:**
 - By facilitating **direct sales and inter-State trading**, the law could lead to more competitive pricing and better income for farmers.
- **Boost to e-NAM:**
 - The electronic National Agriculture Market (e-NAM) platform is likely to see increased usage, which could standardize trading practices and improve market transparency.

Challenges and Considerations

- **Building Trust:**
 - The success of inter-State trading will **depend on building trust among buyers regarding the quality of produce**, which might necessitate third-party guarantees or quality certifications.
- **Stakeholder Engagement:**
 - Given the mixed reception to previous farm laws, the **government must engage in comprehensive consultations with farmers, State governments, and other stakeholders** to address concerns and build consensus.
- **Infrastructure and Logistics:**
 - Effective implementation will **require robust logistics and infrastructure** to handle the increased volume of inter-State agricultural trade.

Conclusion

The proposed farm law represents a significant step towards **modernizing India's agricultural market and improving economic opportunities for farmers**. By leveraging constitutional provisions and modern trading platforms like e-NAM, the government aims to create a more efficient and fair market environment. However, the success of this initiative will largely depend on careful planning, inclusive stakeholder consultations, and the establishment of mechanisms to ensure quality and trust in inter-State agricultural transactions.

Overview of eNAM

- **The National Agriculture Market (eNAM)** is an online trading platform for agricultural commodities in India.
- **Launched on April 14, 2016**, and is **completely funded by the Government of India**.
- The **Small Farmers Agribusiness Consortium (SFAC)** acts as the lead agency for implementing eNAM under the Ministry of Agriculture and Farmer's Welfare.
- **Aims to create better marketing opportunities for farmers** through a **competitive and transparent price discovery system** and **online payment facilities** for buyers.
- **Networks existing Agriculture Produce Marketing Committee (APMC) market yards**, sub-market yards, private markets, and other unregulated markets to **create a central online platform for agricultural commodity price discovery**.

Key Features of eNAM

- **Online Trading and Price Discovery:**
 - **Farmers can showcase their products through nearby markets.**
 - **Traders from anywhere can quote prices.**
 - **Provides single-window services** for all APMC-related services and information:
 - **Commodity arrivals, quality, and prices.**
 - **Buy-and-sell offers.**
 - **E-payment settlements directly into farmers' accounts.**
- **Licensing and Market Access:**
 - **Licenses for traders, buyers, and commission agents** can be obtained from state-level authorities without the need for **physical presence or possession of a shop** in the market yard.
- **Quality Standards and Testing:**
 - **Harmonization of quality standards** for agricultural products.
 - **Infrastructure for quality testing** available in every market.
 - **Provision of Soil Testing Laboratories** in selected markets to facilitate farmers.

Benefits to Stakeholders

- **Farmers:**
 - **Access to a larger market** with competitive pricing.
 - **Reduced dependence on local APMC markets.**

- **Direct payments** to bank accounts ensuring prompt financial transactions.
- **Traders and Buyers:**
 - **Reduced transaction costs.**
 - **Access to quality-certified produce.**
 - **Simplified licensing processes.**
- **Farmer Producer Organizations (FPOs):**
 - **Improved market reach.**
 - **Enhanced ability to negotiate better prices** for members.
- **Market Infrastructure:**
 - **Unified national market network.**
 - **Improved transparency and efficiency** in agricultural trade.

What is APMC?

- **Agriculture Produce Marketing Committee (APMC)** is a statutory market committee established by a State Government under the **Agricultural Produce Market Committee Act**.
- **APMCs regulate wholesale marketing** of agricultural produce in a defined area of operation.
- **Provide a centralized marketplace** where sellers, buyers, and agents can meet to conduct trade.
- **APMCs ensure fair trade practices, provide price information, and maintain market infrastructure.**

Exports from key labour-intensive sectors decline 12% compared to pre-pandemic levels

Subject: Economy

Sec: external Sector

Context: During the last financial year, when overall goods exports shrank 3 per cent, the outbound shipments of textiles, leather, gems and jewellery and marine products saw a much steeper 9 per cent decline to \$78 billion against \$86.32 billion in FY23.

Details:

- While India's exports have been largely flat, the country's exports from labour intensive sectors such as textiles, leather, gems and jewellery and marine products are seeing a sharp dip. India's shipments from these **four high jobs generating sectors** have declined nearly 12 per cent compared to the pre-pandemic levels five years ago (FY18) amid an overall weakness in demand from developed nations and stiff competition from **Vietnam and Bangladesh**.
- During the last financial year, when overall goods exports shrank 3 per cent, the outbound shipments of textiles, leather, gems and jewellery and marine products saw a much steeper 9 per cent decline **to \$78 billion against \$86.32 billion in FY23**. The comparable number in **FY18 and FY19 stood at \$90 billion and \$88.14 billion** respectively, as per commerce and industry ministry data.
- During the last seven years, India's textile and garments exports have remained flat at around \$35 billion, while Vietnam and Bangladesh have gained market share on the back of free trade agreements (**FTAs**) and **Least developed countries (LDC) status that amount to 10-15 per cent concession on duty**.
- As per Global Trade and Research Initiative (GTRI) report in 2023, China exported \$114 billion worth of garments, followed by the European Union (EU) with \$94.4 billion, Vietnam with \$81.6 billion, Bangladesh with \$43.8 billion, and India with just \$14.5 billion.
- India significantly trails behind China and the EU and is also falling behind smaller countries like Bangladesh and Vietnam.
- From 2013 to 2023, Bangladesh's garment exports grew by 69.6 per cent, Vietnam's by 81.6 per cent, but India's grew by only 4.6 per cent. As a result, India's global market share in garment trade has declined from 2015 to 2022. The share of knitted apparel dropped from 3.85 per cent to 3.10 per cent, and the share of non-knitted apparel decreased from 4.6 per cent to 3.7 per cent
- Another sector witnessing considerable stress is the gems and jewellery sector that employs nearly 50 lakh people according to the union government's estimates. The exports from the gems and jewellery sector declined over 20 per cent to \$32.7 billion compared to \$41.54 billion in FY18.

What reforms government has brought?

- To make the industry more globally competitive, however, the Union government had launched **Mega Investment Textiles Parks (MITRA) programme** in 2021 to increase investment and acquire a competitive edge over global competitors.
- The commerce and industry ministry, in its reply to a query, said that remission of duties and taxes under **Remission of Duties and Taxes on Exported Products (RoDTEP)** scheme were extended to 18 items to support the textiles sector.

Positive developments

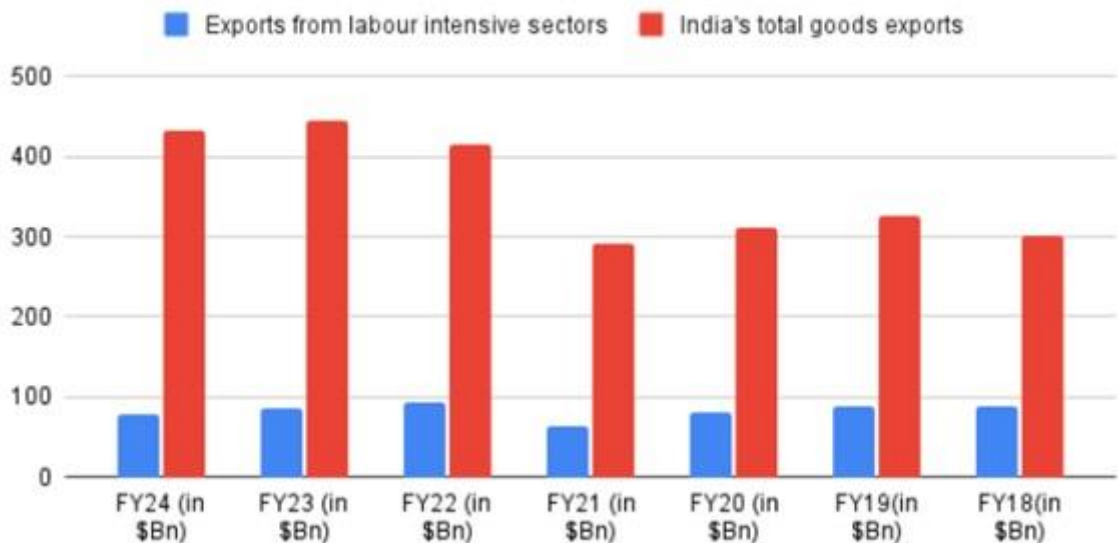
- Rerouting of petroleum products and the PLI-led push for electronic manufacturing has shown increased value addition, but job creation particularly in the tech-intensive phone manufacturing sector has remained lower than government's projected employment generation estimates from the PLI scheme.
- While exports of electronic goods jumped 288 per cent between FY18 and FY24, imports during the same period jumped 61 per cent, official data showed. In the case of petroleum products, the exports between FY18 and FY24 jumped 127 per cent but imports during the same period surged 65 per cent.

Decline exports of labour intensive sector:

	FY24 (in \$Bn)	FY23 (in \$Bn)	FY22 (in \$Bn)	FY21 (in \$Bn)	FY20 (in \$Bn)	FY19 (in \$Bn)	FY18 (in \$Bn)
Textiles	34.40	35.55	41.12	29.46	33.83	35.95	35.36
Leather & leather products	4.28	4.75	4.36	3.3	4.66	5.14	5.29
Gems & Jewellery	32.70	37.95	38.94	26.02	35.9	40.25	41.54
Marine Products	7.36	8.07	7.74	5.96	6.72	6.8	7.38
Exports from labour intensive sectors	78.74	86.32	92.16	64.54	81.11	88.14	89.57
India's total goods exports	433.09	443.72	415.83	290.72	310.01	326.46	300.67

OP

Exports from labour intensive sectors and India's total goods exports



Data on India's exports from labour intensive sectors and total goods export

Why electric vehicles are at the heart of trade frictions between China and Europe

Subject: Economy

Sec: External sector

Context:

- Chinese President Xi Jinping on Sunday arrived in France on a state visit hosted by **Emmanuel Macron** where the **French leader will seek to push his counterpart** on issues ranging from Ukraine to trade.

More on news:

- China's trade issues with the European Union (EU) **arise mainly out of friction over exports of cheap Chinese electric vehicles (EVs)**, and constrained access for European companies to markets in China.

The EVs question:

- Chinese **exports to European markets** significantly outweigh European exports to mainland China.
- The EU has complained that **unfair market access is a key reason for this situation**.
- China's car shipments to foreign markets, and to the EU in particular, have surged in recent years.
- The **EU opened an investigation into subsidies going into Chinese EVs, which Beijing denounced as an example of "naked protectionism"**.
- Brussels has also **opened separate investigations that could limit Chinese solar exports** to the EU, and put restrictions on imports of wind turbines and medical devices.
- This is significant because the **EC used the "facts available" in 10 previous anti-subsidy cases against China to fill in certain gaps**, which allowed Brussels a free hand to impose higher duties.

Fear of Chinese flood:

- China-made EVs are projected** to make up more than a quarter of all EV sales in Europe in 2024, with the country's share in the market increasing by more than 5 percentage points from a year earlier.
- The share of Chinese-made vehicles in the EU is expected** to rise to more than 25% in 2024, according to the T&E report, as brands such as BYD and SAIC step up their global expansion plans.
- The majority of foreign EVs currently sold in the EU** are from Western brands such as Tesla, which manufactures and ships from factories in China.

About Trade Protectionism:

- Protectionism, sometimes referred to as trade protectionism**, is the economic policy of restricting imports from other countries through methods such as tariffs on imported goods, import quotas, and a variety of other government regulations.

About Naked Protectionism:

- When protectionist measures are described as "naked," it implies that they are blatantly obvious and lack any attempt to conceal their intent.
- This might occur when a **government openly imposes high tariffs on imported goods or implements strict quotas to limit foreign competition** without providing any justification beyond protecting domestic industries.

Why Vietnam wants US to change its 'non-market economy' status

Subject: Economy

Sec: External Sector

Tag: non-market economy

Context:

- **Vietnam** has been pushing the President Joe Biden administration to quickly change its "non-market economy" classification to "market economy", in a bid to avoid high taxes imposed by the US on the goods imported from the Southeastern country.

More on news:

- **Vietnam has emerged** as one of the top trading partners of the US and helped thwart China's expanding influence in the region.
- **Vietnam has continued to be on Washington's list of non-market economies** for more than two decades.

What are 'non-market economies'?

- The US designates a country as a non-market economy based on several factors.
- These are:
 - **if the country's currency is convertible;**
 - **if wage rates are determined by free bargaining between labor and management;**
 - **if joint ventures or other foreign investment are allowed;**
 - **whether the means of production are owned by the state; and**
 - **if the state controls the allocation of resources and price and output decisions.**
 - **Other factors like human rights are also considered.**
- The non-market economy label allows the US to impose "anti-dumping" duties on goods imported from designated countries.
- In international trade, dumping is when a country's export prices are considered to be intentionally set below domestic prices, thereby inflicting harm to industries in the importing country.
- The US assesses the value of a product to be imported from a non-market economy like Vietnam based on what it is worth in Bangladesh and then assumes that this is the supposed production cost to a Vietnamese company.
- The company's own data about the costs are not considered.

Why does Vietnam want to get the 'market economy' status?

- The change in status will also help **Vietnam get rid of the anti-dumping duties, making its products more competitive in the US market.**

What is Anti Dumping Duty?

- **Anti-dumping duties are imposed when it is conclusively proved that a particular item is being exported at a price lower than what is prevailing in the domestic market** of the exporter and is leading to disruption in the domestic market, injuring the local producers
- An anti-dumping duty is a protectionist tariff that a domestic government imposes on foreign imports that it believes are priced below fair market value.
- **Dumping is a process where a company exports a product at a price lower than the price it normally charges in its own home market.**
- The imposition of anti-dumping duty is permissible under the **World Trade Organization (WTO) regime**
- **Anti-dumping duties essentially compensate for the difference between the imported good's export price and their normal value.**
- **The level of anti-dumping duties is determined by relying on a third country, for instance, Bangladesh, which is a market economy.**

Places in news:

Vietnam:

- It has a long land border of 4,550 km, bordering **China to the North, Laos and Cambodia to the West, and the Eastern Sea (South China Sea) of Pacific Ocean to the East.**
- It shares maritime borders with **Thailand through the Gulf of Thailand, and the Philippines, Indonesia, and Malaysia through the South China Sea.**

At WTO, India Calls for Focus on Real-Life Trade Issues

Subject: Economy

Sec: External sector

- **Prioritization:** India urges prioritization of real-life trade issues at the World Trade Organization (WTO) that impact developing countries.
- **Key Issues Highlighted:**
 - Access to finance and technology.
 - Bridging the digital divide.
 - Enhancing effective aid for trade.
 - Ensuring food security.
 - Addressing issues hindering digital development.
- **Paper Submission:**
 - India submits a paper titled '30 years of WTO: how has development dimension progressed? – a way forward' to the WTO General Council.
- **Call to Action:**
 - India calls upon WTO members to propose solutions for these issues to refocus on the development dimension of WTO.

Importance of Development Dimension:

- **Core Objective:** Development dimension has been integral to the Marrakesh Agreement establishing the WTO.
- **Primacy to Development:** Marrakesh Agreement preamble prioritizes developmental objectives of the organization.
- **Defender of the Weak:** WTO envisioned as defender of rights of weak and vulnerable members, advocating reason and equity.

MC13 Abu Dhabi Ministerial Conference:

- **Unfinished Development Agenda:** India notes substantial unfinished development agenda from MC13 Abu Dhabi Ministerial Declaration.
- **Call for Strengthened Discussions:** Seeks to strengthen discussions and debate on development issues in all regular bodies of the WTO.

By emphasizing real-life trade issues and the development dimension at the WTO, India seeks to encourage proactive discussions and solutions that address the needs of developing countries and promote equitable global trade.

Outcomes of MC 13 of WTO and Hits & Misses for India:

- **Agriculture:**
 - **India's Demand:** Seeking a permanent solution to the public stock holding issue.
 - **Outcome:** No agreement reached, developed nations oppose due to potential impact on global food security.
 - **Impact on India:** No immediate threat due to 'peace clause,' shielding from legal challenges.
- **Fisheries Subsidies:**
 - **India's Demand:** Curb harmful subsidies for distant water fishing.
 - **Outcome:** No outcome document regarding fisheries subsidies.
 - **Impact on India:** Retains policy space for artisanal fisheries.
- **E-Commerce:**
 - **India's Demand:** Opposing continued exemption of Customs duties on e-commerce.
 - **Outcome:** Maintenance of tax breaks on electronic transmissions until 2026.
 - **Impact on India:** Impacts tax revenue collection, limits policy space for digital industrialization.
- **Dispute Settlement Mechanism:**
 - **India's Demand:** Establishment of a fully functional dispute settlement system.
 - **Outcome:** Resolution to establish accessible dispute settlement system by 2024.
 - **Impact on India:** Aids in faster resolution of trade disputes involving India.

Marrakesh Agreement

The Marrakesh Agreement, signed in April 1994 in Marrakech, Morocco, established the World Trade Organization (WTO), marking a significant evolution in global trade governance. The agreement was the culmination of the Uruguay Round of trade negotiations (1986-1994), which aimed to extend the scope of trade liberalization to sectors not previously covered by General Agreement on Tariffs and Trade (GATT) rules, such as services and intellectual property.

Core Objectives and Structure:

- **Trade Liberalization:** The agreement sought to reduce tariffs and other barriers to trade, aiming to foster a more open and fair global trading system.
- **Dispute Resolution:** It introduced a more structured process for resolving trade disputes between countries, with the establishment of the Dispute Settlement Body (DSB).
- **Monitoring and Transparency:** The WTO was tasked with monitoring national trade policies, ensuring transparency, and providing a forum for trade negotiations.

Key Components:

1. **Trade in Goods:** Through the General Agreement on Tariffs and Trade (GATT), the Marrakesh Agreement aimed to liberalize trade in goods by reducing tariffs and eliminating quantitative restrictions.
2. **Trade in Services:** The General Agreement on Trade in Services (GATS) was introduced to extend the multilateral trading system to the service sector, addressing issues like access to foreign markets and national treatment.
3. **Intellectual Property:** The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) sought to establish common standards for protecting and enforcing intellectual property rights globally.
4. **Agriculture and Textiles:** Specific agreements were made to address the unique challenges and protections in agriculture and textiles, sectors that had been subject to extensive trade restrictions.

Trade dispute with India over sugar subsidies

Subject: Economy

Sec: External sector

1. Issue Raised by U.S. and Australia:

- **Allegation:** India's sugarcane subsidy breaches WTO norms.
- **Concern:** Distortion of global trade due to excessive subsidy.

2. Contentions Presented:

- **Submission:** Paper to WTO's Committee on Agriculture.
- **Data Analysis:** Four-year period (2018-19 to 2021-22).
- **Claim:** India's sugar subsidies consistently exceeded 90% of production value.

3. Call for Discussion:

- **Openness:** U.S. and Australia express readiness to engage in talks.
- **Objective:** Evaluate India's market price support and its impact on global sugar markets.

4. Methodology Used:

- **Calculation Basis:** Previous WTO panel's recommendations.
- **Focus Period:** 2014-15 to 2018-19.
- **Critique:** India disputed the classification of FRP and SAP as market price support.

5. India's Appeal and its Impact:

- **Response:** Appeal lodged against the WTO panel's findings.
- **Consequence:** Prevented adoption of the panel report by WTO Dispute Settlement Body.

6. Data Insights Provided:

- **Financial Figures:** Market Price Support for 2018-19 to 2021-22.
- **Magnitude:** Exceeded \$15.9 billion in 2018-19 and increased annually thereafter.
- **Comparison:** Well above the permissible 10% of production value.

7. Future Course of Action:

- **Potential Dialogue:** India and other WTO members.
- **Focus Areas:** Examination of subsidy impact and adherence to WTO guidelines.

What is WTO:

- **Role:** Only international organization regulating trade rules among countries.
- **Establishment:** Created in 1995, replacing the General Agreement on Tariffs and Trade (GATT).

- **Membership:** Consists of 164 members, representing 98% of world trade.
- **Decision Making:** All decisions made through consensus; any member can exercise a veto.

Dispute Settlement in WTO:

- **Bilateral Consultation:** Initial step; if unsuccessful, either party can approach Dispute Settlement Panel.
- **Panel Report:** Can be challenged before the Appellate Body.
- **Final Decision:** Appellate Body's decision is final, but currently unable to review cases due to vacancies.

Issues Raised in respect of subsidy given:

- Minimum prices for sugarcane and sugar.
- Fair and remunerative prices (FRP).
- State-specific higher minimum prices.
- Minimum Indicative Export Quota (MIEQ).
- **Argument:** India's support exceeds the de Minimis level of 10%.

Way Forward and Impacts:

- **Consultation:** Bilateral talks key to dispute resolution.
- **Impact Mitigation:** No effect on existing sugar sector policies.
- **Reforms:** Continuation of reforms to enhance competitiveness.

Sugar Production in India:

- **Importance:** Second-largest producer and consumer globally.
- **Economic Significance:** Annual output worth approximately Rs. 80,000 crores.
- **Employment:** Supports around 50 million sugarcane farmers and 5 lakh workers directly.

WTO Agriculture Agreement:

- **Purpose:** Reducing agricultural support and subsidies.
- **Provisions:** Developed and developing countries to meet reduction commitments.
- **Focus Areas:** Market access, domestic support, export competition.
- **Goal:** Establish fairer trading system, improve livelihoods of farmers worldwide.

Why Indian agriculture may need a new export-import policy

Subject: Economy

Sec: External sector

Context:

- India's agricultural exports fell 8.2% in the fiscal year ended March 31, 2024 on the back of shipment curbs on a host of commodities, from cereals and sugar to onions.

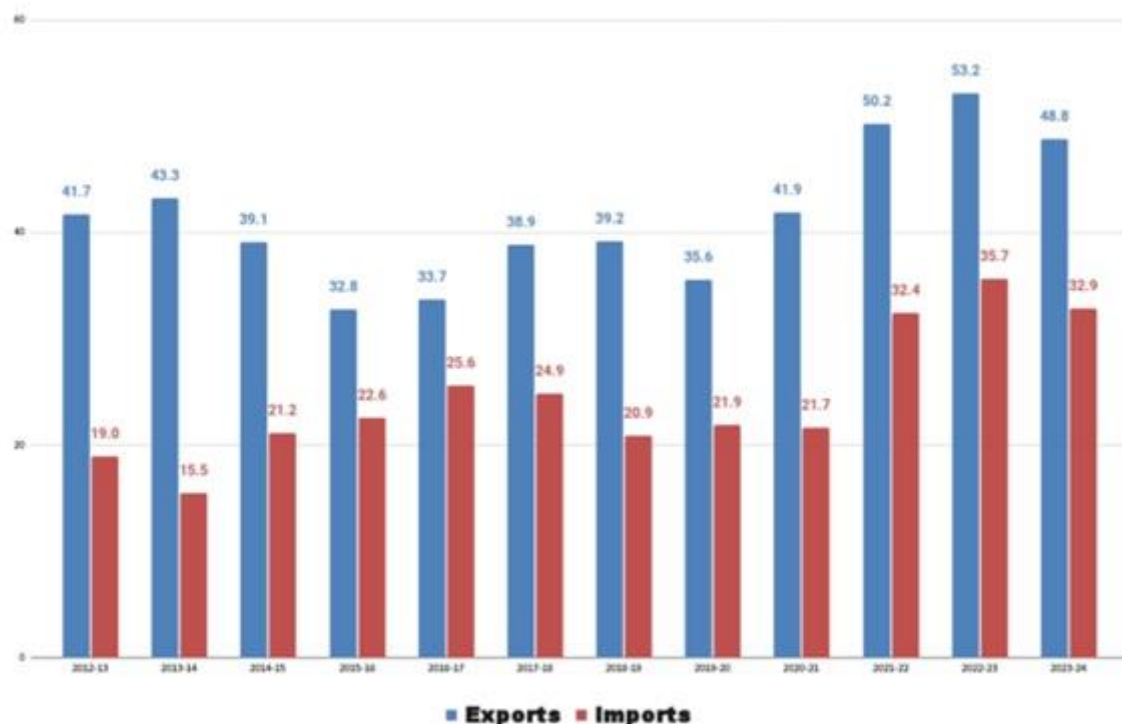
More on news:

- The value of farm exports totaled **\$48.82 billion in 2023-24, down from the record \$53.15 billion of 2022-23 and \$50.24 billion for the previous fiscal.**
- Exports declined from **\$43.25 billion in 2013-14 to \$35.60 billion in 2019-20**, while accompanied by an increase in imports (from \$15.53 billion to \$21.86 billion).
- A crash in **global agri-commodity prices is witnessed with the UN Food and Agriculture Organization's (FAO) food price index (base: 2014-16=100)** dipping from an average of 119.1 to 96.5 points between 2013-14 and 2019-20.
- Global price recovery following the Covid-19 pandemic and Russia's invasion of Ukraine (the FAO index soared to 140.8 in 2022-23) resulted in India's farm exports as well as imports zooming to all-time-highs in 2022-23, before dropping in the fiscal year.

Drivers of exports

- Table 1 shows the fall in exports to have been led primarily by sugar and non-basmati rice.

India's Agricultural Trade (in \$ billion)



- The government hasn't allowed any sugar to go out of the country during the current production year from October 2023.
- Exports of the sweetener were valued at only \$2.82 billion in 2023-24, after peaking at \$5.77 billion and \$4.60 billion in the preceding fiscals.
- Concerns over domestic availability and food inflation have similarly triggered a ban on exports of all white non-basmati rice since July 2023.
- Currently, only parboiled grain shipments are being permitted within the non-basmati segment, while also attracting a 20% duty.
- Two other items that have borne the brunt of export restrictions, triggered by domestic shortages and rising prices are wheat and onion.
- Wheat exports were altogether stopped in May 2022, following which their value plunged to \$56.74 million in 2023-24, after reaching an all-time-high of \$2.12 billion in 2021-22.
- Most of the other major agri export items — barring marine products, castor oil and other cereals (mainly maize) — have posted growth.
- Basmati rice exports fetched \$5.84 billion in 2023-24, surpassing the previous high of \$4.86 billion achieved back in 2013-14.
- Spices exports too crossed the \$4 billion mark for the first time.
- Exports of buffalo meat, oil meals and raw cotton, even while up over 2022-23, were far from their corresponding records of \$4.78 billion, \$3.04 billion and \$4.33 billion touched in 2014-15, 2012-13 and 2011-12 respectively.

Drivers of imports

- India's imports of vegetable fats topped \$20 billion in 2022-23.
- 2023-24 saw the average FAO index ease to 121.6 points and the vegetable oil sub-index to 123.4 points.
- Foreign exchange outflow on account of cooking oil has reduced, imports of pulses almost doubled to \$3.75 billion in 2023-24, the highest since the \$3.90 billion and \$4.24 billion levels of 2015-16 and 2016-17 respectively.

Policy takeaways

- The Modi government has done away with import duties on most pulses — arhar (pigeon pea), urad (black gram), masoor (red lentils), yellow/white peas and, earlier this month, chana (chickpea) — and kept it at 5.5% for crude palm, soybean and sunflower oil.

China's share in India's industrial goods imports jump to 30% from 21% in last 15 years: GTRI

Sub: Economy

Sec: External Sector

Context:

- Beijing's share in New Delhi's imports of such goods rose to 30% from 21% in the last 15 years.

More on news:

- As per the report of the economic think tank Global Trade Research Initiative (GTRI), the growing trade deficit with China is a cause of concern.
- China has reclaimed its position as **India's largest trading partner**, surpassing the United States after two years.

Recent trends:

- From 2019 to 2024, **India's exports to China have stagnated at around \$16 billion annually.**
- Imports from China have surged from \$70.3 billion in 2018-19 to over \$101 billion in 2023-24.
- Cumulative trade deficit exceeding \$387 billion over five years.
- Over the last 15 years, **China's share in India's industrial product imports has increased significantly, from 21% to 30%.**
- **Growth in imports from China has been much faster than India's overall import growth.**
- China's exports to India growing **2.3 times faster than India's total imports** from all other countries
- In 2023-24, **India's total merchandise imports amounted to \$677.2 billion, with \$101.8 billion of that coming from China.**
- China accounted for **15% of India's total imports.**
- Out of these imports from China, \$100 billion or 98.5% were in major industrial product categories.
- China's contribution is quite significant, **representing 30% of India's imports in the industrial product sector.**
- Half of the imports from China consist of capital goods and machinery, indicating a critical need for focused research and development in this area.

Rising India Dependence:

- The key sectors, where **India's dependence is rising significantly** are electronics, telecom and electrical; machinery; chemicals and pharmaceuticals; products of iron, steel and base metal; plastics; textiles and clothing; automobiles; medical, leather, paper, glass, ships, aircraft and remaining categories.
- April-January 2023-24, the **electronics, telecom and electrical products sectors had the highest import value at \$67.8 billion, with China contributing \$26.1 billion.**
- In the machinery sector, China accounts for \$19 billion, which is 39.6% of India's imports in the sector.
- Intermediate goods like organic chemicals, APIs (Active Pharmaceutical Ingredients), and plastics, which represents 37% of imports.

India's trade perspectives with other countries:

- **The US was the largest partner in 2021-22 and 2022-23.**
- In 2023-24, the UAE with USD 83.6 billion was the **third largest trading partner of India.**
- It was followed by **Russia (\$65.7 billion), Saudi Arabia (\$43.4 billion), and Singapore (\$35.6 billion).** India's trade deficit in FY 2023-24 is estimated to be \$78.12 billion, an improvement of 35.77 percent compared to FY 2022-23, when it was \$121.62 billion.
- During the last five years, trade with the US showed positive growth, with exports increasing significantly by 47.9 per cent from \$52.41 billion to \$77.52 billion.
- Saudi Arabia **showed a more balanced growth, with exports more than doubling and imports rising at a slower pace.**
- Russia vaulted to the second spot amongst India's top import sources, surpassing the UAE and the US, in 2023-24. India's import from Russia rose 34 per cent to \$61.44 billion during the fiscal comprising mostly oil. The UAE slipped one spot to the third place with imports from the country declining 9.8 per cent to \$48.01 billion. The US, too, slid a rank to the fourth spot with imports from the country falling 19.83 per cent to \$40.77 billion
- **Russia's trade figures have seen a dramatic increase**, with exports growing by 78.3% and imports soaring by 952%, leading to a significantly widened trade deficit.
- Exports to the UAE **rose by 18.3 percent from \$30.13 billion to \$35.63 billion, and imports increased substantially by 61.2 per cent from \$29.79 billion to \$48.02 billion.**

What is Trade Deficit?

- Trade deficits occur when a country **imports more goods and services than it exports, resulting in a negative balance of trade.**
- They can affect **domestic industries, employment, and economic growth, and are influenced by factors such as exchange rates, trade policies, and global economic conditions.**

In the first seven months of the fiscal year 2023-24, India experienced a trade deficit with nine of its top ten trade partners, with only the US showing a surplus.

What are Active Pharmaceutical Ingredients (API)?

- An **active pharmaceutical ingredient (API)** is the component of an over-the-counter (OTC) or prescription medication that produces its intended health effects.
- These are the **active ingredients contained in a medicine.**
- It is that part of the medicine that produces the intended therapeutic effects.
- Only a small amount of the API is required to produce the effect and so the medicine contains only the required amount of the API.
- China is one of the largest producers of Key Starting Material (KSM) and APIs in the world.

What is the Global Trade Research Initiative (GTRI)?

- **GTRI** aims to **create high quality and jargon-free outputs for Governments and Industry** on issues related to trade, technology and investment from the perspective of development and inequality reduction.

As US hikes China tariffs , imports hiked from China reliant Vietnam

Sub: Economy

Sec: External sector

Context:

- As the United States intensifies efforts to reduce trade with China by hiking tariffs, it has greatly boosted **imports from Vietnam.**

More on news:

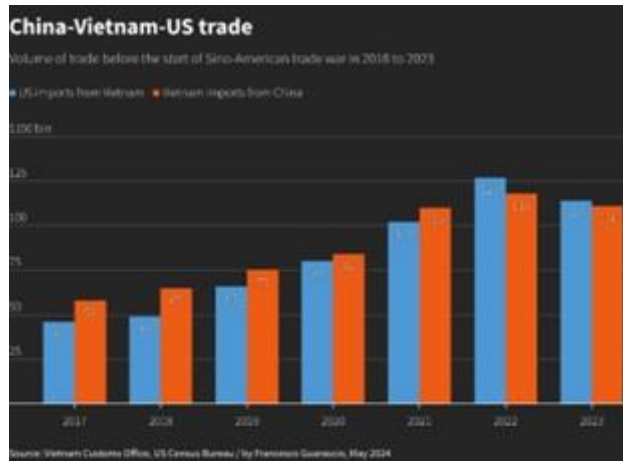
- The surge in the **China-Vietnam-U.S. trade** has vastly widened trade imbalances, with the Southeast Asian country.
- Vietnam now has the fourth-highest trade surplus with the United States, lower only than China, Mexico and the European Union.
- At over \$114 billion last year, U.S. imports of goods from Vietnam were more than twice as big as in 2018 when the Sino-American trade war began.
- The **European Commission (EC)** in October last year launched an anti-subsidy investigation into the imports of battery electric vehicles (BEV) from China.

Tariffs imposed by US on China:

- The tariffs imposed by the US on ship-to-shore cranes will rise to 25 per cent from zero, those on syringes and needles will rise to 50 per cent from nothing now and some personal protective equipment (PPE) used in medical facilities will rise to 25 per cent from as little as 0 per cent now.
- More tariffs will follow in 2025 and 2026 on semiconductors, as well as lithium-ion batteries that are not used in electric vehicles, graphite and permanent magnets as well as rubber medical and surgical gloves.

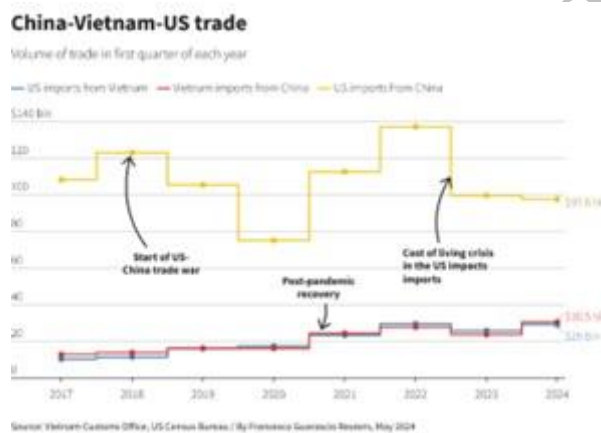
Vietnam exports to U.S.:

- Vietnam now has the **fourth-highest trade surplus with the United States, lower only than China, Mexico and the European Union.**
- Vietnam's export boom has been fuelled by imports from neighboring China, with inflows from China almost exactly matching the value and swings of exports to the United States in recent years.
- The surge in Chinese imports in Vietnam coinciding with the increase in Vietnamese exports to the U.S. may be seen by the U.S. as Chinese firms using Vietnam to skirt the additional tariffs imposed on their goods
- The growing trade **imbalance comes as Vietnam seeks to obtain market economy status in Washington.**
- In key industries such as textiles and electric equipment, **Vietnam captured more than 60% of China's loss.**
- One-third of Vietnam's imports come from China, mostly electronics and components.



Symbiotic Relationship:

- **The symbiotic relationship** is reflected in latest data: In the first quarter of this year, U.S. imports from Vietnam amounted to \$29 billion, while Vietnam's imports from China totalled \$30.5 billion, mirroring similarly corresponding flows in past quarters and years.



How will it negatively impact India?

- Indian exporters feared that the loss of a major market for China could trigger dumping of Chinese products into India.
- China accounts for over half of the global EV sales, largely driven by its near dominance in battery production which is a critical element for EV manufacturing.
- In 2023, China's production of lithium-ion batteries was equivalent to the global demand that stood at 2,600 GWh.
- Indian exporters feared that the recent US move will start a tariff war between two major economic powers as a retaliation is soon expected from China.
- A threat of dumping also comes as the European Union is expected to announce similar barriers citing possible injury from Chinese imports.

Opportunities for India:

- The **US-China tariff war could also open up opportunities for the Indian players.**
- It provides an opportunity for India and other competitors to chip in the supply gap.
- India has opportunities in facemasks, Personal Protective Equipment Kit (PPE), syringes & needles, medical gloves, aluminum and iron & steel.
- Opportunity may come in China also with retaliation on US exports.

What is Dumping?

- **Dumping is a term used in the context of international trade.**
- Dumping occurs when a country or company exports a product at a price that is lower in the foreign importing market than the price in the exporter's domestic market.
- Dumping is legal under World Trade Organization (WTO) rules unless the foreign country can reliably show the negative effects the exporting firm has caused its domestic producers.

What is Anti Dumping Duty?

- **Anti-dumping duties are taxes imposed on imported goods in order to compensate for the difference between their export price and their normal value, if dumping causes injury to producers of competing products in the importing country.**

Renew the Generalised System of Preferences (GSP)

Sub: Economy

Sec: External Sector

- **Importance:**
 - **GSP:** An approach adopted by nearly all developed countries over the last half-century to offer incentives for economic reform in developing countries through lower tariffs.
 - **Customization:** Each developed country customizes its GSP program to meet specific economic reform criteria while avoiding harm to domestic production.
 - **Historical Significance:** The oldest and most extensive approach to “aid for trade” within the modern multilateral trading system, embodied in the World Trade Organization (WTO).
- **Renewing GSP in the U.S.:**
- **Legislative Renewal:** Unique to the U.S., the authorizing legislation for GSP periodically expires and requires renewal by Congress.
 - **Current Status:** The U.S. GSP program expired in 2020 and remains unrenewed despite bipartisan support.
 - **Challenges:** Renewing legislation in a polarized environment is difficult, making bipartisan cooperation essential.
- **Benefits of GSP:**
 - **Market Access:** Provides stable market access for developing countries, crucial for small businesses and women-owned enterprises.
 - **Alternatives to Chinese Imports:** Offers a competitive edge to suppliers in trusted developing country markets.
 - **Promotes Reforms:** Encourages labor and environmental sustainability reforms, and protection of intellectual property rights.
 - **Economic Impact:** Reduces tariff bills for American companies, benefiting small- and medium-sized enterprises.
- **Support for GSP Renewal:**
- **Diverse Coalitions:** Bipartisan support from various U.S. sectors. For example, a group of Florida House members highlighted GSP’s importance in diversifying sourcing away from China and reducing tariff costs for Florida consumers and manufacturers.
 - **Strategic Supply Chains:** In an era of friendshoring and nearshoring, GSP is an effective tool for new supply chain objectives.
- **U.S.-India Trade Relationship:**
 - **Potential for Growth:** GSP renewal could facilitate wide-ranging U.S.-India trade negotiations, potentially increasing bilateral trade significantly.
 - **Past Negotiations:** Before the GSP expiration in 2020, there were near-final negotiations between the U.S. and India covering diverse trade areas.
 - **Current Trade Dialogues:** Existing dialogues lack the leverage needed for ambitious trade agreements, highlighting the need for GSP.
- **Strategic Importance:**
 - **GSP and U.S.-India Relations:** Renewing GSP could bolster the U.S.-India strategic partnership by providing a framework for negotiating trade benefits and addressing key issues like labor rights, environmental laws, and regulatory practices.
 - **Trade Agreement Potential:** Short of negotiating Free Trade Agreements (FTAs), GSP is the most effective trade tool for enhancing U.S.-India trade relations.
- **Conclusion:**
 - **Renewal Advocacy:** Renewing GSP is crucial for establishing stable market access for developing countries, supporting U.S. businesses, and strengthening strategic partnerships.
 - **Strategic Statement:** GSP renewal would signal mutual commitment to deepening trade and economic ties between the U.S. and India, supporting broader strategic objectives in the Indo-Pacific region.

In summary, renewing the GSP program is essential for *enhancing economic cooperation, supporting small and medium enterprises, promoting reforms, and strengthening strategic trade relationships*, particularly between the U.S. and India.

UN Rice Tenders: Indian Export Curbs Under WTO Lens

Sub: Economy

Sec: External sector

Key Points:

- **Concerns Raised by WTO Members:**
 - Canada, Brazil, Australia, and the U.K. have raised questions at the World Trade Organization (WTO) about **India's alleged restriction on rice exporters participating in UN World Food Program (WFP) tenders.**
 - These tenders were for the **supply of broken rice to Cameroon, Togo, and Algeria.**
- **WTO Committee on Agriculture Meeting:**
 - India is expected to respond to these queries at the WTO Committee on Agriculture (CoA) meeting scheduled for Thursday.
- **Commitment to WFP Exemptions:**
 - In 2022, WTO members agreed to exempt the WFP's humanitarian food purchases from export restrictions.
 - Initially, **India opposed this decision to maintain flexibility for domestic food security but eventually consented.**
- **Impact on Agriculture Exports:**
 - India's export restrictions on commodities like rice, wheat, sugar, and onions have affected agricultural exports, reducing them by about \$5-6 billion in the last fiscal year.
- **Domestic Food Security Concerns:**
 - Indian officials argue that **these export restrictions are crucial to ensure domestic food security.**
 - Exports are allowed only when there is a surplus.
- **Decline in Agriculture Exports:**
 - India's agriculture exports for the April-February 2023-24 period **declined by 8.8% to \$43.7 billion**

India's Opposition to Plurilateral Pact on Investment at WTO

Sub: Economy

Sec: External Sector

Tags: Investment Facilitation for Development (IFD) pact WTO

India continues to resist the **inclusion of the proposed China-led Investment Facilitation for Development (IFD) pact into the formal framework of the World Trade Organization (WTO)** as a plurilateral agreement.

This stance was reiterated during the **recent meeting of the WTO's General Council.**

Key Points:

- **Pressure on India:**
 - India faces significant pressure from **other WTO members to support the inclusion of the IFD pact in the WTO framework.**
 - The IFD pact, championed by China, **aims to facilitate investment for development** and has been endorsed by several WTO members.
- **India's Stance:**
 - India maintains that investment issues should not be discussed within the WTO framework.
 - This position was clearly stated at the **WTO's 13th Ministerial Conference (MC13) in Abu Dhabi.**
- **Joint Ministerial Declaration:**
 - At MC13, a **joint declaration was issued by Trade Ministers from 123 WTO member countries, including the EU, finalizing the IFD pact.**
 - The proponents of the pact **aim to formally integrate it into the WTO as a plurilateral agreement**, which would be binding only on signatories.
- **Opposition from India and South Africa:**
 - Both India and South Africa played crucial roles in **blocking the move to incorporate the IFD pact as a plurilateral agreement.**
 - They argued that **there was no exclusive consensus among WTO members to include the IFD in the WTO framework.**
- **Concerns About Policy Space:**
 - India's opposition is partly based on concerns that certain provisions of the IFD would require the government to consult investors on policy matters.
 - This could **potentially infringe on India's policy-making autonomy and encroach upon its policy space.**

- **Current Developments:**
- During the recent General Council meeting, **India reiterated its opposition to the inclusion of investment facilitation and other plurilateral in the WTO framework.**
- The issue of the IFD pact remains a contentious topic among WTO members, with no immediate resolution in sight.

Implications:

- **For India:**
- India's resistance to the IFD pact aligns with its broader strategy to **safeguard national policy-making autonomy and avoid external pressures** on domestic policy issues.
- **For WTO:**
- The lack of consensus on the IFD pact illustrates **the challenges in achieving agreement on new issues within the multilateral trading system.**
- It highlights the **divide between developing countries like India and South Africa and other WTO members** who support the pact.

In conclusion, **India's steadfast opposition to the IFD pact at the WTO underscores its commitment to maintaining control over its investment policies and its broader stance on plurilateral agreements within the organization.** This ongoing debate reflects broader tensions within the WTO regarding the scope and nature of trade agreements and their implications for member countries.

Agreement on Investment Facilitation for Development (IFA)

Overview:

The **Agreement on Investment Facilitation for Development (IFA)** is a **WTO-negotiated agreement focused on creating a more investor-friendly environment by streamlining investment procedures and enhancing transparency and predictability for foreign direct investment (FDI).**

It primarily aims to **benefit developing and least-developed countries** by making it easier for them to attract and retain investments.

Key Objectives:

- **Simplification of Investment Procedures:** The IFA aims to reduce the bureaucratic hurdles that investors face, making the process of establishing and expanding businesses more efficient.
- **Promotion of Transparency:** By ensuring that investment-related regulations are clear and accessible, the IFA helps investors make informed decisions.
- **Predictability:** Providing a stable regulatory environment that investors can rely on, reducing uncertainty and risk.

What the IFA Covers:

- **Regulatory Transparency:** Ensuring that all investment-related measures are published and easily accessible.
- **Streamlining Administrative Procedures:** Simplifying and speeding up processes like obtaining permits and licenses.
- **Enhancing International Cooperation:** Providing technical assistance and capacity-building to help developing countries implement the agreement effectively.

What the IFA Does Not Cover:

- **Market Access:** The IFA does not address the conditions under which foreign investors can enter a market.
- **Investment Protection:** It does not provide protections against expropriation or unfair treatment.
- **Government Procurement:** Rules about how governments purchase goods and services are not included.
- **Specific Subsidies:** It does not regulate the subsidies provided to businesses.
- **Investor-State Dispute Settlement (ISDS):** The agreement does not include mechanisms for investors to sue states.

Investment Facilitation vs. Investment Promotion

Investment Facilitation:

- **Focus:** Simplifies the process for foreign investors to establish or expand their businesses.
- **Activities:** Reduces bureaucratic barriers, improves regulatory transparency, and enhances procedural efficiency.

Investment Promotion:

- **Focus:** Markets a location as an attractive destination for investment.
- **Activities:** Highlights the benefits and opportunities of investing in a particular area, often through incentives and marketing efforts.

Reasons for India's Non-Participation in IFA Talks

- **WTO's Mandate:**
- **Description:** India argues that investment matters are outside the WTO's scope and prefers to handle these issues through bilateral negotiations.

- **Concern About Developed Nations' Strategy:**
- **Description:** India perceives the IFA as a step by developed countries to first introduce facilitation and later push for investment protection rules, which could be more contentious.
- **Opposition to Plurilateral Agreements:**
- **Description:** India is against plurilateral agreements within the WTO because they do not adhere to the consensus decision-making process that multilateral agreements follow.
- **Concerns About 'Most Favoured Nation' (MFN) Provisions:**
- **Description:** India is cautious about MFN provisions due to negative past experiences, such as those faced with the MFN clause in its bilateral investment treaty with Australia.
- **Legally Binding Dispute Settlement:**
- **Description:** There is apprehension that foreign investors might use a future IFA to bring claims under existing bilateral investment treaties, potentially leading to disputes.

Current Context:

- India has terminated many of its older bilateral investment treaties and is negotiating new ones based on its 2016 Model BIT text, which likely influences its stance on multilateral investment agreements like the IFA.

Conclusion

The IFA represents a **significant effort to create a more conducive environment for global investment, focusing on facilitation rather than liberalization.**

While supported by a majority of WTO members, **India's non-participation underscores its preference for bilateral negotiations and caution about potential implications for its policy autonomy and regulatory sovereignty.**

What is the current status with respect to spice exports?

Sub: Economy

Sec: External sector

Context:

- The Indian authorities have initiated several measures to ensure that Indian spices comply with food safety standards of the importing countries.

Background of the news:

- Last month, **Hong Kong and Singapore** recalled certain spice mix products of the MDH and Everest Group allegedly over the presence of a higher than prescribed level of the sterilizing agent **Ethylene Oxide (ETO)**.
- Countries have different standards for ETO and maximum (pesticide) residue levels (MRL).
- The European Union has stringent norms for both ETO and MRLs while Japan largely sources only organic products.

Where does contamination occur?

- **India does not use ETO as a pesticide but only as a sterilizing agent to reduce microbial load in finished (spice) goods.**
- Many of the large factories receive material from the farm/mandies, which is then fed on automated lines.
- It leaves them with high microbial levels and forces companies to opt for ETO sterilization.
- **The contamination levels can be reduced early through the processes adopted for value addition.**

Indian spice exports:

- A quick export estimate data available with the **Spices Board India** shows that **India enjoys a significant share in the global market for spices and spice products.**
- In 2023-2024, **India exported spices worth \$4.4 billion (nearly 14 lakh tonnes)**, which is 12.3% higher than the financial year 2022-2023.
- **Chili, spice oils and oleoresins, curry powder and paste, cumin, mint products, cardamom and pepper** are some of the largest exported spices and spice products in the financial year 2022-2023.
- In terms of production, **garlic, ginger and chili** were the top three spices produced in FY23.
- **China, Bangladesh, west Asian countries and the U.S.** are important markets for Indian spices.
- India's share in total spice production globally is about 70%.

Spice Board of India:

- Spices Board was constituted on **26th February 1987 under the Spices Board Act 1986 with the merger of the erstwhile Cardamom Board (1968) and Spices Export Promotion Council (1960).**
- **The Spices Board** is one of the **five Commodity Boards** functioning under the **Ministry of Commerce & Industry.**

- Headquartered in **Kochi**, the board operates state-of-the-art testing laboratories in several cities including **Mumbai, Chennai, Delhi, Tuticorin, Kandla, and Guntur**, ensuring mandatory quality checks for exported spices.
- Following the recall by Hong Kong and Singapore, the **Spices Board** issued a **detailed protocol** to all manufacturing exporters to **prevent ETO contamination**.
- The board is starting mandatory testing of spice consignments to Singapore and Hong Kong for ETO.

India VIX

Sub: Economy

Sec: Financial markets

Context: India VIX, which is an indicator of the market's expectation of volatility over the near term, surged past the 21 mark. The rise shows that fear among traders or market participants on the expected volatility is more now, as compared to 15 days earlier. Currently, the fear among the market players is coming from the outcome of the ongoing Lok Sabha elections.

Details:

What is the Volatility Index?

- The Volatility Index (**VIX or the Fear Index**) is a measure of the **market's expectation of volatility over the near term**.
- Volatility is often described as the '**rate and magnitude of changes in prices**' and in finance often referred to as risk.
- Usually, during periods of market volatility, the market moves steeply up or down and the volatility index tends to rise. As volatility subsides, the Volatility Index declines.
- The Volatility Index is a measure of the amount by which an underlying index is expected to fluctuate in the near term, (calculated as annualised volatility, denoted in percentage e.g. 20 per cent) based on the order book of the underlying index options.

When was it introduced?

- The **Chicago Board of Options Exchange (CBOE)** was the first to introduce the volatility index for the US markets in 1993 based on S&P 100 Index option prices. In 2003, the methodology was revised and the new volatility index was based on S&P 500 Index options.
- Since its inception, it has become an indicator of how market practitioners think about volatility. Investors use it to gauge market volatility and base their investment decisions accordingly.

What is India VIX?

- India VIX is a **volatility index computed by the NSE** based on the order book of NIFTY Options. For this, the best bid-ask quotes of near and next-month NIFTY options contracts, which are traded on the F&O segment of NSE are used.
- India VIX **indicates the investor's perception of the market's volatility** in the near term i.e. it depicts the expected market volatility over the next 30 calendar days.
- The higher the India VIX values, the higher the expected volatility and vice versa, as per NSE.
- 'VIX' is a trademark of the CBOE, and Standard & Poor's has granted a license to NSE, with permission from the CBOE, to use such a mark in the name of the India VIX and for purposes relating to the India VIX.

Why has India VIX surged?

- In May so far, the India VIX has risen by around 53 per cent to above 20.
- The volatility seen in the benchmark equity indices was amid concerns over the results of the ongoing elections, set to be declared on June 4. The market participants said a lower voter turnout ratio in this election may have some impact on the BJP's seat count. Heavy selling by foreign portfolio investors, who have dumped Rs 18,375 crore (till May 13) of Indian equities, have also led to the fall in the domestic market.

Reconsideration of Sachetisation of F&O Trade to Safeguard Household Savings: CEA Nageswaran

Sub: Economy

Sec: Financial Market

Chief Economic Advisor (CEA) V Anantha Nageswaran emphasized the need to reconsider sachetisation of Futures and Options (F&O) trade to protect household savings.

Key Points:

- **Context of the Discussion:**
 - **Reference:** Nageswaran highlighted historical financial crises, specifically the Asian crisis of 1997-98, where premature financial sector development had adverse effects.
- **Concerns Raised:**

- **Financial Literacy Requirement:** Trading in F&O requires different financial literacy compared to stocks. Many current market participants lack this understanding.
- **Household Savings Risk:** Unchecked retail trading in F&O poses a risk to household savings, potentially diverting them from productive investments.
- **Sachetisation of F&O Trade:**
 - Sachetisation involves making financial products available in smaller, more manageable packets.
 - **Reconsideration:** Due to the complexity of F&O trading, there's a need to rethink this approach to prevent misuse by financially illiterate investors.
- **Supporting Data:**
 - **Decline in Household Savings:** Net financial household savings dropped to a five-year low in FY23, falling by Rs 9 lakh crore in three years.
 - **Investment Shifts:** Despite a tripling of mutual fund investments and doubling of household investments in shares and debentures from 2020-21 to 2022-23, concerns remain about the stability and security of these investments.
- **Union Finance Minister's View:**
 - **Nirmala Sitharaman's Caution:** Earlier warned about the dangers of an unchecked explosion in retail F&O trading, highlighting potential problems for household finances.
- **Market Study Insights:**
 - **SEBI Study Findings:** Nearly 89% of individual traders in the equity F&O segment incurred losses, with average losses of Rs 1.1 lakh during FY22. Active traders faced even higher average losses.
 - **SEBI Chairperson's Advice:** Madhabi Puri Buch suggested a 90% chance of loss for investors in F&O, recommending long-term investments for wealth creation.
- **Conclusion:**
 - **Financial Sector Responsibility:** The financial sector must ensure the growth of capital markets aligns with harnessing Indian household savings for productive purposes, avoiding the pitfalls observed in other countries.

Futures and Options (F&O)

Futures and Options (F&O) are financial derivatives that allow investors to hedge or speculate on the future price movements of underlying assets such as stocks, commodities, or indices. Here's a breakdown of each:

1. Futures:

- A futures contract is an agreement to buy or sell an asset at a predetermined price at a specified time in the future.
- **Key Features:**
 - **Standardization:** Contracts are standardized in terms of quantity, quality, and delivery time.
 - **Obligation:** Both the buyer and the seller are obligated to complete the transaction at the contract's expiration.
 - **Leverage:** Futures trading allows for significant leverage, meaning traders can control large positions with relatively small capital.
- **Use Cases:**
 - **Hedging:** Used by businesses and investors to hedge against price fluctuations.
 - **Speculation:** Traders speculate on price movements to make profits.

2. Options:

- An options contract gives the holder the right, but not the obligation, to buy or sell an asset at a predetermined price within a specific period.
- **Types:**
 - **Call Options:** Gives the holder the right to buy the asset.
 - **Put Options:** Gives the holder the right to sell the asset.
- **Key Features:**
 - **Premium:** Buyers of options pay a premium for the right, which is the cost of the option.
 - **Limited Risk:** Buyers' risk is limited to the premium paid, while sellers (writers) can face significant risk.
 - **Flexibility:** Provides flexibility as the holder can choose to exercise the option or let it expire.
- **Use Cases:**
 - **Hedging:** Protect against potential losses in an investment.
 - **Income Generation:** Investors write options to earn premiums.
 - **Speculation:** Traders use options to speculate on market movements with limited risk.

Tighter AIF Norms Prompt Fund Managers to Consider Offshore Routes

Sub: Economy

Sec: Financial Market

A number of sponsors and investment managers — especially those wanting to raise predominantly foreign capital — are considering taking the offshore route to invest in India instead of setting up alternative investment funds (AIFs) amid regulatory uncertainty and higher costs.

Key Points:

- **Impact of Tighter Regulations:**
 - **Operational Challenges:** Tighter regulations are affecting the operations of AIFs, causing managers to be wary of regulatory stability.
 - **Consideration of Offshore Routes:** Managers based in India looking to raise significant offshore capital are contemplating moving their base outside India to mitigate adverse regulatory impacts.
 - **Expert Insight:** Siddharth Shah, Senior Partner at Khaitan & Co, highlighted the shift due to regulatory uncertainties.
- **Investor Concerns:**
 - **Regulatory Note:** A recent note questioning the FDI policy around AIFs has alarmed investors.
 - **Foreign Direct Investment (FDI) Policy:** Foreign investors have been setting up AIFs with domestic managers to invest in sectors restricted for direct foreign investment or beyond allowed FDI limits.
 - **RBI Recommendation:** The Reserve Bank of India recommended treating investments exceeding 50% of AIF units by persons resident outside India as indirect foreign investment.
- **Regulatory Shift:**
 - **Previous Amendments:** In 2015-16, regulations were amended to allow AIFs to take foreign capital through the automatic route, considering the manager and sponsor's ownership and control.
 - **Current Stance:** The recent regulatory stance represents a reversal, potentially undermining onshore management and pooling of foreign capital.
- **Expert Opinions:**
 - **Impact on Growth:** Vivaik Sharma, Partner at Cyril Amarchand Mangaldas, stated that regulatory subjectivity, especially conflicting with FEMA rules, would hinder the growth of alternative asset management in India.
 - **Increased Compliance Costs:** Ipsita Agarwalla from Nishith Desai Associates mentioned that increased compliance costs for AIFs are impacting the return profile, as these costs are typically passed on to investors.
- **Additional Challenges:**
 - **Taxation and Administration:** Uncertainty regarding the taxation of carry, difficulty in managing co-investments, and the introduction of an online dispute resolution regime for global institutions are also deterring investors.
 - **Offshore vs. Onshore:** Offshore funds benefit from more stable regulatory regimes, but tax considerations must be addressed, especially given recent changes in treaty benefits and substance requirements.
- **GIFT City as an Alternative:**
 - **Regulatory Stability and Tax Benefits:** GIFT City offers regulatory stability, tax incentives, and proximity to India, making it an attractive alternative for fund managers.

Conclusion

The tightening of AIF norms in India is prompting fund managers to explore offshore routes to mitigate regulatory uncertainties and costs. While offshore options provide stability, they come with their own tax considerations. GIFT City emerges as a potential alternative due to its regulatory advantages and incentives. The ongoing regulatory changes and their impacts highlight the need for a balanced approach to maintain India's competitiveness in attracting and managing foreign capital.

Alternative Investment Funds (AIFs)

Alternative Investment Funds (AIFs) are investment vehicles that pool funds from investors and invest them according to a defined investment policy for the benefit of their investors. These funds typically invest in assets beyond traditional securities like stocks, bonds, and cash.

Key Points about AIFs:

- **Category I AIFs:**
 - **Focus:** Invest in start-ups, early-stage ventures, social ventures, SMEs, infrastructure, or other sectors considered socially or economically desirable.
 - **Examples:** Venture Capital Funds, Social Venture Funds, SME Funds, Infrastructure Funds.
 - **Incentives:** Often receive incentives or concessions from the government.

- **Category II AIFs:**
 - **Focus:** Invest in a variety of asset classes including private equity funds or debt funds that do not specifically fall under Category I or III.
 - **Examples:** Private Equity Funds, Debt Funds.
 - **Characteristics:** Do not get any specific incentives or concessions from the government or other regulators.
- **Category III AIFs:**
 - **Focus:** Employ diverse or complex trading strategies and may invest in derivatives.
 - **Examples:** Hedge Funds.
 - **Characteristics:** Typically leverage their investments and are subject to stricter regulatory scrutiny.

Regulation and Structure:

- **Regulatory Body:** AIFs in India are regulated by the Securities and Exchange Board of India (SEBI) under the SEBI (Alternative Investment Funds) Regulations, 2012.
- **Investment Structure:** AIFs can be established as a company, trust, or limited liability partnership (LLP) in India.

BSE Market Capitalization Tops \$5 Trillion: Implications and Concerns

Sub: Economy

Sec: Capital market

Key Highlights:

- **Milestone Achievement:**
 - The market capitalization (M-cap) of companies listed on the Bombay Stock Exchange (BSE) **crossed \$5 trillion for the first time on Tuesday.**
 - This milestone has raised concerns about valuations.
- **Valuation Trends:**
 - The number of companies **trading at over 50 times the 12-month forward price-to-earnings (P/E) multiples has increased tenfold** in the last decade, now totaling 104.
 - The Nifty Midcap 100 index is trading at a 39% premium to the 50-share Nifty.
- **Market Performance:**
 - The MSCI India Index gained 35% over the past year, compared to a 12% rise in the MSCI Emerging Markets (EM) index, increasing the premium gap over other emerging markets.
 - **India's market cap-to-GDP ratio was at 132% at the end of April**, significantly higher than the long-term average of 85%.
- **Expert Opinions:**
 - **Historical Valuation Band:** Current valuations are close to the top end, suggesting limited margin of safety.
 - **Public Sector Companies:** Transitioned from undervalued to fairly valued over the past year, stretching overall market valuations.
 - **New Age Businesses:** Companies listed in the past two years, especially in electronic manufacturing services, are deemed expensive due to high market caps and low profitability.
 - **Sectoral Analysis:** Some companies in industrials, capital goods, and defense sectors are trading at 80-100 P/E multiples, reflecting high expectations that may already be priced in.
 - **Market Inflows:** Wealthy investors have significantly invested in Indian equities over the past two years, inflating valuations.

In summary, while the BSE crossing the \$5 trillion M-cap mark is a significant milestone, it has brought to light the heightened valuations and the need for cautious investment strategies amid high market expectations.

Market Cap-to-GDP Ratio:

- The market cap-to-GDP ratio is a measure that **compares the total market capitalization of all publicly traded companies to the country's gross domestic product (GDP).**
- **Current Status:** As of the end of April, India's market cap-to-GDP ratio was **132%**, significantly higher than its long-term average of 85%.
- **Implications:** A high market cap-to-GDP ratio suggests that **the stock market is overvalued relative to the size of the economy.** It indicates investor optimism but also raises concerns about potential market corrections if **economic growth does not keep pace with market valuations.**

Price-to-Earnings (P/E) Ratio:

The P/E ratio is a valuation measure that **compares a company's current share price to its per-share earnings.**

BSE Calls Off Merger with NSE Arm at IFSC

Sub: Economy

Sec: Capital market

TAG: BSE, NSE

The planned merger between **India INX and NSE IX**, the stock exchange subsidiaries of BSE and NSE operating at the **International Financial Services Centre (IFSC)**, has been called off.

Key Points:

- **Merger called-off:**
 - BSE decided to call off the merger discussions with NSE IX.
- **BSE's Stance:**
 - BSE's board assessed the merger proposal thoroughly and concluded that **it is more beneficial to invest in and develop their exchange independently.**
- **Regulatory Response:**
 - IFSCA mentioned that **as long as BSE is committed to investing in and expanding its products at the IFSC, the authority supports their decision.**

This development **signifies BSE's strategic choice to focus on independent growth rather than merging with NSE IX at the IFSC.**

What are BSE and NSE?

BSE is short for the 'Bombay Stock Exchange'. Founded in 1875, BSE is the first and one of the largest securities markets based out of Mumbai in India. NSE is short for the 'National Stock Exchange'. Founded in 1972, it offers a country-wide stock market similar to BSE. While BSE is older, NSE is larger with greater daily trades and a higher turnover rate.

What are Sensex and Nifty?

While BSE and NSE are stock markets, both Sensex and Nifty are stock market indices. A stock market index summarises the movements of the market in real-time. A stock market index is created by grouping together similar kinds of stock. Sensex, which stands for 'Stock Exchange Sensitive Index', is the stock market index for the Bombay Stock Exchange. Nifty stands for 'National Stock Exchange Fifty' and is the index for the National Stock Exchange.

Inheritance Tax: A Tool for Reducing Inequality

Subject: Economy

Sec: Fiscal Policy

Tag: Inheritance Tax, Inequality

Introduction:

- Sam Pitroda's suggestion of **implementing an inheritance tax for wealth redistribution** has sparked debates.
- This article advocates for **progressive taxes to address high inequality.**

Impact of Inequality:

- Inequality undermines democratic decision-making by concentrating power in the hands of a wealthy few.
- It **hampers economic growth, affects labor income, and diverts resources from essential services like education.**
- Unequal countries see disparities based on place of birth, leading to unequal outcomes.
- Inequality contributes to **political polarization, conflicts, and negative economic effects.**

Arguments for Inheritance Tax:

- Wealth redistribution through an inheritance tax can reduce wealth concentration and promote productive investments.
- Property inheritance without work undermines economic principles.
- Concerns about disincentivizing innovation are unfounded, as revenue from taxes can fund diverse innovations.
- Historical examples like **Japan's 55% inheritance tax and India's past estates duty show effectiveness in wealth distribution.**

Alternatives to Inheritance Tax:

- Land value tax (LVT) targets rental value of land, providing a fair source of revenue.
- LVT can address feudal caste relations in rural India **and the politician-builder nexus in urban areas.**
- Tax evasion concerns among the wealthy can be addressed with improved tax compliance measures.

Economic Impact and Potential:

- Investment in tax compliance can yield significant revenue gains, according to recent research.
- Wealth and inheritance taxes on the top 1% in India can generate substantial public expenditure for socioeconomic rights.

Conclusion:

- Implementation of progressive taxation measures, including inheritance tax, can pave the way for socioeconomic rights and reduce inequality with political will and technological advancements.

Understanding Inheritance Tax: A Comprehensive Overview

Application:

- Inheritance tax is a **tax levied on the value of property or assets inherited from a deceased individual**.
- Paid by the beneficiary, it can **reach up to 55% in some countries**.
- In India, inheritance tax is currently not enforced.

Global Examples:

- Many European, American, and African nations levy inheritance tax.
- Countries like France, Germany, and Japan have high rates.
- Inheritance tax rates vary globally, reaching up to 55%.

Factors Influencing Demand in India:

- Rising wealth and income inequality.
- Disproportionate tax burden on the poor.
- Lack of inclusive growth and social safety nets.

Advantages and Challenges of Implementation:

- **Advantages:**
 - Efficient wealth dispersion and social mobility.
 - Based on egalitarian ideals and progressive taxation.
 - Additional revenue for public welfare programs.
- **Challenges:**
 - Tax system complexity and enforcement issues.
 - Resistance from wealthy families and political/social challenges.
 - Lack of comprehensive data and potential tax evasion.

Similar Taxes in India:

1. **Death Tax:** Imposed on inherited property, abolished in 1985.
2. **Gift Tax:** Duty on gifts, abolished in 1998 and reintroduced in 2004.
3. **Wealth Tax:** Duty on net worth, abolished in 2015.

Way Forward:

- Introduction with higher thresholds targeting the super-rich.
- Exemptions for endowments to specific institutions.
- Utilizing advanced technologies to improve tax administration.

IMF Warns France to Cut Debt, Sees Higher Deficit

Sub: Economy

Sec: Fiscal policy

TAG: Debt

Context:

- The IMF urged France to take more measures this year to reduce its debt load, warning that the budget deficit will be sharply higher than forecast in 2027.

More on news:

- The IMF said that France's deficit will reach **5.3 percent of gross domestic product** this year, slightly higher than the 5.1 forecast by the government.
- Consolidation measures are recommended over the medium term, starting in 2024 in order to bring debt on a downward trajectory, while making space for targeted growth-enhancing spending

About IMF:

- The **International Monetary Fund, or IMF**, promotes international financial stability and monetary cooperation.

- It also facilitates international trade, promotes employment and sustainable economic growth, and helps to reduce global poverty.
- It is a major financial agency of the United Nations, and an international financial institution funded by 190 member countries, with headquarters in Washington, D.C.
- The organization was formed on Established in 27 Dec 1945.

What is Fiscal Deficit?

Fiscal deficit refers to the shortfall in a government's revenue when compared to its expenditure.

When a government's expenditure exceeds its revenues, the government will have to borrow money or sell assets to fund the deficit.

What is Fiscal surplus?

- When a government runs a fiscal surplus, on the other hand, its revenues exceed expenditure.
- It is, however, quite rare for governments to run a surplus.
- Most governments today focus on keeping the fiscal deficit under control rather than on generating a fiscal surplus or on balancing the budget.

Difference Between debt and deficit:

- The fiscal deficit should not be confused with the national debt.
- The national debt is the total amount of money that the government of a country owes its lenders at a particular point in time.
- The national debt is usually the amount of debt that a government has accumulated over many years of running fiscal deficits and borrowing to bridge the deficits.

After RBI Bonanza, Centre to Rake in More Cash via Critical Mineral, Spectrum Auctions

Sub: Economy

Sec : Fiscal policy

Following a substantial surplus transfer from the Reserve Bank of India (RBI), the **Indian government is set to receive further financial boosts through spectrum and critical mineral auctions.**

Additionally, improved performance by Central Public Sector Units (CPSUs) and Public Sector Banks (PSBs) is expected to contribute significantly to the public exchequer.

Key Points:

- **Record RBI Surplus Transfer:**
 - The RBI has approved a record transfer of ₹2,10,874 crore to the central government for the financial year 2023-24.
- **Spectrum Auction:**
 - The Department of Telecommunications (DoT) will conduct a telecom spectrum auction early next month.
 - The **DoT expects to raise at least ₹40,000 crore from the auction based on the earnest money deposited** by telecom service providers (TSPs) last week.
 - A total of 10,513.15 MHz of spectrum worth ₹96,317.65 crore is being auctioned.
 - Major TSPs such as Bharti Airtel, Reliance Jio, and Vodafone-Idea have pre-qualified as bidders with earnest money deposits of ₹1,050 crore, ₹3,000 crore, and ₹300 crore respectively.
- **Critical Mineral Auction:**
 - The government plans to generate revenue from the sale of critical mineral blocks.
 - New rules propose a cap on upfront payments and performance-security payments at ₹500 crore.
 - Performance security for a composite license is capped at ₹250 crore before issuing the license and ₹500 crore before issuing a mining lease.
 - The first tranche of 20 critical-mineral blocks was put up for auction in November, with winners of 6-7 blocks expected to be announced around July. Another seven blocks received fewer than three bidders and were re-auctioned in March. The Centre values the first 20 blocks at ₹45,000 crore.
- **Dividends from CPSUs and PSBs:**
 - Enhanced **profitability of CPSUs and a consistent dividend policy** are expected to yield substantial dividends for the government.
 - According to Finance Ministry guidelines from 2016, **CPSUs should pay an annual dividend of 30% of profit after tax (PAT) or 30% of the government's equity**, whichever is higher.
 - A 2020 advisory suggests that **CPSUs making higher payouts may consider paying quarterly dividends.**

Implications for Fiscal Consolidation:

- These anticipated cash inflows will likely be factored into the full Budget expected in July after the new government is sworn in.
- Economists suggest that **these revenues will aid in fiscal consolidation, potentially revising the projected fiscal deficit for FY25 from 5.1% of GDP as outlined in the Interim Budget.**

The combination of these financial strategies **underscores the government's proactive measures to bolster its fiscal position through diversified revenue streams, enhancing economic stability and growth prospects.**

Components of Government Budget

The government budget is broadly divided into two main components: the **Revenue Budget** and the **Capital Budget**.

1. Revenue Budget

The Revenue Budget consists of **Revenue Receipts** and **Revenue Expenditure**. These are related to the regular functioning of the government and do not directly impact its assets or liabilities.

Revenue Receipts: Income earned by the government through its routine operations.

- **Components:**
 - **Tax Revenues:**
 - **Direct Taxes:** Taxes directly levied on individuals and corporations, such as income tax, corporate tax, and wealth tax.
 - **Indirect Taxes:** Taxes on goods and services, such as excise duty, customs duty, and GST (Goods and Services Tax).
 - **Non-Tax Revenues:**
 - **Interest Receipts:** Income from loans given by the government to states, public sector enterprises, and other governments.
 - **Dividends and Profits:** Earnings from public sector enterprises where the government has an equity stake.
 - **Fees and Charges:** Income from various services provided by the government.
 - **Fines and Penalties:** Revenue from fines and penalties imposed by various government agencies.
 - **Grants and Contributions:** Financial assistance received from other governments and international organizations.

Revenue Expenditure:

- These are expenditures that do not result in the creation of assets or reduction of liabilities. They are **incurred for the normal functioning of government departments and maintenance of existing assets.**
- **Components:**
 - **Salaries and Wages:** Payments to government employees for their services.
 - **Interest Payments:** Payments on the interest for government borrowings.
 - **Subsidies:** Financial assistance to support specific sectors, such as agriculture, food, and fuel.
 - **Pensions:** Payments to retired government employees.
 - **Administrative Expenses:** Costs associated with the day-to-day administration and operation of government departments.
 - **Grants:** Financial assistance given to state governments, local bodies, and other institutions.

2. Capital Budget

The Capital Budget includes **Capital Receipts** and **Capital Expenditure**. These are related to the investment activities of the government and have a **direct impact on its assets and liabilities.**

Capital Receipts:

- These are receipts that either create liabilities or reduce assets. They are mainly obtained through borrowing or asset sales.
- **Components:**
 - **Borrowings:**
 - **Market Loans:** Loans raised by issuing government securities in the domestic or international markets.
 - **External Loans:** Loans from foreign governments and international organizations.
 - **Short-term Borrowings:** Borrowings through treasury bills and other short-term instruments.
 - **Disinvestment Receipts:** Proceeds from the sale of government's stake in public sector enterprises.
 - **Recovery of Loans:** Repayments received from states, public sector enterprises, and other entities.
 - **Small Savings and Provident Funds:** Funds mobilized through small savings schemes and provident funds.

Capital Expenditure:

- These are expenditures that **lead to the creation of assets or reduction of liabilities**. They are typically long-term investments in infrastructure and development projects.
- **Components:**
 - **Infrastructure Projects:** Investments in building and upgrading physical infrastructure like roads, bridges, ports, airports, and railways.
 - **Public Health and Education:** Investments in hospitals, schools, colleges, and universities.
 - **Defence:** Expenditure on acquiring new defense equipment and infrastructure.
 - **Loans to States and UTs:** Financial assistance provided to state governments and union territories for various development projects.
 - **Repayment of Borrowings:** Payments made to reduce the principal amount of government debt.
 - **Equity Investments:** Capital infusion in public sector enterprises and financial institutions.

Summary

The **Revenue Budget** focuses on the regular income and routine expenditure of the government, ensuring smooth functioning and maintenance of services. The **Capital Budget** deals with investment in long-term assets and infrastructure, crucial for the economic development and growth of the country.

LTCG liability to ease on cost inflation reset

Sub: Economy

Sec: Fiscal Policy

Tags: Long-term capital gains (LTCG) liability

Context:

- **Long-term capital gains (LTCG) liability** on the **sale or transfer** of any **capital asset**, such as **land, property, trademarks** and **patents** is expected to be **lower** this year as the **Cost Inflation Index (CII)** for **2024-25** has been **fixed** at **363**, a **rise** of **4.3%** from **348** for **FY24**.
- Come into force with effect from **April 1, 2025**.

Cost Inflation Index (CII):

- The **CII** is a way to **calculate inflation**, that is, an **estimated increase in the price of a good or service over the years**.
- Released annually by the **Central Board of Direct Taxes (CBDT)**.
- **Indexation** is used to **adjust the purchase price of an investment** to **reflect the effect of inflation on it**.
- A **higher purchase price** means **lower profits**, which **effectively means a lower tax**.
- The **CII number** assists in determining the **long-term capital gains** on which an assessee is required to **pay taxes** when she/he **files income tax returns** the following year.
- The **index** is **useful** to **adjust the capital gains for inflation** so that the **taxpayers** are **taxed on real appreciation of the assets** and **not the gains due to inflation**.
- The **Finance Act, of 2023** removed **CII** for **debt mutual funds**.
 - **April 1, 2024**, onwards, **gains for funds** are **taxed** at the **investor's tax slab rate**, rather than the previous **20%** with **indexation benefit** and **10%** without that.
 - As a result, if the **investor** is subject to the **highest tax bracket**, this rate would be **35.8%** (including surcharge and cess).
- **Impact on taxable income:**
 - With the help of **indexation**, one can **lower her/his long-term capital gains**, bringing down the **taxable income**.
 - The **rate of inflation** to be used for indexation can be obtained from the **government's CII**.

Capital Gain Tax: A tax imposed on the profits (gains) derived from the sale of assets such as land, shares, etc.

Types of Capital Gains:

Long-Term Capital Gains (LTCG)	Short-Term Capital Gains (STCG)
<p>Gains made on assets held for a period exceeding three years (one year for shares and mutual funds).</p> <ul style="list-style-type: none"> • Capital assets such as land, building and house property shall be considered long-term capital assets if the owner holds it for a period of 24 months or more (from FY 2017-18). 	<p>Gains made on assets held for a period of three years or less.</p> <ul style="list-style-type: none"> • The criteria is 24 months (2 years) for unlisted shares (those shares which are not listed in a recognized stock exchange in India) and immovable properties such as land, buildings and house property from FY 2017-18. • Some assets are considered short-term capital assets when these are held for 12 months or less. This rule is

- Whereas, **below-listed assets** if held for a period of **more than 12 months**, shall be considered as **long-term capital asset**:
 - Equity or preference shares in a company listed on a recognized stock exchange in India
 - Securities (like debentures, bonds, govt securities etc.) listed on a recognized stock exchange in India
 - Units of UTI, whether quoted or not
 - Units of equity oriented mutual fund, whether quoted or not
 - Zero coupon bonds, whether quoted or not

applicable if the **date of transfer** is after 10th July 2014 (irrespective of what the date of purchase is).

- **These assets are:**
 - Equity or preference shares in a company listed on a recognized stock exchange in India
 - Securities (like debentures, bonds, govt securities etc.) listed on a recognized stock exchange in India
 - Units of UTI, whether quoted or not
 - Units of equity oriented mutual fund, whether quoted or not
 - Zero coupon bonds, whether quoted or not

Tax Rates:

- **LTCG Tax:** Historically, **LTCG** arising from the **transfer of listed equity shares** were **exempt** from **tax** until the **Union Budget 2018-2019**. The budget **reintroduced LTCG tax** on **equity investments**, taxing **gains exceeding 1 lakh at a rate of 10%**, without allowing the benefit of indexation. **Gains up to January 31, 2018, are grandfathered**, meaning **they are not subject to the new tax**.
- **STCG Tax:** Gains from **equity shares** held for **up to one year** are taxed at the rate of **15%** for short-term capital gains.

RBI's Provisioning Norms Affect PSU Banks and Infrastructure Financers

Subject: Economy

Sec: Monetary Policy

Tag: RBI's Provisioning Norms

What Happened:

- The Reserve Bank of India (RBI) **proposed tighter norms for project financing, recommending increased standard asset provisioning of up to 5% on loans**.
- This move is anticipated to result in additional **provisioning of 0.5-3% of banks' net worth**.
- Shares of state-owned banks and project financers fell significantly in response.
- The **Common Equity Tier 1 (CET1) ratio**, a measure of a bank's core equity capital, could be impacted by **7-30 basis points**.

Details of the Proposal:

- Under the proposed norms, **lenders must make provisions of up to 5% of outstanding exposures for under-construction projects**.
- These norms also **apply to commercial real estate financing for all lenders** and are set to be implemented immediately.

Impact on Financial Institutions:

- Analysts predict **adverse effects on profitability and capital expenditure growth** as provisioning requirements increase.
- PSU banks and **infrastructure-focused financers like PFC and REC are expected to be particularly affected**.

Expert Analysis:

- Analysts suggest that **while the impact on profit after tax (PAT) may be limited for some institutions like IREDA**, there could be marginal effects on **net worth and Capital Adequacy Ratio (CAR)**.
- The robustness of institutions' **CAR levels may help absorb these impacts** without significant consequences.

Impact on NBFCs:

- Additional provisions for non-banking finance companies (NBFCs) will be apportioned to the impairment reserve, sparing the impact on Return on Equity (RoE).
- Infrastructure-focused NBFCs like REC Ltd, PFC, and IREDA may see a potential hit of 200-300bps to their capital ratio.

Understanding Capital Adequacy Ratio (CAR)

- Capital Adequacy Ratio (CAR) is a **measure of a bank's capital in relation to its risk-weighted assets and current liabilities**.

Risk Weighting:

- Risk-weighted assets consider credit risk, market risk, and operational risk to determine the appropriate amount of capital a bank should hold.

Regulatory Criteria:

- Basel III norms originally stipulated a capital to risk-weighted assets ratio of 8%.
- However, Indian scheduled commercial banks are **mandated by the RBI to maintain a CAR of 9%, while public sector banks must adhere to a CAR of 12%.**

Profit After Tax (PAT)

Profit After Tax (PAT) is a financial metric that **represents the net profit of a company after deducting taxes. It is a key indicator of a company's profitability and financial performance.**

PAT is calculated as follows:

$$\text{PAT} = \text{Net Profit} - \text{Taxes}$$

Where:

- Net Profit is the total earnings of the company before taxes.
- Taxes represent the income tax expense incurred by the company.

PAT is an essential measure for investors, analysts, and stakeholders as it **reflects the amount of money a company has earned after accounting for all expenses, including taxes.** It provides insights into the company's ability to generate profits and its overall financial health.

In financial analysis, PAT is often compared over different periods to assess the company's performance trends. **Higher PAT indicates stronger profitability and efficiency in generating earnings for shareholders.**

Why is the RBI keeping an eye on gold loans?

Sub: Economy

Sec: Monetary Policy

Context:

- The **Reserve Bank of India (RBI)** had asked gold loan lenders to stick to regulatory norms while lending in a bid to tighten its grip over Non-Banking Financial Companies (NBFCs).

More on news:

- The **RBI has increased its scrutiny of NBFCs** after it found certain NBFCs to be flouting regulatory norms.
- RBI banned **IIFL Finance** from issuing fresh gold loans after the firm was found violating lending norms.
- Gold loan portfolio of NBFCs has increased at an aggressive pace since the pandemic, growing over four fold from about **₹35,000 crore at the end of financial year 2020 to about ₹1,31,000 crore by the end of FY 2023.**
- RBI had temporarily allowed lenders to make loans up to 90% of the value of the underlying gold collateral during the pandemic to help borrowers, and this also helped NBFCs expand their loan books aggressively.

What are the RBI's gold loan norms?

- The RBI stipulates lenders to **comply with certain norms while lending money in lieu of gold.**
- Lenders are not allowed to lend any amount of money that is greater than **75% of the value of the gold that is submitted as collateral by the borrower.**
- This is to ensure that banks have **sufficient cushion to absorb any losses by selling the gold in case the borrower defaults on the loan.**
- Complying with income tax rules, the RBI mandated that when a loan is disbursed to a borrower, no more than **₹20,000** can be disbursed in the form of cash and the remaining loan amount needs to be deposited in the borrower's bank account.
- It also instructs lenders to conduct the auction of any gold (in case a borrower defaults) in a fair and transparent manner in locations that are accessible to the borrowers.

Why does the RBI want to reinforce these norms now?

- Some NBFCs are violating **regulations linked to gold-based lending.**
- RBI found that there were **loan-to-value irregularities in over two-thirds of defaulted accounts** in the case of IIFL Finance.
- NBFCs are wanting to increase the **size of their loan book** at an aggressive pace in an attempt to grow their business, and thus may be **willing to offer loans of value that exceed 75% of the value of the underlying collateral.**
- RBI suspects that aggressive lending by NBFCs is **leading to widespread violation of lending norms** and that could potentially cause systemic trouble in the future as the gold loan industry grows in size rapidly.
- NBFCs are trying to deliberately overestimate the value of the gold that the borrowers submit as collateral.
- Lenders such as IIFL Finance were using internal assayers to evaluate the value and the purity of the gold offered as collateral by borrowers.

Impact on NBFCs?

- RBI's scrutiny is expected to make **NBFC gold loans less attractive**.
- NBFCs might become **less aggressive in their lending practices as the RBI enforces the loan-to-value rules more strictly**.
- Such measures to make the auction **process more transparent and accessible to borrowers could** increase the cost of doing business for NBFCs and lead to higher borrowing rates for lenders.
- These lending norms will make the **gold loan business more sustainable** and help avoid systemic risks in the long run.

What are NBFCs?

- **Nonbank financial companies (NBFCs)**, also known as nonbank financial institutions (NBFIs), are entities that provide similar services to a bank but do not hold a banking license.
- A **Non-Banking Financial Company (NBFC)** is a company registered under the **Companies Act, 1956**.
- **Investment banks, mortgage lenders, money market funds, insurance companies, hedge funds, private equity funds, and P2P lenders** are all examples of NBFCs.

Features of NBFCs:

- **NBFC cannot accept demand deposits.**
- **NBFCs do not form part of the payment and settlement system and cannot issue cheques drawn on itself.**
- **Deposit insurance facility of Deposit Insurance and Credit Guarantee Corporation is not available to depositors of NBFCs.**

RBI's Proposed Framework for Long-Gestation Project Financing

Sub: Economy

Sec: Monetary policy

Key Points:

- **Purpose of the Framework:**
 - **Strengthening Regulations:** To enhance the regulatory framework for long-gestation period financing in infrastructure, non-infrastructure, and commercial real estate sectors.
 - **Challenges in Infrastructure Projects:** Infrastructure projects often have long gestation periods and **higher financial risks, facing delays and cost overruns** due to issues like land acquisition and regulatory clearances.
- **Issues with Current Framework:**
 - **Project Delays and Cost Overruns:** The Ministry of Statistics and Programme Implementation reported that **out of 1,837 projects, 779 were delayed and 449 faced cost overruns as of March**.
 - **Bank Risk Pricing:** Banks price risks based on initial project assessments, which can become outdated due to project delays and changes.
- **Key Revisions in the Proposed Framework:**
 - **Mitigating Credit Events:** Focus on avoiding defaults, extensions of the Date of Commencement of Commercial Operations (DCCO), **additional debt infusions, and reductions in Net Present Value (NPV)**.
- **Provisioning Requirements:**
 - **Increased Provisioning:** A general provision of 5% at the construction stage, a significant increase from the previous 0.4%.
 - **Phased Implementation:** The 5% provisioning requirement will be phased in gradually.
- **Prudential Conditions:**
 - **Pre-requisites for Financial Closure:** All necessary environmental, regulatory, and legal clearances must be in place before financial conditions are finalized.
 - **DCCO Specification:** Clearly defined DCCO with financial disbursements and equity infusion based on project completion stages.
 - **Independent Verification:** Banks must deploy an independent engineer or architect to certify project progress.
- **Positive NPV Requirement:** Projects must have a **positive NPV to qualify for financing**, with annual independent re-evaluation of NPV.
- **Repayment Norms:**
 - **Repayment Tenure:** Should not exceed 85% of the economic life of the project, including the moratorium period.
 - **Revision Criteria:** For changes in repayment schedules due to project scope and size increases, **reassessment is required if costs exceed 25% of the original outlay before DCCO**.
- **Initial Observations and Impact:**

- **Impact on NBFCs:** Higher provisioning requirements could affect the near-term profitability of non-banking financial companies and infrastructure financing firms.
- **Bank Confidence:** Major banks like SBI, Union Bank of India, and Bank of Baroda expressed confidence that the proposal would not significantly impact them.

Summary: The Reserve Bank of India's proposed framework aims to improve the regulatory environment for **long-gestation project financing by increasing provisioning requirements, ensuring prudential pre-requisites, and mandating positive NPV** for project finance. While higher provisioning may impact some financial institutions, **major banks are confident in managing these changes without significant disruption.**

RBI's Record Surplus Transfer to the Centre for FY24

Sub: Economy

Sec: Monetary Policy

Key Highlights:

- **Record Surplus Transfer:**
 - The Reserve Bank of India (RBI) has **approved a transfer of ₹2,10,874 crore as surplus to the Union government** for the financial year 2023-24.
 - This transfer is **more than double the ₹87,416 crore transferred in FY23.**
- **Economic Capital Framework (ECF):**
 - The surplus has been determined based on the **Economic Capital Framework adopted by the RBI on August 26, 2019.**
 - The ECF was developed following **recommendations from the Expert Committee to review the RBI's capital framework.**
- **Contingent Risk Buffer (CRB):**
 - The RBI has decided to **increase the Contingent Risk Buffer to 6.50% for 2023-24**, up from 6% the previous year.
- **Implications for Fiscal Consolidation:**
 - The significant surplus transfer is expected to aid the Union government's fiscal consolidation efforts.
 - Experts noted that the **larger dividend was due to higher RBI income from both domestic and foreign assets, leading to increased profits.**
- **Future Outlook:**
 - The **transfer supports the government's fiscal consolidation program**, with the final budget anticipated in July.
 - Economists view this as a positive step towards **maintaining fiscal discipline and managing the fiscal deficit.**

Conclusion:

The RBI's record surplus transfer of ₹2,10,874 crore to the Union government for FY24 marks a significant financial boost. The **transfer, which more than doubles the previous year's amount, is expected to support fiscal consolidation efforts, reflecting higher income from the RBI's domestic and foreign assets.**

The increase in the Contingent Risk Buffer further strengthens the RBI's financial resilience, ensuring continued stability in the economic framework.

How the RBI Generates Surplus

RBI's Income Sources:

- **Interest on Holdings:**
- **Domestic Securities:** Interest earned on government securities held by the RBI.
- **Foreign Securities:** Interest earned on foreign assets and securities.
- **Fees and Commissions:**
- Charges for various services provided to the government and financial institutions.
- **Profits from Foreign Exchange Transactions:**
- Gains from buying and selling foreign currencies.
- **Returns from Subsidiaries and Associates:**
- Income from the RBI's investments in its subsidiaries and associated organizations.

RBI's Expenditure:

- **Printing of Currency Notes:**
- Costs incurred in the production and supply of currency notes.

- **Payment of Interest:**
- Interest paid on deposits and borrowings.
- **Salaries and Pensions:**
- Compensation and retirement benefits for RBI staff.
- **Operational Expenses:**
- Costs of running the RBI's offices and branches.
- **Provisions for Contingencies and Depreciation:**
- Funds set aside to cover unforeseen expenses and asset depreciation.

Surplus Calculation:

- The **surplus** is the difference between the RBI's total income and its total expenditure.
- After accounting for reserves and retained earnings, the remaining surplus is transferred to the government.

Legal Framework for Surplus Transfer:

- **Section 47 of the Reserve Bank of India Act, 1934:**
 - This section governs the allocation of surplus profits of the RBI.
 - It mandates that the surplus, after provisions, must be transferred to the Central Government.

RBI Unveils Pravaah Portal

Sub: Economy

Sec: Monetary Policy

Tags: PRAVAAH

The **PRAVAAH (Platform for Regulatory Application, Validation, and Authorisation)** portal is a secure, centralized web-based platform designed for individuals and entities to apply for various regulatory approvals from the RBI online. This **portal aims to simplify and expedite the process of seeking authorizations, licenses, and other regulatory approvals by offering a single point of contact for applicants.**

Key benefits of the PRAVAAH portal include:

- **Online Application:** Enables online submission of applications for regulatory approvals.
- **User Convenience:** Designed to make the approval process more accessible and less cumbersome.
- **Streamlined Process:** Facilitates a more efficient approval and clearance process by the RBI.
- **Centralized Access:** Provides a single, secure platform for all regulatory application needs.

Retail Direct Mobile App

The **Retail Direct Mobile App** is designed to make it **easier for retail investors to access and transact on the Retail Direct platform for government securities (G-Secs)**. The app offers several functionalities aimed at increasing retail investor participation in the G-Secs market, including:

Account Management: Enables retail investors to open Retail Direct Gilt accounts with the RBI.

Primary Auctions: Allows participation in primary auctions for G-Secs.

Secondary Market Transactions: Facilitates buying and selling of G-Secs in the secondary market.

User Accessibility: Available for download on both the Play Store (Android) and the App Store (iOS), ensuring broad accessibility.

FinTech Repository

The **FinTech Repository** is a comprehensive database that contains detailed information on the Indian fintech sector. This repository serves multiple purposes:

Regulatory Insight: Provides a better understanding of the fintech sector from a regulatory perspective.

Policy Design: Aids in the design of appropriate regulatory policies by the RBI.

Sector Information: Includes data on fintech companies, their products and services, and the applicable regulatory frameworks.

EmTech Repository

In addition to the FinTech Repository, the RBI has launched the **EmTech Repository** for entities regulated by the RBI, such as banks and non-banking financial companies (NBFCs). This **repository focuses on the adoption of emerging technologies** by these entities and includes information on:

- **Artificial Intelligence (AI)**
- **Machine Learning (ML)**
- **Cloud Computing**
- **Distributed Ledger Technology (DLT)**

- **Quantum Computing**

Overview of CRISIL's Credit Growth Projections for FY25

Sub: Economy

Sec: Monetary Policy

Tags: Credit Growth

CRISIL Ratings has projected that **bank credit growth in FY25 will moderate to 14%, down from an estimated 16% in FY24**. This deceleration is attributed to several factors including a high base effect, revisions in risk weights, and a slowdown in GDP growth.

Key Factors Influencing the Slowdown

High Base Effect:

The previous year's high growth rate of 16% creates a base that makes maintaining similar growth rates challenging.

Revision in Risk Weights:

Changes in risk weights, which affect the amount of capital banks must hold against their assets, can impact lending capacity and, consequently, credit growth.

Slower GDP Growth:

A deceleration in economic growth reduces demand for credit as businesses and consumers scale back on borrowing.

Potential Tailwinds

Revival in Private Corporate Capex:

A revival in capital expenditure by private corporations, particularly in the latter half of the year, could bolster credit growth. This indicates that **investment in infrastructure and business expansion could drive credit demand**.

Sector-Specific Growth Projections

Corporate Credit:

Corporate credit, which constitutes **45% of bank credit**, is expected to grow steadily at 13%. This reflects stable demand from large corporations despite overall economic challenges.

Retail Credit:

The retail segment, making up 28% of bank credit, is projected to grow the fastest at 16%. This suggests strong consumer borrowing, potentially driven by personal loans, mortgages, and credit cards.

Credit to MSMEs:

Growth in credit to Micro, Small, and Medium Enterprises (MSMEs) is expected to slow down due to the high base effect. This indicates that previous high growth rates in this segment are unlikely to be sustained at the same pace.

Deposit Growth Impact

Pace of Deposit Growth:

The rate at which deposits grow can influence credit growth. **If deposit growth is slower, it could constrain the ability of banks to extend new credit**. However, CRISIL notes that the differential between deposit and credit growth has reduced over the past year, which might mitigate some of the impact.

Conclusion

CRISIL's projection of a 200 basis points easing in bank credit growth in FY25 reflects the **interplay of high base effects, regulatory changes, and economic conditions**.

While corporate credit is expected to remain steady, retail credit is poised for robust growth, driven by consumer demand. The **moderation in MSME credit growth highlights the challenges of sustaining high growth rates in this segment**. Despite these challenges, potential tailwinds such as a revival in private capex could provide support to credit growth in the latter part of the year.

Summary of RBI's Financial Performance and Projections (FY24)

Sub: Economy

Sub: Monetary Policy

Key Financial Highlights:

- **Income and Expenditure:**
 - **Income:** Increased by 17% to ₹2,75,572.32 crore.
 - **Expenditure:** Decreased by 56.3% to ₹64,694.33 crore from ₹1,48,037.04 crore in FY23.
 - **Transferable Surplus:** Ended the year with a surplus of ₹2,10,873.99 crore, up from ₹87,416.22 crore in the previous year.
- **Income Sources:**
 - **Forex Gains:** ₹83,615.86 crore.

- **Interest Income from Foreign Securities:** ₹65,327.93 crore.
- **Balance Sheet:**
 - **Increase:** Grew by ₹7,02,946.97 crore (11%) to ₹70,47,703.21 crore from ₹63,44,756.24 crore in FY23.
 - **Asset Side:**
 - **Foreign Investments:** Increased by 13.9%.
 - **Gold:** Increased by 18.26%.
 - **Loans and Advances:** Increased by 30.05%.
 - **Liabilities Side:**
 - **Notes Issued:** Increased by 3.88%.
 - **Deposits:** Increased by 27%.
 - **Other Liabilities:** Increased by 92.57%.
 - **Asset Composition:**
 - **Domestic Assets:** 31% of total assets.
 - **Foreign Currency Assets, Gold, Loans to Foreign Financial Institutions:** 69% of total assets.
 - **Contingency Fund:** ₹42,819.91 crore provision transferred.

Economic Outlook:

- **GDP Growth:** Projected at 7% for FY25.
- **Macroeconomic Fundamentals:**
 - Sustained strengthening of macroeconomic fundamentals.
 - Robust financial and corporate sectors.
 - Resilient external sector.
- **Government Policies:**
 - Continued focus on capital expenditure (capex).
 - Pursuit of fiscal consolidation.
 - Optimism in consumer and business sectors, supporting investment and consumption demand.
- **Inflation:**
 - Headline inflation expected to ease towards the target.
 - Revitalization of consumption demand, especially in rural areas.
- **External Sector:**
 - Forex reserves acting as buffers against global economic spillovers.
- **Risks:**
 - Geopolitical tensions and geoeconomic fragmentation.
 - Global financial market volatility.
 - International commodity price movements.
 - Erratic weather developments.

These highlights **reflect a robust financial performance by the RBI in FY24, underpinned by significant income growth, reduced expenditure, and an expanded balance sheet.** The outlook for FY25 remains positive with expected GDP growth and stable inflation, although several external risks persist.

Delay in Publishing Consumer Price Index for Industrial Workers (CPI-IW) Unusual: CITU

Sub: Economy

Sec: Inflation

Key Points:

- **CITU's Concern:**
 - The Centre of Indian Trade Unions (CITU) has **raised concerns over the delay in releasing the All India Consumer Price Index for Industrial Workers (AICPI-IW)** for February and March.
- **Importance of AICPI-IW:**
 - AICPI-IW is **crucial for regulating wages and dearness allowance for millions of workers and employees in India** and compiled by the Labour Bureau.
 - It is also **used for measuring inflation and informing other policy formulations.**

- **Scheduled Release Dates:**

- According to norms, the **index for February was due on March 28, and the index for March was expected on April 30.**
- The index for April is expected to be released on May 31.

Conclusion:

The CITU has highlighted the critical importance of the All India Consumer Price Index for Industrial Workers (AICPI-IW) and expressed concern over the unusual delay in its release for February and March.

Given the **index's role in wage regulation and inflation measurement, the CITU urges the Labour Ministry to adhere to the scheduled release dates to maintain transparency and reliability in economic indicators essential for workers and policy formulations.**

What is AICPI-IW?

- **AICPI-IW** stands for **All India Consumer Price Index for Industrial Workers.**
- It is a measure of the cost of living for industrial workers in India.
- Compiled by the **Labour Bureau** under the **Ministry of Labour and Employment.**

Importance of AICPI-IW

- **Wage Regulation:** Used for the regulation of wages and dearness allowance for millions of workers and employees in the country.
- **Inflation Measurement:** Serves as an important metric for measuring inflation.
- **Policy Formulation:** Influences policy decisions related to labor, wages, and inflation.

Compilation and Release

- The Labour Bureau compiles the AICPI-IW based on the price changes of various goods and services consumed by industrial workers.
- **Frequency:** The index is usually released monthly.

India's 400-Million Casual Labour Market Needs a Structural Shift: ISF

Sub: Economy

Sec: Inflation and Unemployment

Tags: Casual labour

Overview: India's informal labour market, comprising approximately 400 million workers, plays a crucial role in the country's economy.

The Indian Staffing Federation (ISF), representing the **contract staffing industry, has emphasized the need for a structural shift towards formal employment to ensure equitable opportunities and sustainable livelihoods.**

Current Scenario:

- **Informal Labour Force:** Almost 85% of India's workforce is employed in the informal sector.
- **Economic Contribution:** This segment generates more than half of the country's GDP.
- **Challenges:** The informal sector faces significant issues such as income inequality, lack of job security, and rising poverty levels.

ISF's Perspective:

- **Need for Formalization:** ISF Executive Director Suchita Dutta highlights the critical need for formalizing the informal labour market. Formal employment can provide better job security, income stability, and access to social benefits.
- **Income Inequality:** The disparity in income and the associated poverty levels are stark reminders of the systemic challenges faced by the informal workforce.
- **Blueprint for Change:** ISF has unveiled a blueprint aimed at formalizing the informal workforce and implementing labour codes to protect workers' rights and improve working conditions.

Key Recommendations:

- **Formal Employment Opportunities:**
 - Transitioning workers from informal to formal employment sectors.
 - Providing structured employment opportunities to lower-income and semi-skilled workers.
- **Implementation of Labour Codes:**
 - Ensuring the effective implementation of new labour codes to protect workers' rights.
 - Facilitating better working conditions, social security, and fair wages.
- **Inclusive Growth:**

- Creating an inclusive labour market that invites participation from all sections of society.
- Ensuring equitable opportunities and sustainable livelihoods.
- **Economic and Social Security:**
- Enhancing the economic security of workers through stable employment.
- Providing social security benefits like health insurance, pensions, and unemployment benefits.

Benefits of Formalization:

- **Economic Stability:** Formal employment can lead to more predictable and stable income for workers, contributing to overall economic stability.
- **Social Security:** Access to social security benefits can significantly improve the quality of life for workers and their families.
- **Skill Development:** Formal employment often comes with opportunities for skill development and career advancement.
- **Government Revenue:** Formal employment increases tax revenues for the government, enabling better public services and infrastructure development.

Challenges to Formalization:

- **Regulatory Hurdles:** Implementing new labour codes and ensuring compliance can be challenging.
- **Employer Resistance:** Some employers may resist formalizing their workforce due to perceived higher costs.
- **Awareness and Education:** Workers need to be made aware of the benefits of formal employment and trained to meet the requirements of formal jobs.

Conclusion: The ISF's call for a structural shift towards formal employment is a significant step towards addressing the challenges faced by India's informal labour market. **By implementing comprehensive labour codes and creating formal employment opportunities, India can ensure equitable opportunities and sustainable livelihoods for all workers. This shift is essential for reducing income inequality, alleviating poverty, and fostering inclusive economic growth.**

India and China: A Comparative Analysis of Consumer Markets

Sub: Economy

Sec: National Income

- **Population Dynamics:**
 - **India:** Surpassed China in 2023 to become the world's most populous country. India's population is expected to continue growing and peak around 2060.
 - **China:** Facing a declining birth rate (6.4 births per 1,000 people), a low total fertility rate (~1%), and a negative population growth rate. China's dependency ratio is projected to increase over time.
- **Consumption Metrics:**
- **Private Final Consumption Expenditure (PFCE):**
 - **India:** PFCE contributes over 58% to GDP, steadily increasing.
 - **China:** PFCE contributes only 38% to GDP and has been on a decline.
 - **Aggregate PFCE:** Despite China's larger economy, **its PFCE is only about 3.5 times that of India's, indicating a larger contribution of consumption to India's GDP.**
- **Consumption Trends:**
- **India:**
 - PFCE grew from \$1.64 trillion in 2018 to \$2.10 trillion in 2022.
 - Despite marginal growth in aggregate and per-capita terms in 2022, India showed resilience.
- **China:**
 - PFCE increased significantly post-2020 but showed a decline in both aggregate and per-capita terms in 2022.
- **Per Capita PFCE:**
 - Despite India closing the gap in aggregate terms, China's per capita PFCE increased marginally from ~3.0 times of India in 2018 to ~3.1 in 2022.
- **PPP Adjustments:**
 - **China:** PFCE approximately 1.5 times that of India in PPP terms, despite China's GDP (PPP) being 2.5 times that of India.
 - **India:** Closed the PPP gap from ~1.58 in 2018 to ~1.55 in 2022, indicating significant growth despite exchange rate challenges.
- **Expenditure Categories:**

- **India:** Higher spending on food, clothing, footwear, and transport, indicative of a developing market.
- **China:** Higher spending on housing, white goods, recreation, education, and healthcare, indicative of a maturing market.
- **Sectoral Expenditure:**
 - **India:** Spends around half of what China spends on food, transport, and communication. Significant real growth rates in these categories often outperform China's nominal growth rates.
- **Future Prospects:**
 - **India's Growing Consumer Base:** Increasing spending potential enhances India's appeal to foreign businesses.
 - **China+1 Strategy:** India's expanding consumer market, coupled with geopolitical shifts, positions it as a favorable alternative or complement to China for foreign businesses.

Conclusion

India's consumer market is characterized by a growing population, increasing consumer spending, and higher contributions to GDP from PFCE, making it a compelling destination for foreign businesses.

China's market, while larger and more mature, faces demographic challenges and a declining consumption trend. The evolving dynamics in both countries suggest that India's burgeoning consumer class and rising expenditure will significantly enhance its appeal as a preferred destination over China in the coming years.

The comparative analysis reveals that **while China's consumption market is larger in absolute terms, India's consumer market is growing at a faster rate.** India's younger, expanding population and increasing consumer spending make it an attractive destination for foreign businesses. **The data indicates a shift in global consumer dynamics, with India potentially becoming a preferred market over China due to its growth trajectory and consumer base expansion.**

About China Plus One Strategy

- The **China Plus One Strategy** refers to the practice of multinational companies diversifying their supply chains by setting up operations in **one or more additional countries outside of China.**
- This strategy aims to **reduce reliance on China and mitigate risks associated with concentrating manufacturing and supply chain operations** in a single country.

Drivers of the Strategy:

- **China-U.S. Trade War:** Ongoing trade tensions and tariffs between China and the U.S. have increased the cost and complexity of doing business exclusively in China.
- **COVID-19 Pandemic:** The pandemic exposed vulnerabilities in global supply chains that were overly dependent on China, prompting companies to seek alternative locations to ensure business continuity.

Benefits:

- **Risk Mitigation:** Diversifying production sites helps companies avoid disruptions caused by geopolitical tensions, trade restrictions, or local crises.
- **Cost Management:** Shifting some operations to countries with lower labor and production costs can help companies manage expenses better.
- **Market Access:** Establishing a presence in multiple countries can provide better access to regional markets and reduce logistical challenges.

Preferred Destinations:

- **Thailand**
- **Malaysia**
- **Vietnam**

Attraction Strategies:

- These countries have implemented **preferential policies** to attract foreign investment, including:
 - **Tax Incentives:** Reduced corporate taxes and tax holidays for foreign investors.
 - **Simplified Regulations:** Streamlined procedures for setting up businesses.
 - **Infrastructure Development:** Investment in transportation, logistics, and industrial infrastructure to support manufacturing and export activities.
 - **Skilled Workforce:** Training programs to ensure the availability of skilled labor.

Impact on China:

- While companies are expanding their operations to other countries, they are not necessarily exiting China entirely. **Instead, they are creating a more balanced and resilient supply chain by maintaining a significant presence in China while adding production capabilities elsewhere.**

Conclusion:

- The **China Plus One Strategy** is a strategic response to global economic shifts, **aiming to create more resilient and efficient supply chains**.
- Countries like Thailand, Malaysia, and Vietnam are capitalizing on this trend by offering attractive conditions for foreign investment, thus becoming important hubs in the global manufacturing network.

AI-Intensive Sectors Showing a Productivity Surge, PwC Reports

Sub: Economy

Sec: National Income

Tag: denuclearisation of Korean peninsula

Key Findings:

Productivity Growth: Sectors likely to use artificial intelligence (AI) have experienced productivity growth that is nearly five times faster than other sectors.

- **AI-Intensive Sectors:** Professional and financial services, information technology.
- **Productivity Increase (2018-2022):** 4.3%.
- **Other Sectors:** Construction, manufacturing, retail, food, and transport.
- **Productivity Increase in Other Sectors:** 0.9%.

Economic Impact:

- **Potential for Broader Economic Boost:** The rise in AI usage could help countries overcome low productivity growth, enhancing overall economic growth, wages, and living standards.
- **Commentary by PwC:** Highlighted the faster growth in job advertisements for AI skills in highly productive sectors, indicating a **role for AI in driving productivity**.

AI and Job Market:

- **Increasing AI Deployment:** As companies adopt generative AI, which can be utilized by non-AI specialists, the trend in productivity growth is expected to accelerate.
- **Challenge:** The rapid pace of AI-related changes.

IMF Insights:

- **Kristalina Georgieva (Head of IMF):** Predicts AI will **impact 60% of jobs in advanced economies** within the next two years.

Wage Premium for AI Skills:

- **United States:** Jobs requiring AI skills carry an average premium of 25%.
- **Britain:** Jobs requiring AI skills carry an average premium of 14%.

Conclusion:

- The integration of AI into various sectors is **significantly enhancing productivity, suggesting a potential pathway for economic revitalization and growth** in living standards through technological advancement.

Rising Interest, Falling Savings: Substantiating the Article with Data and Figures

Sub: Economy

Sec: National Income

TAG: Falling savings

Household net financial savings as a percentage of GDP have seen a decline due to increased borrowing and structural economic shifts, rather than just changes in savings patterns. This has raised concerns about financial stability and the need for macroeconomic policies that support household income growth.

Key Points from the Article:

- **Decline in Household Financial Savings:**
 - The household **net financial savings to GDP ratio declined by 2.5 percentage** in FY22-23.
 - The increase in physical savings to GDP ratio was only 0.3 percentage points.
 - The **borrowing to GDP ratio increased by 2.5 percentage**, resulting in a net decline in overall household savings.
- **Structural Shifts:**
 - This shift indicates a structural change in the economy, **reflecting higher borrowing and increased financial stress on households**.
- **Higher Borrowing and Interest Burden:**

- The **net financial savings to GDP ratio declined while borrowing increased**, indicating higher debt levels and interest payment burdens.
- **Fisher Dynamics:**
- The **debt-income ratio has risen due to higher interest rates and lower nominal income growth**.
- This phenomenon, explained by Irving Fisher, indicates that **when income growth lags behind interest rates, households face increased financial stress**.
- **Macroeconomic Challenges:**
- **Interest Rate and Income Growth Gap:** There is a need to reduce the gap between interest rates and income growth to slow down the debt-income ratio's growth.
- **Aggregate Demand:** High interest payments and debt commitments may lead households to cut consumption, reducing overall demand in the economy.
- **Policy Implications:** To address these challenges, macroeconomic policies should aim to stimulate household income growth, alongside managing inflation and government debt targets.

Supporting Data and Figures:

- **Changes in Components of Savings to GDP Ratio (Figure 1):**
- **Net Financial Savings to GDP Ratio:** Declined by 2.5 percentage points.
- **Physical Savings to GDP Ratio:** Increased by 0.3 percentage points.
- **Borrowing to GDP Ratio:** Increased by 2.5 percentage points.
- **Overall Savings to GDP Ratio:** Declined by 1.7 percentage points.
- **Lending Rate and Household Growth (Table 1a):**
- **Average Lending Rate (RBI):**
 1. 2019-20 to 2021-22: 9.3%
 2. 2019-20 to 2022-23: 9.4%
- **Average Household GDI Growth Rate:**
 1. 2019-20 to 2021-22: 8.0%
 2. 2019-20 to 2022-23: 9.3%
- **Household GDI Growth Rate minus Average WALR:**
 1. 2019-20 to 2021-22: -1.3%
 2. 2019-20 to 2022-23: -0.1%

Current Economic Context:

- **Inflation-Adjusted Growth of Household Savings:** Remained positive during 2022-23.
- **GNI Growth Rate in 2023-24:** Lower than the average WALR.
- **Debt Servicing Ratio:** India's debt servicing ratio is still lower than that of many other countries.

Analysis:

- The data indicates a significant structural shift in the household savings pattern, with increased borrowing and financial stress.
- The **declining household net financial savings to GDP ratio and the rise in borrowing underscore the financial strain on households**.
- The average **growth rate of household disposable income being lower than the lending rate indicates higher financial burdens** and increased debt levels.

Implications:

The declining household financial savings to GDP ratio and increased borrowing highlight the financial vulnerabilities of households. The **growing debt-income ratio and higher interest payment burdens point to deeper structural issues that require comprehensive macroeconomic policies focused on supporting household income growth and stabilizing the economy**. This approach will be crucial in mitigating financial stress and sustaining economic growth.

Debt Servicing Ratio measures the **proportion of household income required to meet debt obligations, including both interest and principal payments**.

Significance:

- Indicates the financial burden of debt on households.
- A lower DSR means households can manage their debt payments comfortably.
- A higher DSR suggests households are under financial stress, as a larger share of their income is needed for debt repayment.

Fisher Dynamics

Fisher dynamics, named after economist Irving Fisher, describe the **relationship between interest rates, income growth, and the debt-to-income ratio**.

Key Components:

1. **Interest Rate (i):** The cost of borrowing money.
2. **Nominal Income Growth Rate (g):** The rate at which household income is increasing.
3. **Debt-Income Ratio (D/Y):** The ratio of total household debt (D) to household income (Y).

Mechanism:

- **Rising Debt-Income Ratio:** If the interest rate (i) is higher than the nominal income growth rate (g), the debt-to-income ratio (D/Y) will increase over time, leading to higher financial stress.
- **Falling Debt-Income Ratio:** If the income growth rate (g) exceeds the interest rate (i), the debt-to-income ratio (D/Y) can decrease, easing financial stress.

S&P Revises India's Economic Outlook to 'Positive'

Sub: Economy

Sec: National Income

Tags: Rating agency

Key Highlights:

- S&P Global Ratings upgraded India's economic outlook **from 'stable' to 'positive'**.
- The sovereign rating **remains at 'BBB-Minus'**, the lowest investment-grade rating, which has been maintained since 2007.
- This outlook change suggests a potential rating upgrade within the next two years if certain fiscal conditions are met.
- Fitch Ratings also affirmed **India's 'BBB-Minus' rating with a stable outlook in January**.

Reasons for the Outlook Upgrade:

- **Robust Economic Growth:** India's GDP is expected to grow close to 7% annually over the next three years.
- **Quality of Government Spending:** There has been a pronounced improvement in government expenditure, focusing on high infrastructure investment.
- **Policy Stability:** The continuation of economic reforms and cautious fiscal and monetary policies are contributing to sustained long-term growth prospects.
- **Fiscal Consolidation:** Political commitment to reducing the fiscal deficit is noted, with projections of the deficit decreasing from 7.9% of GDP in FY25 to 6.8% by FY28.

Implications of the Positive Outlook:

- **Potential Rating Upgrade:** The positive outlook indicates a potential upgrade in India's sovereign rating **if fiscal deficit management improves and economic resilience is bolstered**.
- **Bank Ratings:** S&P also revised the outlook on six Indian banks (Axis Bank, ICICI Bank, State Bank of India, HDFC Bank, Kotak Mahindra Bank, and Indian Bank) from stable to positive.
- **Corporate Entities:** The outlook for several major corporations, including EXIM Bank, NTPC, Oil and Natural Gas Corp Ltd, and Power Grid Corp of India, was also revised to positive.

Challenges and Conditions:

- **Fiscal Deficit Management:** A significant narrowing of the fiscal deficit is required for a rating upgrade.
- **Political Commitment:** Continued political commitment to maintaining sustainable public finances is crucial.
- **External Position:** Avoiding a widening current account deficit that could weaken India's external position is essential.

Economic Growth Dynamics:

- **Medium-term Prospects:** Improvements in infrastructure and connectivity are expected to enhance economic growth dynamics.
- **Corporate Capex Revival:** A potential revival in private corporate capital expenditure, particularly in the latter half of the year, could provide additional growth momentum.

Conclusion

The upgrade to a 'positive' outlook by S&P Global Ratings **reflects confidence in India's economic growth prospects, fiscal management, and structural reforms**. This change underscores the importance of continued policy stability and fiscal prudence in achieving a potential rating upgrade in the near future.

Environment

How the next government will push 'balanced fertilization'

Subject: Environment

Sec: Agriculture

Context:

- The fiscal ended March 2024 saw urea consumption hit a record 35.8 million tonnes (mt), 16.9% higher than the 30.6 mt in 2013-14, the year before the Narendra Modi government came to power.

More on news:

- The **consumption of urea, containing 46% nitrogen (N)**, actually fell during 2016-17 and 2017-18, which was attributed to the mandatory coating of all urea with neem oil from May 2015.

What is Balanced Fertilization:

- **Fertilizers are basically food for crops, containing nutrients necessary for plant growth and grain yields.**
- **Balanced fertilization** means supplying these primary (**N, phosphorus-P and potassium-K**), secondary (**sulfur-S, calcium, magnesium**) and micro (**iron, zinc, copper, manganese, boron, molybdenum**) nutrients in the right proportion, based on soil type and the crop's own requirement at different growth stages.
- **Balanced fertilization** aims at discouraging farmers from applying too much urea, di-ammonium phosphate (DAP) or muriate of potash (MOP), which only have primary nutrients in high concentrations.

About Neem coated urea:

- **Neem coating** was intended to check illegal diversion of the highly-subsidized urea for non-agricultural uses, including by plywood, dye, cattle feed and synthetic milk makers.
- **Neem oil supposedly also acted as a mild nitrification** inhibitor, allowing more gradual release of nitrogen.
- **Improved nitrogen use efficiency**, in turn, brought down the number of urea bags required per acre.

About Nutrient Based Subsidy:

- The **nutrient-based subsidy (NBS) system, instituted in April 2010 to promote balanced fertilization.**
- Under it, the government fixed a per-kg subsidy for **N, P, K and S.**
- The **subsidy on any fertilizer was linked to its nutrient content.**
- The underlying idea was to induce product innovation and wean away farmers from urea, **DAP (18% N and 46% P content) and MOP (60% K), in favor of complex fertilizers containing N, P, K, S** and other nutrients in balanced proportions with lower concentrations.

India and opportunities:

- India is heavily import-dependent in fertilizers, be it of finished products or intermediates and raw materials.

About PM PRANAM scheme:

- The **Programme for Restoration, Awareness, Nourishment, and Amelioration of Mother Earth is known as the PM PRANAM Scheme in short.**
- The government plans to **reduce subsidies for chemical fertilizers and direct 50% of subsidy savings as a grant to states to invest in new fertilizer technology.**
- The scheme will have no separate budget and will be financed through the savings of existing fertilizer subsidies under schemes run by the Department of Fertilizers.

About Nano Urea:

- **Nano Urea is a nanotechnology based revolutionary Agri-input which provides nitrogen to plants.**
- **Nano Urea (Liquid) is a source of nitrogen** which is a major essential nutrient required for proper growth and development of a plant.
- Nano Urea (Liquid) contains nanoscale nitrogen particles which have more surface area (10,000 times over 1 mm Urea prill) and number of particles (55,000 nitrogen particles over 1 mm Urea prill).which makes it more impactful.
- In comparison to Urea the uptake efficiency of **Nano Urea is more than 80 %.**



Microbes, not fossil fuels, produced most new methane: study

Subject: Environment

Section: Climate change

Tag: Greenhouse gases, Methane, Global methane Pledge

Context:

- Historically, methane levels rose until the 1990s, stabilized, and then began increasing again in 2007.
- Current methane concentrations are estimated to be three times higher than they were 300 years ago.

Evolving understanding:

- Methane, the second most abundant anthropogenic greenhouse gas after CO₂, is significantly more potent, having a global warming potential 28 times greater than CO₂ over a century and even higher over two decades.
- Its sources include cattle-farming, landfills, wastewater treatment facilities, rice cultivation, and some industrial processes.
 - Energy, agriculture and waste sectors are the primary emitters of methane, responsible for 30 per cent of the earth's warming.
- It is only recently that policymakers have started to prioritize methane in global warming discussions.
- This shift was highlighted at the 2021 U.N. climate talks where the 'Global Methane Pledge' was introduced, aiming to reduce methane emissions to slow global warming.
- New research has revealed that the primary source of atmospheric methane is microbes, rather than the burning of fossil fuels, indicating an evolving understanding of methane's sources and impacts.

Greenhouse Gases: Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrochlorofluorocarbons (HCFCs), ozone (O₃), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆).

Sources of methane:

- Scientists have identified two primary sources of methane: biogenic and thermogenic.
 - Thermogenic methane is released during the extraction of fossil fuels like natural gas and oil from beneath the Earth's crust.
 - Biogenic methane, on the other hand, is produced by microbes known as archaea, or methanogens.
- These single-celled organisms, distinct from bacteria and eukaryotes, thrive in oxygen-poor environments such as animal digestive tracts, wetlands, rice paddies, landfills, and lake and ocean sediments.
- Methanogens are crucial to the global carbon cycle, converting organic matter into methane, a potent greenhouse gas.
- However, human activities such as agriculture, dairy farming, and fossil fuel production have amplified methane emissions.

- **Different isotopes of methane**, produced by **both biogenic and thermogenic processes**, help scientists trace the most active sources.

Modelling with a supercomputer:

- **The carbon-13 isotope** is important in **distinguishing the sources of methane**.
- **Methane molecules** containing **fewer carbon-13 atoms** typically indicate a **biological origin**, while a **higher presence** suggests **thermogenic sources** like **fossil fuels or geological activities**.
- The study suggests that the observed **discrepancies in methane emissions** might be linked to **increased cattle-rearing in Latin America** and **rising emissions from waste in South and Southeast Asia**, as well as in **Latin America and Africa**.
- Additionally, the **number of wetlands globally has also grown**. While satellite data has previously highlighted **anaerobic archaea microbes** as **major methane contributors**, Mr. Patra points out that satellite data, reliant on models, cannot accurately measure changes over time and are subject to uncertainties.

Global Methane Pledge

- Launched at the **UN COP26 climate conference in Glasgow**.
 - So far, over **90 countries** have signed this pledge, which is an effort led jointly by the **United States** and the **European Union**.
- The pledge was **first announced** in September by the **US and EU**, and is essentially an **agreement to reduce global methane emissions**.
- One of the **central aims of this agreement** is to **cut down methane emissions by up to 30 per cent from 2020 levels by the year 2030**.
- Among the signatories is **Brazil** — one of the **five biggest emitters of methane**, which is generated in cows' digestive systems, in landfill waste and in oil and gas production.
 - Three others — **China, Russia and India** — have not signed up.
 - **Australia** has said it will not back the pledge.
- According to the latest **Intergovernmental Panel on Climate Change report**, methane accounts for about half of the **1.0 degrees Celsius net rise** in global average temperature since the pre-industrial era.

Sea also rises: On understanding the Indian Ocean's local impact

Subject: Environment

Sec: Climate change

Tags: Ocean warming , Climate change impact on ocean

Impact of Global Warming on the Indian Ocean

- A study led by the **Indian Institute of Tropical Meteorology** in **Pune** and other global institutions has examined the **effects of projected carbon emissions** on the **Indian Ocean**.

Increase in Temp: The **Indian Ocean's temperature** has **increased by 1.2°C** and is expected to **rise further by 1.7°C to 3.8°C** from **2020 to 2100**.

Marine Heatwaves: The **frequency of marine heatwaves** is predicted to **significantly increase**, rising from an **average of 20 days per year to 220-250 days per year**, potentially pushing the **tropical Indian Ocean** into a **near-permanent heatwave state**.

Coral Bleaching: It **accelerates coral bleaching** and **adversely affect the fisheries sector**.

- The **oceanic thermal energy** stored in the **Indian Ocean**, measured from the **surface down to 2,000 meters**, is **increasing**.
- It currently **rises** at a rate of **4.5 zetta-joules per decade**, with future rates projected between **16 and 22 zetta-joules per decade**.

Broader Implications for India:

- The **warming ocean** is linked to **more frequent and severe cyclones** and an **erratic monsoon pattern in India**, characterized by **long droughts** interrupted by **heavy rains and flooding**.

Global Warming and Policy Response:

- **Anthropogenic activities**, notably **fossil fuel combustion**, are **major contributors** to **global warming** and **consequent oceanic changes**.
- Current international efforts to reduce **greenhouse gas emissions** are deemed **insufficient** to significantly **alter** the trajectory of oceanic warming.
- **India** is urged to **enhance its collaboration** with **other Indian Ocean-bordering nations** to improve data collection and projections.
- This collaborative effort should **aim** at better preparing for and mitigating the effects of climate change on infrastructure and populations.

What is carbon farming?

Subject: Environment

Sec: Climate Change

Carbon Farming:

- **Carbon farming** integrates the **fundamental role of carbon in life processes** with **agricultural practices**, focusing on **regenerative techniques** that **enhance ecosystem health, improve soil health, and boost agricultural productivity**.
- This approach helps **mitigate climate change** by **increasing carbon storage in soil** and **reducing greenhouse gas emissions**.
- It is adaptable to various **agro-climatic conditions** and offers solutions to issues like **soil degradation, water scarcity, and climate variability**.
- The technical term for this is **carbon sequestration**.

Carbon farming techniques:

- **Carbon farming** employs various **sustainable agricultural practices** to enhance **carbon sequestration, improve soil health, and reduce greenhouse gas emissions**.
- Techniques such as **rotational grazing, agroforestry, conservation agriculture, and integrated nutrient management** each **contribute differently**.
 - **Agroforestry (including silvopasture and alley cropping)** increases **carbon storage in vegetation**, while **conservation agriculture** reduces **soil disturbance** and **increases organic content**.
 - **Integrated nutrient management** optimizes the use of **organic fertilizers** to promote **soil fertility** and **reduce emissions**.
 - Additionally, strategies in **livestock management** help **lower methane emissions** and **enhance carbon storage** in pastures.
- Collectively, these practices not only contribute to **mitigating climate change** but also support **diverse and resilient agricultural ecosystems**.

Challenges:

- **Carbon farming** offers significant benefits but faces several challenges that **affect its effectiveness**, including **geographical variations, soil types, crop selection, water availability, biodiversity, and the scale of farming operations**.
- Its **success** is also dependent on **effective land management, supportive policies, and active community involvement**.
- **Regions with long growing seasons, ample rainfall, and good irrigation systems** are **more conducive to carbon farming** due to better conditions for **vegetation growth** and **carbon sequestration**.
- Techniques like **agroforestry** and **conservation agriculture** have **high potential** in such **fertile and well-watered areas**.
- Conversely, **carbon farming** is more **challenging** in **arid regions** with **limited water availability**, where **water is prioritized for essential uses** over agricultural expansion.
- This scarcity can **limit plant growth**, essential for **carbon sequestration** through **photosynthesis**.
- Additionally, the **choice of plant species is critical**, as **not all are equally effective at trapping and storing carbon**, and some **may not thrive in dry conditions**.
- **Economic factors** also play a role, particularly in **developing countries** where **small-scale farmers** may lack the resources to implement sustainable practices without financial support.

Global scenario:

- **Carbon farming** has **gained traction worldwide** with schemes such as **carbon trading in the agriculture sector**, particularly in countries like **the U.S., Australia, New Zealand, and Canada** where **voluntary carbon markets** are prominent.
- **Examples** include the **Chicago Climate Exchange** and **Australia's Carbon Farming Initiative**, which encourage practices like **no-till farming** and **reforestation** to reduce carbon emissions and enhance carbon sequestration in agriculture.
- **Internationally**, projects like **Kenya's Agricultural Carbon Project**, supported by the **World Bank**, demonstrate **carbon farming's** potential to address climate change mitigation, adaptation, and food security in developing regions.
- Additionally, the **'4 per 1000'** initiative launched during the **COP21 climate talks in 2015 in Paris** emphasizes the **critical role of carbon sinks** in **mitigating greenhouse gas emissions**.

Indian scenario:

- **Organic and agro-ecological farming practices** have demonstrated the potential to **sequester carbon**, with the possibility of creating an economic value of approximately **\$63 billion** across **India's 170 million hectares of arable land**.

- This includes **incentives for farmers**, offering them about **₹5,000-6,000 per acre annually** for providing **climate services** through **sustainable agriculture**.
- Regions like the **Indo-Gangetic plains** and the **Deccan Plateau** are well positioned for **carbon farming**, whereas the **Himalayan** and **coastal areas** face challenges due to their **terrain** and **salinisation**, respectively.
- Additionally, implementing **carbon credit systems** could provide farmers with **supplementary income** by **monetizing the environmental services of carbon sequestration**.
- Research suggests that **agricultural soils** could absorb **3-8 billion tonnes of CO2 equivalent annually** over **20-30 years**, significantly aiding in **climate stabilization** and bridging the gap in necessary emissions reductions.
- However, **scaling up carbon farming in India** requires overcoming hurdles such as **limited awareness, insufficient policy frameworks, technological limitations, and creating an environment conducive to adoption**.
- Despite these challenges, promoting **carbon farming** aligns with **India's interests to combat climate change, enhance soil health, boost biodiversity, and generate economic benefits for farmers**.

Renewable energy certificates (RECs)

Sub: Environment

Sec: Climate change

Context: Renewable energy certificates (RECs) prices hit ₹185 per certificate during the May 8 trading session on the Indian Energy Exchange (IEX), which is the lowest on record. Around 4 lakh RECs, equivalent to 400 million units (MU), were traded.

Prior to this, the REC market recorded an all-time low price of ₹204 in the trading session held on April 24. Prices have declined by more than 80 per cent on an annual basis so far.

What are REC?

REC is a market based instrument to promote RE and facilitate compliance of renewable purchase obligations (RPO). It is aimed at addressing the mismatch between availability of RE resources and requirement of obligated entities to meet the RPO.

One REC equals 1 MWh of energy generated from renewable sources. More than 85 per cent of the trade in RECs takes place on power exchanges.

Historically, RECs have traded under solar and non-solar categories, based on the renewable source. Floor and forbearance prices were set for trading on power exchanges wherein prices varied from time to time. Most of the time, RECs traded at the floor price, that is, ₹1,000 per certificate due to surplus inventory.

However, regulation by the Central Electricity Regulatory Commission, effective December 5, 2023, eliminated the concept of floor and forbearance prices, enabling trading of RECs at market determined price. Subsequently, there has been a significant decline in REC prices.

For instance, 7.55 lakh RECs, equivalent to 755 MU, was traded in the IEX sessions on November 8 and November 29, 2023, at a clearing price of ₹375 per certificate. It rose to 10.52 lakh RECs, equivalent to 1,052 MU, in the trading sessions on December 13 and December 27, at a clearing price of ₹370 and ₹360, respectively.

The numbers went up further in January 2024, with a total of 15.20 lakh RECs equivalent to 1,520 MU being traded on January 10 and January 31, at a clearing price of ₹360 per certificate, which is also the highest REC volume in FY24.

Trading in RECs dipped in February. A total of 6.14 lakh RECs, equivalent to 614 MU, traded in the sessions held on February 14 and February 28, at a clearing price of ₹360 per certificate and ₹347, respectively.

March again witnessed higher volume of 11.14 lakh RECs, equivalent to 1,114 MU, in the sessions held on March 13 and March 27, at a clearing price of ₹300 and ₹270 per certificate, respectively.

The higher numbers during January and March 2024 were also due to companies undertaking carbon emission audits for FY24. Lower volumes are also reflective of oversupply in the market as REC suppliers have increased to more than two dozen aided by government's policies to increase adoption of renewables.

April witnessed lower numbers compared with March. A total of 6.18 lakh RECs, equivalent to 618 MU, were traded in the sessions held on April 10 and April 24, at a clearing price of ₹240 a certificate and ₹204, respectively.

Industry sources said that REC prices have declined substantially since December last year encouraging obligated entities to leverage record low rates to procure RECs.

Impact of low prices?

- A government official explained that low prices will encourage obligated entities to meet their RPOs and voluntary customers to meet their sustainability aspirations.
- However, even as REC prices have been weakening, some Discoms are not meeting their RPO compliance leading to a huge inventory pile up. For instance, REC inventory in May 2024 is more than 3.5 crore.

Analysing local environmental footprints of luxury consumption

Sub: Environment

Sec: Climate change

Tag: environmental footprints

Context:

- **Climate change** is a **global concern**. **Water scarcity** and **air pollution** are often localized or regional issues. **Excessive water use in one region doesn't directly affect other areas**. Thus, focusing on **local environmental issues** is **crucial**, and understanding **household environmental footprints** is important.

Environmental/Ecological Footprint:

- The **ecological footprint** serves as a metric to gauge human dependence on natural resources, revealing the environmental impact of specific lifestyles or businesses.



How are household environmental footprints distributed in India?

- A recent study titled "**Water, Air Pollution and Carbon Footprints of Conspicuous/Luxury Consumption in India**" examines the **environmental impact** of affluent individuals in India.
- It highlights the **CO₂, water, and PM_{2.5} footprints** associated with **luxury consumption choices** among different economic classes.
- The study contrasts these footprints with those from non-luxury consumption.
- **Luxury consumption** includes **dining out, vacations, furniture, social events, and more**.

How were environmental impacts assessed in this study?

- Utilized **input/output analysis** of the **entire economy**.
- **Mapped household consumption to resources/materials** involved in production.
- **Captured and aggregated indirect/embedded environmental impacts** at each production stage.
- **Quantified water usage** through the **water footprint**.
- **Assessed PM_{2.5} footprint** from embedded and direct emissions (e.g., fuelwood, kerosene, vehicular fuels).
- **Measured CO₂ footprint** from **embedded and direct emissions** related to household consumption.
- **Key Findings**
 - Environmental footprints **increase** with household **wealth**.
 - The **richest 10%** have **double** the **overall average environmental footprints**.
 - **Significant footprint surge from ninth to tenth decile:**
 - **Air pollution footprint** increases by **68%**.
 - **Water footprint** rises by **39%**.
 - **CO₂ emissions** increase by **55%**.
 - **Top decile's high footprints** are driven by **luxury consumption**.
 - **Decile:** Each of ten equal groups into which a population can be divided according to the distribution of values of a particular variable.
- **Key Contributors**
 - **Eating out/restaurants** significantly **raises** environmental footprints in **top decile households**.
 - **Consumption of fruits and nuts** **increases** water footprint in the top decile.
 - **Luxury items** (personal goods, jewellery, dining out) **elevate CO₂ and air pollution footprints**.
 - **Poorer households' use of fuels like firewood** contrasts with modern energy transitions.

- The **top decile's per capita CO2 footprint** (6.7 tonnes/year) **exceeds the global average** (4.7 tonnes in 2010) and the **Paris Agreement target** (1.9 tonnes CO2eq/cap).

Implications

- Sustainability efforts often overlook local/regional environmental issues.
- **Luxury consumption** exacerbates issues like water scarcity and air pollution, disproportionately affecting marginalized communities.
- **Affluent groups** can mitigate these impacts with measures like **air-conditioned cars** and **air purifiers**.
- **Multi-footprint analysis** is crucial for addressing **environmental justice** and **ensuring equitable sustainability efforts**.
- Policymakers should focus on **reducing consumption levels of affluent households** to meet sustainability goals.

Nearly 6 million trees disappeared from farmlands: study

Sub :Environment

Sec: Ecosystem

Tags: Tress,

Context:

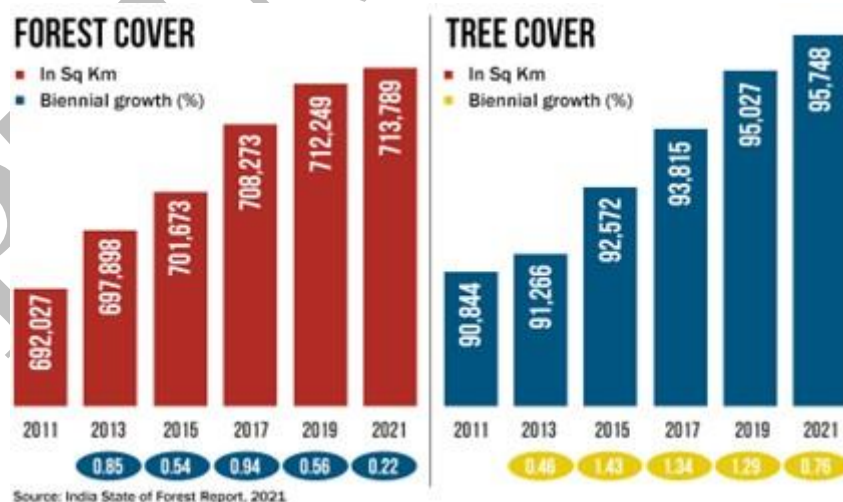
- **Satellite-imagery**-based analysis by researchers at the **University of Copenhagen, Denmark**, reveals the huge tree loss (close to 5.8 million full-grown trees) in Indian agricultural land from **2019 to 2022**.

Key Findings

- Satellite imagery analysis revealed that **11% of trees** present in **2010-2011** were **no longer visible** by **2018-2022**.
- The study is **specific to large trees** and **does not indicate a decline in overall tree cover**.

Data Sources and Methods:

- Researchers utilized data from **RapidEye** and **PlanetScope** satellites, which offer resolutions of **3 to 5 meters**, enabling the **identification of individual large trees**.
- The analysis relied on maps from multiple 'micro-satellites' and **machine learning** to **track tree numbers** and trends from **2010 to 2022**.
- Contrastingly, the **Forest Survey of India (FSI)** uses **Sentinel satellite data** with a **10-meter resolution**, suitable for **assessing blocks of trees rather than individual ones**.
 - While **FSI reports an increase in tree cover** from **2019 to 2021**, their data is focused on **acreage** rather than **individual trees**.
- **India** has the **largest agricultural area globally**, making changes in **farmland tree cover** crucial yet often overlooked.
- The **tree loss estimates** are conservative, with most losses likely occurring between **2018 and 2020**.



Regional Hotspots:

- Detected trees had an **average crown size of 96 square meters**.
- Unexpectedly **high loss rates of mature trees** were observed, particularly in **central India**.
- **Hotspots of tree loss:**
 - **Telangana and Maharashtra:** Massive losses of **up to 50% of large farmland trees**, with up to **22 trees per square kilometre** disappearing.

- **Madhya Pradesh (around Indore):** Smaller hotspots with significant tree loss.

Limitations of the study:

- The **exact number of trees lost** since **2010** is uncertain due to the **inconsistent quality of imagery** from **2010-2011** and the **non-comprehensive mapping exercise** during that period.

India State of Forest Report- 2021

- The **total forest and tree cover** in **India** has **grown** by **2,261 sq km** since the **2019** assessment (ISFR-2019).
- **Forest cover** increased by **1,540 sq km**, and **tree cover** increased by **721 sq km**.
- The **overall forest and tree cover** now account for **80.9 million hectares**, equivalent to **24.62%** of the country's geographical area.

How is Tree Cover Different from Forest Cover?

- **Tree cover** refers to the **total area of land** that is covered by **trees**, regardless of whether or not the trees are part of a forest ecosystem.
- **Forest cover**, on the other hand, refers specifically to the **area of land that is covered by a forest ecosystem**, which is defined as an area with a **tree canopy density of more than 10%** and an **area of more than 1 hectare**.
- So, all forest cover is tree cover, but not all tree cover is forest cover.

RapidEye:

- **RapidEye** was a **constellation of five identical satellites** owned and operated by **Planet**, launched on **29 August 2008**.
- The **constellation** was deactivated on 31 March 2020 but **Planet** still offers data archive.
- **RapidEye** is part of **ESA's Third Party Missions Programme**, in which **ESA** has an agreement with **Planet** to **distribute archive data products from the mission**.
- **Objective:** to provide a range of Earth Observation products and services to a global user community.

PlanetScope satellite:

- Constellation consists of multiple launches of groups of individual cubesats (Doves and SuperDoves).
- Able to image nearly all Earth's land every day.
- Programme of European Space Agency (ESA).

Combating forest fires in focus on Day 1 of UN forum; India Shares Revised National Forest Policy

Subject: Environment

Sec: Int convention

Tag: UN Forum on forest

Context:

- **19th United Nations Forum on Forests** held in **New York, United States**.

Details

- **Theme of discussion:** Combating forest fires and developing a **Model Forest Act**.
 - Discussions on the **UN's strategic plan for forests 2017-2030** and considered activities that support the **thematic priorities for the biennium 2023-24**.
- **Global forest goals include:**
 - Enhancing forest-based economic, social, and environmental benefits; significantly increasing the area of protected forests; mobilising financial resources; and promoting governance frameworks to implement sustainable forest management.
 - Additional focus was given to fostering cooperation, coordination, and synergies as cross-cutting goals.

India's contribution:

- **India** shared its revised **National Forest Policy**, which included a series of **recommendations aimed at addressing forest fires**.
- India advocated for a **holistic strategy towards forest fire management**, emphasizing **prevention, management, and post-fire restoration** through policy reforms. The country has incorporated technology such as **remote sensing** and **online geoportals for real-time fire monitoring and reporting**. It also supports the use of **ecosystem-based methods for rehabilitation after fires**.
- **India** called for the development of **universal global standards for forest certification** to **ensure consistent quality across existing programs**.
- The nation acknowledged the **vital role communities** play in **managing forest fires** and highlighted the **increasing frequency, scale, and impact** of these fires on **biodiversity, ecosystem services, and human welfare**.

- Moreover, **India** proposed the **establishment** of a **Global Fire Management Hub**, facilitated by the **UNEP** and **FAO**, to foster international collaboration and knowledge sharing in fire mitigation efforts.

Contributions of other countries:

- **Ukraine** outlined its **expanded Forest Code**, detailing the **impact on forests** due to the **Russian invasion**.
- **Costa Rica** highlighted its **ban on deforestation, forest cover protection, and payment for ecosystem services**.
- **Indonesia** presented its **Forest and Other Land Use Net Sink 2030 strategy**.
- **Malaysia** committed to keeping at least **50 per cent of its territory under tree cover**, with a plan to plant **7.9 million trees**.
- **Nepal** reviewed its progress in **community-managed forests, restored forests, protected areas, and tree planting policies**.
- **Guatemala** from **Latin America** reported a **reduction in its annual deforestation rate to 0.36 per cent**.

About the UN Forum on Forests:

- It promotes the **management, conservation, and sustainable development of all types of forests**.
- Established in **2000** by the **UN Economic and Social Council of the United Nations (ECOSOC)**.
- The **Forum** meets **annually** at the **UN Headquarters in New York**, bringing together representatives of **all member states and forest-related agencies** for high-level dialogue on technical matters in odd years and policy matters in even years.
- The forum has **universal membership** and is composed of **all Member States of the United Nations and specialized agencies**.
- **India** is a **founding member** of **UNFF**.

About the United Nations Strategic Plan for Forests 2017–2030:

- In January **2017**, during a **special session** of the **UN Forum on Forests**, the **first-ever UN Strategic Plan for Forests** was agreed upon, outlining a forward-looking vision for the **world's forests by 2030**.
- This plan, **officially adopted** by the **UN Economic and Social Council** in **April 2017** and later by the **UN General Assembly**, comprises **six Global Forest Goals** along with **26 associated targets**.
- These targets, which are both **voluntary** and **universal**, include an **ambitious aim to expand global forest area by 3% or 120 million hectares** (more than twice the size of France) by **2030**.
- The plan aligns with the **broader 2030 Agenda**, emphasizing the need for decisive and collective action to achieve significant and sustainable change.

Paris Summit on clean cooking in Africa ends with \$2.2 billion in global pledges

Sub: Environment

Sec: Int conventions

Tag: clean cooking

About Paris Summit on clean cooking:

- **Inaugural Summit** on Clean Cooking in Africa held in **Paris** on May 14, 2024.
- **Aimed** to address the health and climate impacts of traditional cooking methods in Africa.
- Gathered over 1,000 delegates from nearly 60 countries.
- **Financial commitments:**
 - **Governments and the private sector** pledged over **\$2.2 billion** to support clean cooking initiatives in Africa.
 - **Norway** allocated **\$50 million**, the **EU** committed **\$431 million**, and the **African Development Bank** pledged **\$2 billion** over the next decade.
 - **African Development Bank** will allocate **20%** of its financing for energy to **clean cooking**.
- Governments **aim to promote effective policies** to ensure the widespread **adoption of clean cooking methods**.
- The **estimated cost to achieve universal access in Africa** is **\$4 billion annually**.

Current Situation:

- Over a **billion people in Africa** rely on **charcoal and wood** for cooking.
- **Traditional methods** pose serious health and environmental risks.
- **Clean cooking** has almost been **achieved** in **China, India** and **Latin America**, but **remains a universal failure in Africa**.
 - In **Benin, Ethiopia, Liberia, the Democratic Republic of Congo** and **Tanzania**, **more than 80 per cent** of the population still **depends on biomass** to cook their meals.
 - In **Nigeria, Kenya** or **Ghana**, it's **70 per cent**.

- Countries like **Uganda** and **Mozambique** are implementing **electric cooking devices** as examples to follow.

Health and Environmental Impact:

- **Household air pollution** causes **3.2 million deaths annually**, with **Africa disproportionately affected**.
- Over **600,000 people**, mainly **women** and **children**, die prematurely each year in **Africa** due to **respiratory diseases** from cooking practices.
- **Economic Cost:**
 - **Global health costs** are estimated at **\$1.4 trillion annually**, with over **half in Africa**.
 - **Access to clean cooking** is essential for **human dignity, fairness, and equity**, particularly for **women**.

Clean fuels and technologies:











- **Clean fuels** and technologies are those that **attain the fine particulate matter (PM2.5) and carbon monoxide (CO) levels** recommended in the **WHO global air quality guidelines (2021)**.
- **Fuel and technology combinations will be classified as clean if they achieve:**
 - either the annual average air quality guideline level (AQG, 5 µg/m³) or the Interim Target- 1 level (IT1, 35 µg/m³) for PM2.5; and
 - either the 24-hour average air quality guideline level (AQG, 4 mg/m³) or the Interim Target-1 level (IT-1, 7 mg/m³) for CO
- Examples include **biogas, LPG, electricity, ethanol, natural gas, and solar power**.

Liquefied petroleum gas (LPG):

- **Liquefied petroleum gas**, also referred to as **liquid petroleum gas (LPG or LP gas)**, is a **fuel gas** which contains a **flammable mixture** of **hydrocarbon gases**, specifically **propane, n-butane** and **isobutane**. It can sometimes contain some **propylene, butylene, and isobutene**.
- **LPG** is used as a **fuel gas** in **heating appliances, cooking equipment, and vehicles**.
- It is increasingly used as an **aerosol propellant** and a **refrigerant**, replacing **chlorofluorocarbons** to **reduce damage** to the **ozone layer**.
- When specifically used as a **vehicle fuel**, it is referred to as **autogas** or **gas**.

Biogas:

- **Biogas** is a **gaseous renewable energy source** produced from **raw materials** such as **agricultural waste, manure, municipal waste, plant material, sewage, green waste, wastewater, and food waste**.
- Biogas is produced by **anaerobic digestion** with **anaerobic organisms** or **methanogens** inside an **anaerobic digester, biodigester** or **bioreactor**.
- The gas composition is primarily **methane (CH₄)** and **carbon dioxide (CO₂)** and may have **small amounts** of **hydrogen sulfide (H₂S), moisture** and **siloxanes**.
- The methane can be combusted or oxidized with oxygen. This energy release allows **biogas** to be **used as fuel**; it can be used in **fuel cells** and for **heating purposes**, such as in **cooking**.
- It can also be used in a gas engine to convert the energy in the gas into electricity and heat.

Clean fuels/technologies	Transitional fuels/technologies	Polluting fuels/technologies
 Solar  Electric  Biogas  Liquefied petroleum gas (LPG)  Alcohol (i.e. ethanol)  Biomass stoves classified as tier 4 or 5 for PM _{2.5} emissions and tier 5 for CO emissions	 Biomass stoves classified as tier 3 for PM _{2.5} emissions and tier 3 or 4 for CO emissions	 Kerosene  Unprocessed coal  Biomass stoves meeting tier 0, 1, or 2 standards for PM _{2.5} and CO emissions

KAZA Summit 2024: Delegates renew calls to leave CITES

Sub: Environment

Sub: Int Convention

KAZA Summit 2024:

- **KAZA 2024 Heads of State Summit** held in **Livingstone, Zambia**
- Called for member states to **withdraw** from **CITES**.
- **Reason for withdrawal:** The delegates cited **CITES's refusal to permit the sale of ivory and other wildlife products** as **unreasonable**, denying the country economic benefits.

Kavango-Zambezi Trans-Frontier Conservation Area (KAZA-TFCA):

- The **Kavango-Zambezi Trans-Frontier Conservation Area (KAZA-TFCA)** spans 520,000 square kilometers.
- It includes **Angola, Botswana, Namibia, Zambia, and Zimbabwe**, sharing borders along the **Okavango and Zambezi River basins**.
- These countries, along with **South Africa**, host over **two-thirds of Africa's elephant population**, estimated at 450,000.



CITES agreement

- CITES is an international agreement between **184 governments** to ensure that **international trade in wild animals and plants does not threaten the survival of the species**.
- The convention entered into force in **1975** and **India** became the **25th party** as a state that voluntarily agreed to be bound by the Convention in **1976**.
- **All import, export and re-export** of species covered under **CITES** must be authorised through a **permit system**.
- **CITES Appendix I** lists species **threatened with extinction** — import or export permits for these are issued rarely and **only if the purpose is not primarily commercial**.
- **CITES Appendix II** includes species not necessarily threatened with extinction but in which trade must be strictly regulated.
- Every **two years**, the **Conference of the Parties (CoP)**, the supreme decision-making body of **CITES**, applies a set of biological and trade criteria to evaluate proposals from parties to decide if a species should be in Appendix I or II.

Dispute with CITES:

- The threat to leave **CITES** is not new; it was also discussed at the **19th CITES conference** in **Panama** in **2022**.
- **Southern African countries** argue that **high elephant populations** contribute to **habitat loss** and **human-wildlife conflict**.
- **Monetising wildlife resources** is seen as a **way to fund conservation efforts**, but **CITES repeatedly rejects requests to open the ivory trade**.
- In **Panama**, **10 African countries** declared a dispute with **CITES**, criticizing its shift from science-based to ideologically driven conservation models.

Tussle over ivory

- **1989-** Global ban on ivory trade, **All African elephant populations** were put in **Appendix I**
- **1997-** Namibia, Botswana, and Zimbabwe were transferred to **Appendix II**
- **2000-** South Africa was transferred to **Appendix II**
- These countries are allowed to **'one-off sale'** of ivory stockpiled from natural elephant deaths and seizures from poachers.
- **CoP17 (2016) & CoP18 (2019)**– **Namibia's proposal** for allowing a regular form of controlled trade in ivory by delisting the elephant populations of the four countries from **Appendix II**, was **rejected**.

- **CoP19 (2022)**– Zimbabwe’s proposal for the same has been rejected.

Why these countries wanted to lift the trade ban:

- The **four southern African countries** argue that their **elephant populations** have bounced back and that their **stockpiled ivory** if sold internationally, can **generate much-needed revenue** for **elephant conservation** and **incentivising communities**.
 - **Zimbabwe** highlighted the **country's 166-ton ivory stockpile**, valued at about **\$700 million**.

Alternative Markets for Trophy Hunting:

- **Zimbabwe** is seeking **new markets** for **trophy-hunting exports** due to **increasing Western bans**.
- The **European Parliament** and several Western countries, including **Belgium** and **the UK**, have **banned imports of hunting trophies** from **endangered species**.
- **Zimbabwe** is exploring markets in the **East** to continue its **trophy hunting business** and **manage wildlife populations**.

Semal trees are being wiped out in Rajasthan due to Udaipur’s Holi

Sub: Environment

Sec: Places in news

Context:

- **Holika Dahan in Udaipur:** The bonfire traditionally uses a **semal tree (silk cotton tree or Bombax ceiba L.)** as its **central pillar**. This tree is **significant** not only for its use during Holi but also for its **ecological and medicinal value**.

About Semal Tree (silk cotton tree or Bombax ceiba L.):

- Commonly known as **Cotton tree, Malabar silk-cotton tree, red silk-cotton, red cotton tree**, or ambiguously as **silk-cotton** or **kapok**.
- This **Asian tropical tree** has a straight tall trunk and its leaves are deciduous in winter. Red flowers with 5 petals appear in the spring before the new foliage.
- The **tree is widely planted** in **southeastern Asian countries** and regions (such as **Myanmar, Thailand, Vietnam, Malaysia, Philippines, Indonesia, southern China** and **Taiwan**, etc.).

Ecological Importance of Semal Tree:

- The **semal tree** supports **various wildlife species** including **rock bees**, the **golden-crowned sparrow**, and **Hanuman langurs**, among others. It is described as a **“one-tree wildlife sanctuary”**.
- Various tribal communities value the **semal** for its resources—**food, fodder, and materials for crafting instruments and utensils**.
 - Members of tribal communities consume the **tree’s reddish root for food during the monsoons**.
 - Larvae of the moth **Bucculatrix crateracma** feed on its leaves.
 - The **golden-crowned sparrow** weaves the lining of its **nests** with white **cotton from its seeds**.
 - The **Dysdercus** bugs, the **Indian crested porcupine, Hanuman langurs**, and some other **species feast on the nectar in its flowers**.



Conservation Challenges

- Annually, around **1,500-2,000 semal trees** or branches are cut and used for **Holika Dahan** festivities in **Udaipur**, despite **legal protections under various forest acts**.
- The once-common **crimson flower of the semal** is now rarely seen, signalling a **decline in its population due to extensive cutting**.
- **Tribal members** involved in **cutting semal trees** see it as an **economic opportunity**, given the **low effort and cost of harvesting wild trees** compared to **cultivated crops**.

- The **demand from urban areas**, particularly for **large Holika Dahan events**, drives the cutting of semal trees.
- Little formal documentation or research since a 2009 study.

Efforts and Initiatives for Conservation

- **Semal Conservation Mission:** Initiated in **2008** by **Dr Vartika Jain**, this group comprises various professionals **aiming to raise awareness about the semal tree's importance** and **encourage alternative practices for Holika Dahan**, like using an **iron pole** instead of a **semal tree**.
- **Government Response:** There is a perceived **lack of interest** from **local and state government bodies** in **enforcing laws to protect the semal tree**, and it is **not listed among the state's 'rare, threatened, and endangered' species**.

Denotifying Pulicat Bird Sanctuary

Subject: Environment

Sec: Protected Areas

Context:

- The **Pulicat Lake**, located across **Andhra Pradesh** and **Tamil Nadu**, faces a significant threat from **industrial expansion**.

Details:

- The **Tamil Nadu** government has initiated processes to **denotify** parts of the **Pulicat bird sanctuary**, which is a **critical habitat** for diverse **aquatic** and **avian species**.
 - The **sanctuary** was notified in **1980** under **Section 18 of the Wild Life (Protection) Act, of 1972**.
- Recent moves to **settle local claims** and the **potential reduction** of the **eco-sensitive zone** around the sanctuary have alarmed environmentalists.
- The discharge from surrounding industries has already damaged the **lake's aquatic life**, exacerbated by the introduction of invasive species like **charru mussels**, which further **threaten local marine populations**.
- The current **re-notification** under the **Wild Life (Protection) Act, 1972**, has nothing to do with the **demarcation of the ESZ**, which is to be **done** under the **Environment (Protection) Act, 1986**.



Pulicat lake:

- India's second-largest brackish water lagoon.
- Located across **Andhra Pradesh (96%)** and **Tamil Nadu (3%)**.
- The lagoon is **one of three important wetlands** that **attracts northeast monsoon rain clouds** during the **October to December season**.
- The **lagoon** comprises the following regions: **Pulicat Lake** (Andhra Pradesh and Tamil Nadu), **Marshy/Wetland Land Region** (AP), **Venadu Reserve Forest** (AP), and **Pernadu Reserve Forest** (AP).
- The **barrier island** of **Sriharikota** separates the **lagoon** from the **Bay of Bengal**.
- **Arani River** and the **Kalangi River** feed the lagoon.
- The **Buckingham Canal**, a **navigation channel**, is part of the lagoon on its **western side**.

Eco-Sensitive Zones (ESZ):

- The **National Wildlife Action Plan (2002-2016)** of the **Ministry of Environment, Forest and Climate Change (MoEFCC)** stipulated that **state governments should declare** land falling **within 10 km** of the boundaries of **national parks** and **wildlife sanctuaries** as **eco-fragile zones** or **Eco-Sensitive Zones (ESZs)** under the **Environmental (Protection) Act, 1986**.
- While the **10-km rule** is implemented as a general principle, the extent of its application can vary. **Areas beyond 10 km** can also be notified by the **Union government** as **ESZs** if they hold larger ecologically important “sensitive corridors”.

Activities in ESZs:

- **Prohibited Activities:** Commercial mining, sawmills, industries causing pollution (air, water, soil, noise etc), establishment of major hydroelectric projects (HEP), commercial use of wood.
- **Regulated Activities:** Felling of trees, the establishment of hotels and resorts, commercial use of natural water, erection of electrical cables, drastic change of agriculture system, e.g., adoption of heavy technology, pesticides etc, widening of roads.
- **Permitted Activities:** Ongoing agricultural or horticultural practices, rainwater harvesting, organic farming, use of renewable energy sources, and adoption of green technology for all activities.

Significance of ESZs:

- To **minimise the impact of urbanisation** and **other developmental activities**, the areas adjacent to protected areas have been declared as **Eco-Sensitive Zones**.
- **ESZs** help in **in-situ conservation**, which deals with the **conservation of an endangered species in its natural habitat**, for example, the conservation of the One-horned Rhino of Kaziranga National Park, Assam.
- ESZs **minimise forest depletion** and **man-animal conflict**.
- The protected areas are based on the **core and buffer model of management**, through which **local area communities** are **also protected and benefitted**.
- The purpose of declaring eco-sensitive zones around protected areas is to create some kind of a '**Shock Absorber**' for the protected area.
- They also act as a **transition zone** from **areas of high protection** to **areas involving lesser protection**.

Supreme Court orders against illegal mining in Sariska réserve

Sub: Environment

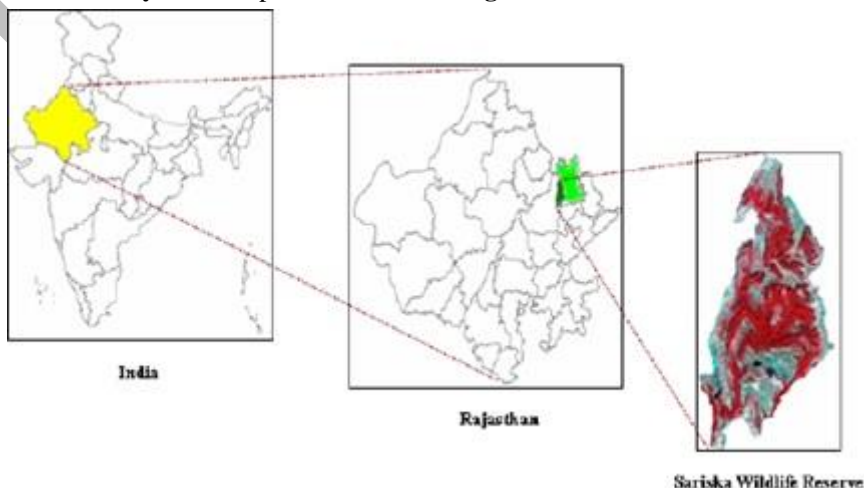
Sec: Protected Area

Context:

- The **Supreme Court of India** ordered the **closure of 68 mines** within a **1-kilometre radius** of **critical tiger habitat (CTH)** of the **Sariska tiger reserve** on May 15.

Details:

- The purpose is to stop the **illegal mining** of **marble, dolomite, and limestone** in the area, which violates the **Wildlife Protection Act, 1972** and the **Environment Protection Act, of 1986**.
- The order is viewed as an opportunity to rectify past errors and effectively demarcate **no-go zones** around **Sariska** and other affected reserves.
- Based on a "**traced map provided by the Forest Department,**" the **Jain Committee** found in **1992** that the **protected areas covered "about 800 sq km"**.
- The **Central Empowered Committee (CEC)** of the **SC** in the **2000s** submitted a damning report on mining around the **Jamua Ramgarh Sanctuary** which is part of the **Sariska tiger reserve**.



About Sariska Tiger Reserve:

- A tiger reserve in **Alwar district, Rajasthan, India.**
- It stretches over an area of 881 km² (340 sq mi) comprising **scrub-thorn arid forests, dry deciduous forests, grasslands, and rocky hills.**
- This area was a **hunting preserve** of the **Alwar state** and was declared a **wildlife sanctuary in 1958.**
- It was given the status of a **tiger reserve** making it a part of **India's Project Tiger in 1978.**
- The wildlife sanctuary was declared a **national park in 1982**, with a total area of about 273.8 km² (105.7 sq mi).
- It is the **first reserve in the world with successfully relocated tigers.**
- It is an **important biodiversity area** in the **Northern Aravalli leopard and wildlife corridor.**
- The park is a part of the **Aravalli Range** and the **Khathiar-Gir dry deciduous forests ecoregion.**
- It is **rich in mineral resources**, such as **copper.** Despite the Supreme Court's 1991 ban on mining in the area, **marble mining** continues to threaten the environment.
- **Flora:** The dominant tree in the forests is **dhok** (*Anogeissus pendula*).
 - Other trees include the **salar** (*Boswellia serrata*), **kadaya** (*Sterculia urens*), **dhak** (*Butea monosperma*), **gol** (*Lannea coromandelica*), **ber** (*Ziziphus mauritiana*) and **khair** (*Acacia catechu*).
- **Fauna:** Apart from the **Bengal tiger**, the reserve harbours many wildlife species including sloth bear, Indian leopard, jungle cat, caracal, striped hyena, golden jackal, chital, sambar deer, nilgai, wild boar, small Indian civet, Javan mongoose, ruddy mongoose, honey badger, Rhesus macaque and Northern plains grey langur and Indian hare.
 - **Bird species** present include grey francolin, white-throated kingfisher, Indian peafowl, bush quail, sandgrouse, treepie, golden-backed woodpecker, crested serpent eagle and the Indian eagle-owl.
- In **2008**, two tigers from **Ranthambhore National Park** were **relocated** to **Sariska Tiger Reserve.**

Jamua Ramgarh Sanctuary:

- In Ramgarh, a subdivision of Jaipur, Rajasthan.
- Located near the Ramgarh artificial lake.
- Banganaga River, which originates from the hills of Bairath, passes through the sanctuary.
- The **Ramgarh Lake** hosted a rowing event during the **1982 Asian Games.**

Critical Tiger habitat

- These are **core areas** of tiger reserves and are identified under the **Wild Life Protection Act (WLPA), 1972** based on scientific evidence.
- Such areas are required to be kept as inviolate for the purpose of tiger conservation, **without affecting the rights of the Scheduled Tribes or such other forest dwellers.**
- The **notification of CTH** is done by the **state government** in consultation with the **expert committee** constituted for the purpose.

New study reveals extent of microplastic pollution in Ashtamudi Lake

Sub: Environment

Sec: Protected area

Tag: Ashtamudi Lake

Study on Microplastic Pollution in Ashtamudi Lake

- **Study Title:** "Microplastic contamination in Ashtamudi Lake, India: Insights from a Ramsar wetland"
- **Conducted by:** Department of Aquatic Biology and Fisheries, University of Kerala
- **Supported by:** Ecomarine Project, Erasmus Programme of the European Union

Key Findings

- **Extent of Contamination:**
 - **Microplastics** are found in **fish, shellfish, sediment, and water of Ashtamudi Lake.**
 - **Fish** accounted for **19.6%** and **shellfish** for **40.9%** of the microplastics in macrofauna.
 - **Types of microplastics:** **Fibers** (35.6%), **fragments** (33.3%), and **films** (28%).
 - The majority of particles were **small**, indicating **high bioavailability to aquatic organisms.**
- **Composition and Risks:**
 - **Microplastics** contain **polymers** such as **nylon, polyurethane, polypropylene, polyethylene, and polysiloxane.**
 - **Detected heavy metals** included **molybdenum, iron, and barium.**

- The presence of these substances poses risks to both aquatic life and human health.

- **Sources of Pollution**

- **Untreated Waste:** Municipal solid waste and plastic debris entering the lake.
- **Domestic Waste:** Discharges from nearby residences and resorts.
- **Solid Waste Management:** Inadequate handling of plastic waste in surrounding watershed areas.
- **Fishing Equipment:** Nets, cages, and monofilaments contribute significantly to nylon fibre pollution.

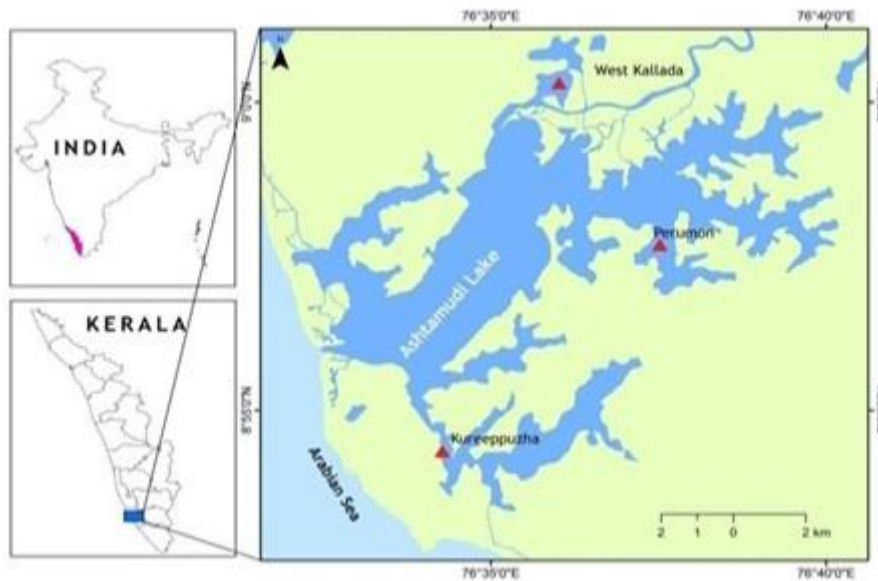
Significance and Recommendations

- **Urgent Actions Needed:**

- Continuous monitoring of microplastics in lake water.
- Development of strategies to reduce microplastic pollution.
- Address potential public health concerns due to contaminated fish and shellfish consumption.

About Ashtamudi Lake:

- **Location:** Kollam District, Kerala.
- It possesses a **unique wetland ecosystem** and a **large palm-shaped** (also described as **octopus-shaped**) **water body**, second only in size to the **Vembanad estuary** ecosystem of the state.
- Ashtamudi means '**eight hills or peaks** ' in the local Malayalam language. The name is indicative of the **lake's topography** with its multiple branches.
- The lake is also called the **gateway to the backwaters of Kerala** and is well known for its houseboat and backwater resorts.
- **Ramsar Status:** Designated in **2002** due to its **hydrological functions, biodiversity, and support for fish.**
- **Eight arms of Ashtamudi estuary:** Thevally Kayal, Kadapuzha Kayal, Kandachira Kayal, Kanjirottu Kayal, Kumbalathu Kayal, Kuripuzha Kayal, Perumon Kayal, Thekkumbhagum Kayal.
- **Kallada River** is a major river discharging into the **Ashtamudi Lake.**



About Microplastics:

- **Microplastics** are **tiny bits** of various types of **plastic** found in the environment.
- They are a result of the **fragmentation and degradation of larger plastic items**, as well as the **direct release of tiny plastic particles**, often intentionally added to consumer products like cosmetics and cleaning agents.
- The name is used to differentiate them from “**macroplastics**” such as bottles and bags made of plastic.
- There is **no universal agreement on the size** that fits this bill — the U.S. NOAA (National Oceanic and Atmospheric Administration) and the European Chemical Agency define microplastic as **less than 5mm in length.**
- **Environmental Impact:**
 - Microplastics are **not biodegradable.**
 - Thus, once in the environment, **primary and secondary microplastics accumulate and persist.**
 - They can be **ingested by marine organisms**, leading to potential harm to aquatic life and bioaccumulation along the food chain.

- They can also carry **toxic chemicals** and **pollutants**, posing additional risks to organisms and ecosystems.

Rhinos, elephants, pangolins, cedars, rosewoods & agarwood most affected by illegal wildlife trade: UNODC

Sub: Environment

Section: Species in news

Context:

- The **2024 World Wildlife Crime Report** by the **United Nations Office on Drugs and Crime** offers a comprehensive analysis of the **illegal wildlife trade from 2015 to 2021**.

World Wildlife Crime Report:

- It is the **3rd edition (2024)** of the **report** and earlier editions were published in **2016** and **2020**.
- It probes **trends in the illicit trafficking of protected wildlife species**.
- It also presents **systematic analyses of wildlife crime harms and impacts**, probes the factors driving wildlife trafficking trends, and takes stock of current knowledge about the effectiveness of the different types of intervention being pursued to resolve this problem.

Major Findings on Species Impacted:

- **Key Species:** The **rhino** and the **cedar** were the **most affected species**, with **rhino horns** and **cedar trees** being heavily targeted by traffickers.

Animal Products	Plant products
<p>Rhino Horn: Represented the largest market share at 29%.</p> <p>Pangolin Scales: Close second at 28%.</p> <p>Elephant Ivory: Accounted for 15% of the market.</p> <p>Additional species impacted include eels (5%), crocodilians (5%), parrots and cockatoos (2%), carnivores (2%), turtles and tortoises (2%), snakes (2%), and seahorses (2%).</p> <p>Animal-derived medicines: Made up 10% of all seizures.</p>	<p>Cedars and Other Sapindales: Dominated the plant market at 47%.</p> <p>Rosewoods: Second largest at 35%.</p> <p>Agarwood and Other Myrtales: Included species like ramin and eucalyptus at 13%.</p> <p>Other Notables: Golden chicken ferns and orchids each comprised 1% of the market.</p> <p>Corals: Comprised the highest proportion of seizures at 16%</p>

Challenges and Adaptability of Traffickers:

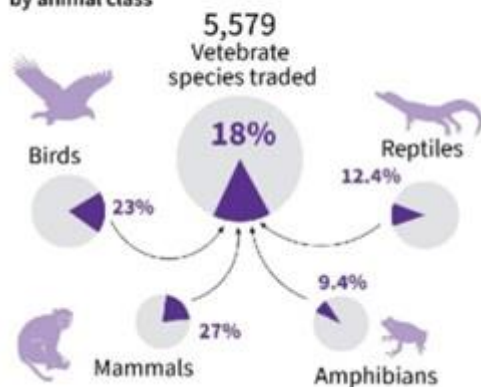
- Traffickers increasingly use **technology** to reach **global markets**, complicating enforcement efforts.
- **Corruption** acts as a significant barrier to effective regulation and law enforcement.

Trade in Wildlife:

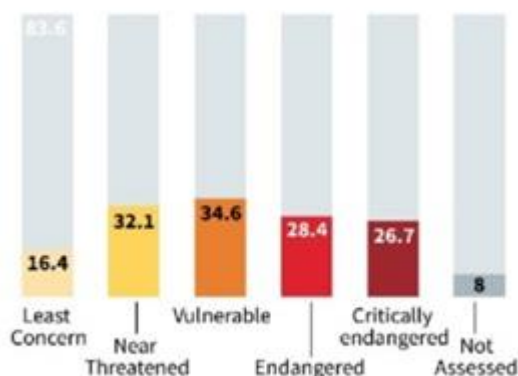
- **Illegal wildlife trade** encompasses **unlawful actions** related to the **capturing, gathering, transportation, and commerce of wildlife and their commodities**.
 - This includes **live animals, various animal components, and derivatives**.
- In **India**, the **trade** involving more than **1,800 species of wild animals, plants, and their derivatives** is **forbidden** as per the **Wildlife (Protection) Act of 1972**.

Trade in wildlife

Percentage of total vertebrates species trade by animal class



% of threatened* vertebrates species traded by status



United Nations Office on Drugs and Crime (UNODC):

- Headquarters: **Vienna, Austria**

- Established in **1997** through a **merger** between the **United Nations Drug Control Programme** and the **Centre for International Crime Prevention**.
- It is a **global leader in the fight against illicit drugs and international crime**, in addition to being responsible for implementing the United Nations lead programme on terrorism.
- **Funding:** It relies on voluntary contributions, mainly from governments, to carry out the majority of our work.
- **Functions:**
 - It works to educate people throughout the world about the dangers of drug abuse.
 - Strengthen international action against illicit drug production and trafficking and drug-related crime.
 - It also works to improve crime prevention and assist with criminal justice reform to strengthen the rule of law, promote stable and viable criminal justice systems and combat the growing threats of transnational organized crime and corruption.
 - In 2002, the UN General Assembly approved an expanded programme of activities for the Terrorism Prevention Branch of UNODC. The activities focus on assisting States, on request, in ratifying and implementing the eighteen universal legal instruments against terrorism.

Three-day synchronised elephant census in southern states from May 23

Sub: Environment

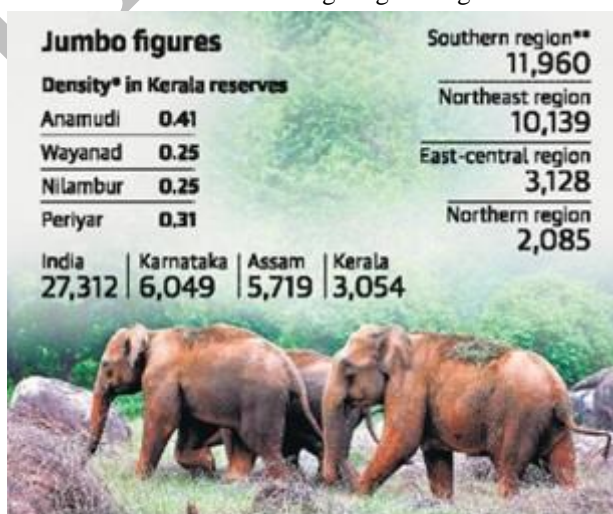
Sec: Species in news

Context:

- An **elephant census** in the **border areas** of **Karnataka, Tamil Nadu, Kerala, Telangana, and Andhra Pradesh** will be held from May 23 to 25.
- While the **elephant census** is usually held for an **entire forest patch** once **every five years**, this time it will be held only in the border areas of the southern states.

Details of this census:

- **Objective:** Understand elephant population, and conflict areas, and develop better policies for coordination and future planning.
- **Geographical Focus:** Border areas of Karnataka, Tamil Nadu, Kerala, Telangana, and Andhra Pradesh.
- **Census Methodology:** Block count method, Transect method, Waterhole count.
- **Tracking:** Radio-collared elephants (wild ones only) will be tracked and assessed.
- **Included Regions:**
 - **Kolar, Bannerghatta National Park, Cauvery Wildlife Sanctuary, MM (Malai Mahadeshwara) Hills (bordering Tamil Nadu), Bandipur Tiger Reserve (bordering Tamil Nadu and Kerala), Nagarahole Tiger Reserve (bordering Kerala), All three divisions of Kodagu.**
- **Excluded Regions:**
 - Other forest divisions in Karnataka not bordering neighboring states.



*ELEPHANTS PER SQ KM

**SOUTHERN REGION INCLUDES KERALA, ANDAMAN AND NICOBAR, KARNATAKA, TAMIL NADU, MAHARASHTRA, ANDHRA PRADESH

Background and Significance

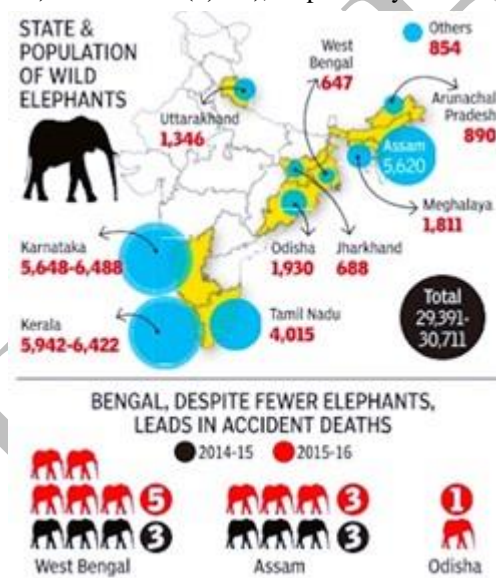
- The census follows the **first interstate coordination committee** meeting in March 2024 at **Bandipur Tiger Reserve, Karnataka**.
- The meeting was prompted by an incident where a **radio-collared tusksless male elephant** (makhana) killed a man in **Wayanad, Kerala**.
- **Outcome:** Creation of the **Interstate Coordination Committee Charter 2024** to enhance collaboration on **human-animal conflict mitigation**.
- **Signatories:** **Chief wildlife wardens** and heads of forest departments from **Karnataka, Kerala, and Tamil Nadu**.

Previous Census Data

- Earlier **Karnataka** led the **southern states' elephant estimation** in **2022-23**.
- **Findings:** **Karnataka** had **6,395 elephants**, an **increase of 346** since **2017**, as reported in "**Asian Elephant (Elephas maximus) Population Size and Structure Estimates for Karnataka-Interim Report, August 2023.**"

Status of Elephants in India:

- **India** has the **largest** and the **most stable population** of **Asian elephants**.
- **India** is home to **more than 60%** of all wild **Asian elephants**.
- The number of **29,964 elephants** were registered in the most recent elephant census, which was conducted in **2017**.
 - **31 elephant reserves** exist in India. **Dandeli Elephant Reserve** of **Karnataka**, **Singphan Elephant Reserve** of **Nagaland**, and **Lemru Elephant Reserve** of **Chattishgarh** have been established in the past three years by respective states.
 - As a result, there is now **around 76,508 sq km of elephant reserves** spread throughout **14 states** in India.
 - As per the **Elephant Census** conducted in 2017, **Karnataka** has the **highest number of elephants (6,049)**, followed by **Assam (5,719)** and **Kerala (3,054)**, respectively.



About Asian Elephants:

- **Three subspecies** of **Asian elephants** are found which are the **Indian, Sumatran, and Sri Lankan**.
- The **largest terrestrial mammal** on the **Asian continent** is the **Asian elephant**. They live in **grasslands and forests** ranging from dry to wet in **13 range countries** across **South and Southeast Asia**.
- **Elephant herd sizes** in **Asia** are far **smaller** than those of **African savannah elephants**.
- The **largest** and **oldest female elephant** herd member is in **charge** (known as the **matriarch**) of the herd.
- **Elephants' gestation (pregnancy) period**, which can last up to **680 days (22 months)**, is the **longest known gestational period** among any mammals.
- **Females** between the ages of **14 and 45** may give birth to calves **every four years** on average, increasing to **five years** by **age 52** and **six years** by **age 60**.
- Elephants have always been closely associated with humans throughout Asia, where they have evolved into significant cultural symbols.
- **Protection Status of Asian Elephants**
 - **IUCN Red List:** Endangered.
 - **Wildlife (Protection) Act, 1972:** Schedule I.

- **CITES:** Appendix I

Source: [IE](#)

With food scarce, lion-tailed macaques come down forest canopies, enter the urban jungle

Sub: Environment

Sec: Species in news

Context:

- Lion-tailed macaques were seen in urban areas of **Valparai town** in **Coimbatore district, Tamil Nadu** searching for food waste.
- Their **natural habitat, Puthuthottam**, is about four kilometres away.
- The **Valparai plateau**, with its **tea and coffee estates** and forest patches within the **Anamalai Tiger Reserve**, hosts **one of the 40 populations of lion-tailed macaques** in the **Western Ghats**.



About lion-tailed Macaque (*Macaca silenus*):

- Also known as the **wanderoo**.
- They are **arboreal primates native to the Western Ghats**.
- They are rainforest dwellers, often being found in the upper canopy of tropical moist evergreen forests or monsoon forests.
- Important for **seed dispersal**.
- **Gestation** lasts approximately **six months**.
- Around **2,500 mature individuals** are spread across the **Western Ghats** between the **Kalakkad Hills** in the **south** and **Sirsi-Honnava** in the **north**.
- **Threat: Habitat fragmentation** due to large amounts of timber harvesting and exotic plantations.
- **Protection measures:**
 - IUCN Red List: **Endangered**
 - **Wildlife (Protection) Act, 1972- Schedule I**

Bonnet macaques (*Macaca radiata*):

- The bonnet macaque, also known as **zati**, is a **species of macaque endemic to southern India**.
- Its distribution is **limited** by the **Indian Ocean** on **three sides** and the **Godavari and Tapti Rivers**, along with its related competitor the **rhesus macaque** in the **north**.
- **Land use changes** in the last few decades have resulted in **changes in its distribution boundaries** with the **rhesus macaque**, raising concern for its status in the wild.
- They are **diurnal, arboreal, and terrestrial**.
- They feed on **fruits, nuts, seeds, flowers, invertebrates, and cereals**.
- In southern India, this macaque exists as **commensal to humans**, feeding on food given by humans and raiding crops and houses.



The baobab's journey from Madagascar to Africa and Australia

Sub: Environment

Sec: Species in news

Context:

- The origins and history of the **baobab tree** have been clarified through a **new genomic study**.

Details of the study:

- The **baobab lineage** began in **Madagascar** around **21 million years ago** and spread to **Africa** and **Australia** within the past **12 million years**.
- **Two baobab lineages** went **extinct in Madagascar** but established themselves in **Africa** and **Australia**.
- **Baobab seed pods** likely floated from **Madagascar to Africa and Australia** via **ocean currents** and **Indian Ocean gyres**.

About the Baobab tree:

- **Adansonia** is a genus made up of **eight species** of **medium-to-large deciduous trees** known as **baobabs**.
- They are placed in the **Malvaceae family**, subfamily **Bombacoideae**.
- They are **native to Madagascar, mainland Africa, and Australia**.
- The trees have also been introduced to other regions such as **Asia**.
- The **baobab tree** has a unique appearance, especially when **leafless**, resembling upside-down roots.
- **Baobabs** provide **food, shelter, and nesting sites** for **wildlife** in **dry savannahs** and produce **nutrient-rich fruits** and edible leaves for people.
- The **trees** have **large, fragrant flowers** attracting **nocturnal pollinators and primates** like **lemurs** and **bush babies**.
- **Baobabs** can grow very large and live for thousands of years, with extensive root systems that help prevent soil erosion and aid in nutrient recycling.



Environmental significance of Baobab tree:

- Baobab trees are crucial to the **dry African savanna ecosystem**, maintaining **soil humidity**, **aiding nutrient recycling**, and **preventing soil erosion** with their **extensive root systems**.
- Their **large whitish flowers** **open at night** and **fall within 24 hours**.
- As **succulents**, baobabs **store water in their trunks** during the rainy season, producing **nutrient-dense fruit** in the dry season, containing **tartaric acid** and **Vitamin C**, vital for many species.
- Baobabs provide **water** and **shelter** for various animals, including birds, lizards, monkeys, and elephants, which consume the bark for moisture. **Bats pollinate** the flowers by feeding on their **nectar**.
- The African baobab is notable for its **size, lifespan, fruit, bark, and unique growth of multiple fused stems** with **regenerating bark** in the spaces between them, known as **false cavities**.

The controversy over eucalyptus planting in Kerala

Sub: Environment

Sec: Species in news

Tag: eucalyptus

Context:

- The **Kerala** government **allowed** the **Kerala Forest Development Corporation (KFDC)** to **plant eucalyptus trees** for **financial reasons** in **2024-2025**.
- Environmentalists protested, citing **potential adverse effects** on **forests** and **increased human-animal conflicts**.
- The **head of the Forest Force** clarified that **planting eucalyptus inside forests** was **not permitted**.
- On May 20, the government **revised** the order to **limit the cutting of exotic tree species only to KFDC-controlled lands**.
- The government's **revised order** and **eco-restoration efforts** aim to **align forestry practices** with **ecological** and **environmental sustainability goals**.

About KFDC and Its Plantations:

- **Establishment:** January 24, 1975.
- **The area under KDFC:** Approximately **7,000 hectares** of plantations.
- **Species:** Includes *Eucalyptus grandis*, *Acacia auriculiformis*, *Acacia mangium*, *Acacia crassiparva*, *Acacia pycnantha* (also known as **wattle**), *Alnus nepalensis*, *Casuarina equisetifolia*, and *Pinus patula*.
- **Rotation Ages of these species:** *Eucalyptus* (9 years), *Acacia auriculiformis* (18 years), *Acacia mangium* (7 years).
- At the **end of each cycle**, **plantations** approved by the **Union Ministry of Environment, Forests and Climate Change** are **felled** and **replanted** with species from a **management plan**.
- Experts assess **soil quality** and consult with the **Kerala Forest Research Institute**. **Exotic species plantations** are being **converted to indigenous species** for **ecological benefits**.

Issue with the Order:

- **2021 Eco-restoration Policy:** Aimed to address **invasive species** and **natural forest depletion**, which **increased human-wildlife conflict**. It suggested replacing exotic plants with native species to support wildlife.
- **Chinnakanal Example:** A study indicated that **replacing eucalyptus with native species** could **provide food for wild elephants**, **reducing human-animal conflicts**.
- **Policy Conflict:** Environmental activists argued that the order to plant eucalyptus contradicted the **eco-restoration policy**, which prioritized **eradicating invasive species** and **restoring natural habitats**.

What is Ecological Restoration?

- The **UN** define **ecosystem restoration** as “the process of halting and reversing degradation, resulting in improved ecosystem services and recovered biodiversity”.
- In practice, a **particular restoration can involve quite different transitions**, depending on what best suits the local conditions.

Eco-restoration Efforts:

- **Goal:** Phase out industrial plantations of **eucalyptus, acacia, wattle, and pine** by **2024**, replacing them with natural forests.
- **Examples:**
 - **Marayoor Sandal Division, Idukki (2019):** **Removal of exotic species** on 108 hectares led to the **restoration of active water streams after 30 years**, supported by **UNDP, NABARD, and CAMPA**.

About the Eucalyptus tree:

- Eucalyptus is an **efficient biomass producer**, which can produce more biomass than any other tree species.
- It is widely adopted by international wood companies and has become the **'Green Gold'** of the pulp industry.
- It **consumes less water per unit biomass produced** than many other species of trees but due to the result of its fast growth and high biomass production, **Eucalyptus species consume more water than other, less productive species**.
- **Growing Eucalyptus in low rainfall areas** becomes the reason for **adverse environmental impacts** due to **competition for water** with other species and hence it **increases the incidence of allelopathy**. Generally, the areas which receive an annual rainfall of less than about 400 mm are **not ideal for Eucalyptus wood production** purposes due to this reason.
- The eucalyptus tree is one of the champions of biomass production. These trees lend themselves particularly well to genetic environment and biotechnologies, and so to farming intensification.
- However, **eucalyptus reduces the water table significantly** in the area where it grows apart from that it **reduces the fertility of the soil nearby**. Hence it is considered an **ecological disaster**.



Plastic treaty talks conclude in Ottawa with little progress

Subject: Environment

Sec: Pollution

Tag: Plastic treaty

Context:

- The **fourth round** of the **Intergovernmental Negotiating Committee (INC-4)** to negotiate a **Global Plastics Treaty** concluded in **Ottawa, Canada**, with **192 member countries** deliberating on a **legally binding agreement to end plastic pollution**.

Details:

- The next meeting, expected to be the final one, is scheduled for **November 2024** in **Busan, South Korea**.
- Despite high expectations, the talks **failed** to establish a timeline for halting primary plastic production.
- The discussions **aimed** to address the challenges posed by the **widespread use of plastics** linked to **oil economies, extensive manufacturing sectors, and the absence of affordable alternatives**.
- The negotiations highlighted the **difficulties in curbing the production of plastics**, which are **major pollutants in marine and terrestrial ecosystems** due to their **non-biodegradable nature**.

India's Position:

- India's stance in the negotiations was to **oppose restrictions on producing primary or virgin plastic polymers**, arguing that **production reductions** were **beyond the scope of the United Nations Environment Assembly (UNEA) resolutions**.
- **Indian** delegates emphasized the **need for decisions on chemical usage in plastics to be based on scientific evidence and conducted through a transparent and inclusive process**.
- In **2022**, **India** implemented the **Plastic Waste Management Amendment Rules**, which **banned 19 categories of single-use plastics**, though enforcement remains uneven across the country.

Instances of other nations:

- Many **plastic and petrochemical-producing countries** including **Saudi Arabia, Iran and China**- known collectively as the **group of Like-Minded Countries**- have **opposed mentioning production limits**.
- Meanwhile, the **60-nation "High-Ambition Coalition"**, which includes **EU countries, island nations, Japan and the UAE**, wants to **end plastic pollution by 2040**.
 - Backed by some environment groups, this coalition has called for **common, legally binding provisions to "restrain and reduce the production and consumption of primary plastic polymers to sustainable levels."**
 - They also are proposing measures such as **phasing out "problematic" single-use plastics and banning certain chemical additives** that could carry health risks.
- The **U.S.** wants to **end plastic pollution by 2040**. But unlike the **High-Ambition Coalition**, it wants **countries to set their plans** and send updates regularly to the **United Nations**.

Considerations in the New Global Plastics Pollution Treaty:

- Focus on elements like **global objectives to tackle marine and other types of environmental pollution** and their impact, and worldwide obligations and measures throughout the **lifecycle of plastics**, right from product design to waste management.
- **Mechanisms for providing scientific information relevant to the policies of the resolution**, and for helping with **financial support** for its implementation.
- The treaty might require the **testing of certain chemicals present in plastics** to ensure safety and environmental protection.
- **Identifies the importance of indigenous communities and their age-old practices** to keep the **environments pollution-free** and calls for the knowledge of these communities to be taken into account by the INC.
- **National action plans and national and international cooperative measures** towards achieving the goal of eliminating plastic pollution.
- **Progress assessment** for member states.

Intergovernmental Negotiating Committee (INC):

- **Established by the United Nations Environment Programme (UNEP) in 2022 to develop an international legally binding agreement on plastic pollution.**
- Its **mandate** is to develop an instrument that addresses the **entire life cycle of plastic**, including in the **marine environment**, and could **include both voluntary and binding approaches**.
- The **INC-1** started in **November 2022 in Punta del Este, Uruguay**. The **INC-2** occurred in **May-June 2023 in Paris, France**. The **INC-3** convened in **Nairobi, Kenya in December 2023**.

Plastic pollution:

- While **plastic waste** has become a **global menace** polluting landscapes and waterways, **producing plastics involves releasing greenhouse gas emissions**.
- The **plastic industry** now accounts for **5% of global carbon emissions**, which could **grow to 20% by 2050** if current trends continue.
- **Plastic production** is on track to **triple by 2060** — unless the treaty sets production limits, as some have proposed.
- **Most virgin plastic is derived from petroleum**.

India's effort to reduce plastic pollution:

- Plastic Waste Management (Amendment) Rules, 2024
- The Plastics Manufacture and Usage (Amendment) Rules (2003).
- UNDP India's Plastic Waste Management Program (2018-2024).
- Prakrit initiative.
- EPR Portal by Central Pollution Control Board (CPCB).
- India Plastics Pact
- Project REPLAN
- Swachh Bharat Mission

Delhi's mounting waste crisis

Sub: Environment

Sec: Pollution

Tag: Solid Waste Management (SWM)

Supreme Court observation:

- Recent criticism of **solid waste management (SWM) in New Delhi** by the **Supreme Court**, highlighted that over **3,800 tonnes** of **untreated solid waste** in the **national capital**, posing threats to **public health** and the **environment**.

Delhi's solid waste management (SWM) Status:

- The city's **population** is expected to **rise to 2.85 crore by 2031**, so **waste generation** could go up to **17,000 TPD**.
- **Waste composition: 50-55%** biodegradable wet waste, **35%** non-biodegradable wet waste, and **10%** inert waste.
- **Three municipal corporations**, the Municipal Corporation of Delhi (MCD), the Delhi Cantonment Board, and the New Delhi Municipal Corporation, collect about **90%** of the waste.

Processing Capacity:

- **New Delhi** has **waste-processing facilities** at **Okhla, Bhalswa, Narela, Bawana, Tehkhand, SMA Industrial Area, Nilothi, and Ghazipur**.
- **Design capacity:** Approximately **9,200 TPD**.
- **Actual disposal:** **3,800 TPD** of unprocessed waste in landfills.

- **Challenges:** Landfill issues, methane gas generation, leachates, legacy wastes and landfill fires.

MCD's Challenges:

- Lack of waste segregation at source.
- Need for large land parcels for waste processing plants.
- Public awareness and improper disposal habits.
- Irregular waste collection services.
- Illegal dumping and lack of coordination among stakeholders.

Efforts Needed for Waste Separation:

- Scaling up processing capacity to manage increasing waste.
- Waste management plan for expected population growth.
- **Biodegradable wet waste:** composting or biogas generation.
- **Non-biodegradable dry waste:** recycling or **RDF for waste-to-energy projects.**
 - The **non-recyclable dry waste fraction** is called **refuse-derived fuel (RDF)** and consists of **plastics, paper, and textile waste.**
 - This material has **good calorific value** and can be used to **generate power in waste-to-energy projects.**
- Focus on scientific waste management and environmental mitigation.

Decentralization Possibilities:

- Challenges with **land availability.**
- Need for partnerships with neighbouring states.
- Examples of **decentralised waste management in other cities** (Micro-Composting Centres in **Tamil Nadu** and **Kerala** and dry Waste Collection Centres in **Bengaluru**).
- Integration of decentralised options with large processing facilities for comprehensive waste management.

Recommendations:

- Ensure existing processing facilities operate at full capacity.
- Construct new facilities to prevent untreated waste.
- Learn from best practices domestically and internationally for efficient SWM processing.

Waste Management Policy in India:

- **Until 2000**, we didn't even have any law concentrating on how to deal with **MSW.**
- **Municipal Solid Wastes (Management and Handling) Rules, 2000:**
 - The **2000 rules** were applicable to "every municipal authority responsible for the collection, segregation, storage, transportation, processing, and disposal of municipal solid wastes".

Solid Waste Management Rules, 2016:

- The Government has revamped the **Municipal Solid Wastes (Management and Handling) Rules 2000** and notified the new **Solid Waste Management Rules, 2016.**
- They are a set of comprehensive guidelines established by the Ministry of Environment, Forest and Climate Change.
- **Key features:**
 - Households must separate waste into **three categories:** Organic/Biodegradable waste, Dry waste, and Domestic Hazardous waste.
 - The **informal sector**, including waste pickers and **rag pickers**, is now included in the **waste management process.** This helps streamline operations and provides better income opportunities for these workers.
 - Manufacturers that use **non-biodegradable packaging** must have a system in place to collect that waste.
 - **Local governments** can **charge a fee to bulk waste generators** for collecting and processing their waste. People who burn garbage or throw it in public places can be fined.
 - **Non-recyclable waste** with a **high calorific value** cannot be put in **landfills.** Instead, it should be used for generating energy or co-processing in cement or thermal power plants.
 - The **Rules** for the **first time** prescribe the **duty of MSW generators.**
 - A **Central Monitoring Committee** is to be constituted to monitor the implementation. **Criteria for landfilling and waste-to-energy plants** are also provided.
 - The **Central Pollution Control Board** will have to coordinate with the **State Pollution Control Board**, **review environmental standards, monitor implementation,** publish guidelines and prepare an annual report on implementation.

Techniques of Solid Waste Management:

Techniques	Description
Incineration method	<ul style="list-style-type: none"> This involves burning waste at high temperatures The incineration method is suitable for combustible refuse. High operation costs and construction are involved in this procedure. This method would be suited in crowded cities where sites for landfilling are not available. It can be used to reduce the volume of solid wastes for landfilling.
Composting process	<ul style="list-style-type: none"> The composting process is similar to sanitary landfilling and it is popular in developing countries. Decomposable organic matter is separated and composted in this procedure. Yields are stable end products and good soil conditioners. They can be used as a base for fertilizers. Two methods have been used in this process: <ol style="list-style-type: none"> Open Window Composting Mechanical Composting
Fermentation/biological digestion	<ul style="list-style-type: none"> Biodegradable wastes are converted to compost and recycling can be done whenever possible. Hazardous wastes can be disposed of using suitable methods.
Waste-to-Energy Conversion	<ul style="list-style-type: none"> This involves the use of waste as a fuel source to generate electricity or heat
Recycling	<ul style="list-style-type: none"> This involves recovering materials such as paper, plastics, and metals from the waste stream for reuse in new products.
Micro-Composting	<ul style="list-style-type: none"> Microcomposting ensures that the collected uncooked waste is decomposed scientifically and naturally to produce rich manure called compost. It is a natural biological process that can help in breaking the organic waste down into compost.
Dry Waste Collection	<ul style="list-style-type: none"> The dry waste from domestic generators (other than bulk waste generators) is collected and it is separated into recyclable and non-recyclable non-biodegradable waste.
Biomining	<ul style="list-style-type: none"> Biomining is the process of using microorganisms (microbes) to extract metals of economic interest from rock ores or mine waste. Biomining techniques may also be used to clean up sites that have been polluted with metals. It is usually used for old dumped waste that remains in a partly or fully decomposed state with no segregation in existence between wet and dry waste. This biological decomposition of the waste decreases the volume of the waste by 40%.

Legacy waste:

- Legacy wastes** are the wastes that have been collected and kept for years at some barren land or a place dedicated to Landfill (an area to dump solid waste).
- This waste can be roughly grouped into four categories:**
 - Contained and/or stored waste (contained or stored waste are wastes in tanks, canisters, and stainless steel bins).
 - Buried waste.
 - Contaminated soil and groundwater
 - Contaminated building materials and structures.

Geography

Heatwaves in several parts of India: Why has April been hotter than usual?

Subject: Geography

Sec: Climatology

Tags: Anticyclone, Heat waves

Context:

- In the first 26 days of the month of April, either a small pocket or a considerably large geographical area in India experienced heatwave conditions, according to the **India Meteorological Department (IMD)**.

More on news:

- While the **southern peninsular and the southeastern coast areas** have been the worst affected, the northern plains are yet to experience heatwave conditions this season.

About Heat Waves:

- A Heat Wave is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the summer season in the North-Western parts of India.
- Heat Waves typically occur between March and June, and in some rare cases even extend till July.
- The extreme temperatures and resultant atmospheric conditions adversely affect people living in these regions as they cause physiological stress, sometimes resulting in death.

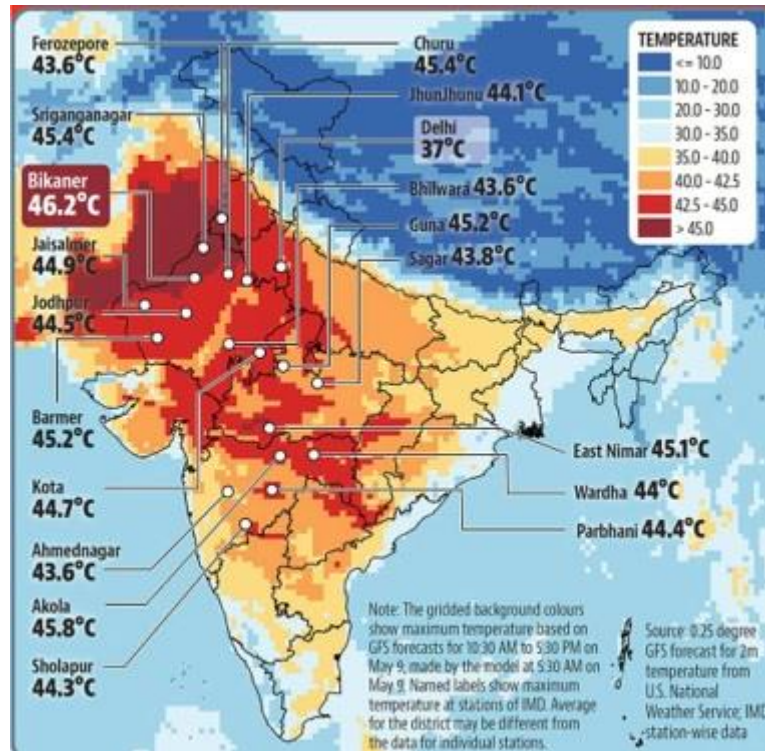
The Indian Meteorological Department (IMD) has given the following criteria for Heat Waves :

- Heat waves need not be considered till the maximum temperature of a station reaches **at least 40°C for Plains, 37°C for coastal areas and 30°C for hilly regions**.
- When the **normal maximum temperature of a station is less than or equal to 40°C**:
 - Heat Wave**: Departure from normal is 5°C to 6°C
 - Severe Heat Wave**: Departure from normal is 7°C or more.
- When the **normal maximum temperature of a station is more than 40°C**:
 - Heat Wave**: Departure from normal is 4°C to 5°C
 - Severe Heat Wave**: Departure from normal is 6°C or more.
- When actual maximum **temperature remains 45°C or more irrespective of normal maximum temperature, heat waves should be declared.**

Heat wave Scenario		40°C	30°C
Maximum Temperature		Plains	Hills
Heat wave conditions prevail when...		Severe heat wave conditions prevail when...	
Normal maximum temperature	Deviation from normal	Normal maximum temperature	Deviation from normal
Above		Above	
40°C	4-5°C or more	40°C	6°C or more
At or below		At or below	
40°C	5-6°C or more	40°C	7°C or more

Which areas in India are prone to heatwaves?

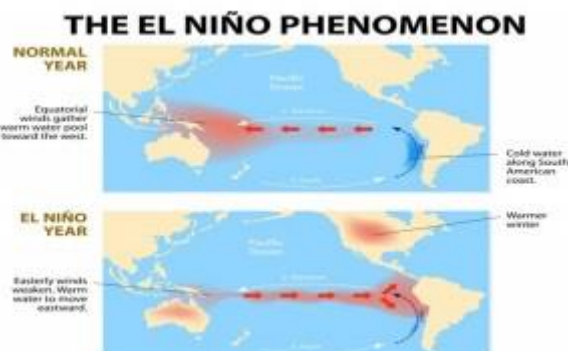
- The **Core Heatwave Zone (CHZ)** spanning central, north, and peninsular India between Gujarat and West Bengal is prone to heatwave conditions every year.
- Rajasthan, Punjab, Haryana, Chandigarh, Delhi, West Madhya Pradesh, Uttar Pradesh, Chhattisgarh, Odisha, Vidarbha in Maharashtra, parts of Gangetic West Bengal, coastal Andhra Pradesh, and Telangana are the most heat-wave-prone states or regions.



Why has April been so hot?

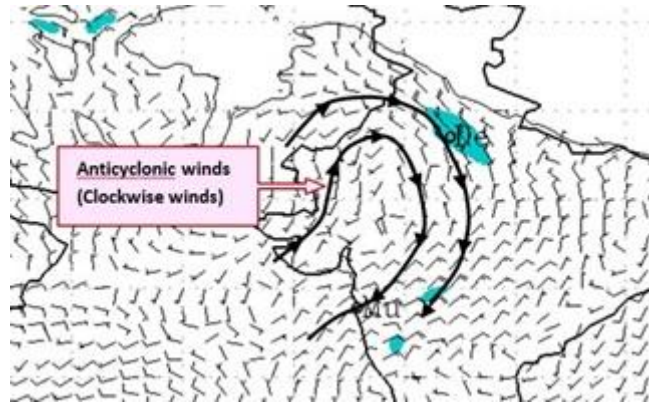
El Nino:

- 2024 is a year that began in an El Niño state.
- **El Niño, a weather pattern, refers to an abnormal warming of surface waters in the equatorial Pacific Ocean, which leads to extreme heat in many parts of the world and the ocean.**
- It is the **large-scale ocean-atmosphere climate interaction linked to periodic warming in sea surface temperatures across the central and east-central Equatorial Pacific.**
- It is associated with **high pressure in the western Pacific.**
- El Nino adversely impacts the Indian monsoons and hence, agriculture in India.
- It developed in June 2023 and generally, the years which begin in an El Niño state, experience extreme temperatures, harsh, multiple and extended heatwave spells, and lack of pre-monsoon rainfall.



Anticyclonic conditions:

- The **persistent presence of anticyclone systems over southern peninsular and southeastern coastal areas is also partly responsible for such a hot April.**
- An **anticyclone is an area of high pressure where air moves apart and sinks.**
- It typically indicates **fair weather.**
- Winds in an anticyclone **blow clockwise in the Northern Hemisphere and counterclockwise in the Southern Hemisphere.**
- These **high-pressure systems, which exist at about the altitude of 3 km and extend between 1,000 and 2,000 km in length, push the air underneath them towards the Earth, in a process called air subsidence.**
- The forcefully **sunk air generates more heat on the surface closer to the Earth.**



Cyclone Hidaya to slam into Tanzania south of Dar es Salaam; Ruto puts Kenya on alert

Subject: Geography

Sec: Climatology

Context:

- **Cyclone Hidaya** ('Guidance' in Arabic and 'Gift' in Swahili) is expected to hit the **Tanzanian coast near Dar es Salaam** from the **Indian Ocean** on May 4, 2024.
- **Places affected:** The coast of Mtwara, Lindi, Pwani, Dar es Salaam, Tanga, Morogoro, and the islands of Unguja and Pemba. All are part of **Tanzania**.

Details:

- The cyclone developed over the **South Indian Ocean** and has been named by the **French meteorological service, Météo France's centre in the Indian Ocean French Overseas Department of La Reunion**.
- **East Africa**, including **Kenya, Tanzania, and Burundi**, has already experienced significant **flooding** since March, resulting in 350 deaths and widespread property damage.



Why 'Kenya' is considered safe from tropical cyclones?

- Traditionally, **Kenya** has been considered **safe** from the **direct impact of cyclones** due to its **geographic location near the equator**.
- **Tropical cyclones** typically form at **latitudes between 5° and 30° North or South** of the equator, and **Kenya** is situated within **Latitude 4° North and South**.
 - **Tropical cyclones** are **difficult to form** over a region **within 5 degrees of latitude from the Equator** because the **Coriolis force** there is **too small to generate a vortex**.
- This conventional safety from cyclones might no longer hold, as the country faces the potential impact of **Cyclone Hidaya**. This would mark the first time Kenya experienced a cyclone.

Other conditions for the formation of Tropical Cyclone:

- Large sea surface with a temperature higher than **27° C**
- Presence of the **Coriolis force**

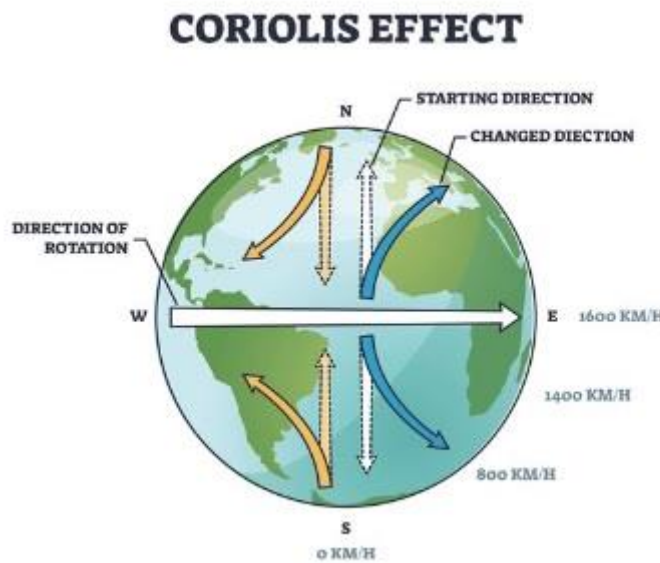
- **Small differences in the vertical wind speed**
- **A pre-existing weak- low-pressure area or low-level-cyclonic circulation**
- **Upper divergence** above the sea level system.

Why tropical cyclones don't form near or cross Equator?

- This is because of the lack of the Coriolis force. What is that? It is an apparent force caused by the rotation of the Earth. It is named after French mathematician Gaspard Gustave de Coriolis who investigated energy in rotating systems

Coriolis Effect:

- Earth's circumference is largest at the equator. This means anything standing on the equator is moving faster eastward than anything lying away from the equator — anything on the equator is traveling a greater distance than anything north or south on Earth's surface in the same amount of time.
- If air moves north from the equator, it will also still flow quickly eastward compared with its new surroundings. This means air traveling north from the equator will appear to veer right. In contrast, air flowing south from the equator will appear to stray left.
- This phenomenon, known as the Coriolis effect, helps control the direction in which tropical cyclones spin. In the Northern Hemisphere, rightward-turning air will create a counterclockwise spinning motion, and the opposite will occur in the Southern Hemisphere.



Kenya:

- A coastal country in East Africa, named after **Mount Kenya**.
- Capital- **Nairobi**
- Its **oldest and second largest city** is the **major port city of Mombasa**, situated on **Mombasa Island** in the **Indian Ocean** and the surrounding mainland.
- **Bordered by South Sudan to the northwest, Ethiopia to the north, Somalia to the east, Uganda to the west, Tanzania to the south, and the Indian Ocean to the southeast.**

Tanzania:

- A country in East Africa within the **African Great Lakes region**.
- Capital- **Dodoma**
- Largest city- **Dar es Salaam**
- **Bordered by Uganda to the north; Kenya to the northeast; the Indian Ocean to the east; Mozambique and Malawi to the south; Zambia to the southwest; and Rwanda, Burundi, and the Democratic Republic of the Congo to the west.**
- **Mount Kilimanjaro, Africa's highest mountain, is in northeastern Tanzania.**

Cyclone Remal may make landfall along West Bengal coast on May 26: IMD

Sub: Geography

Sec: Climatology

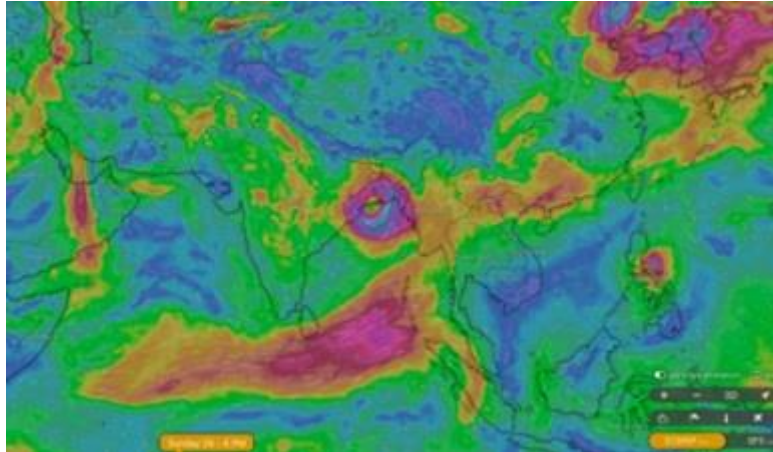
Tags: Cyclone Remal

Context:

- Cyclonic storm "Remal" is expected to escalate into a **severe cyclonic storm** by May 25.

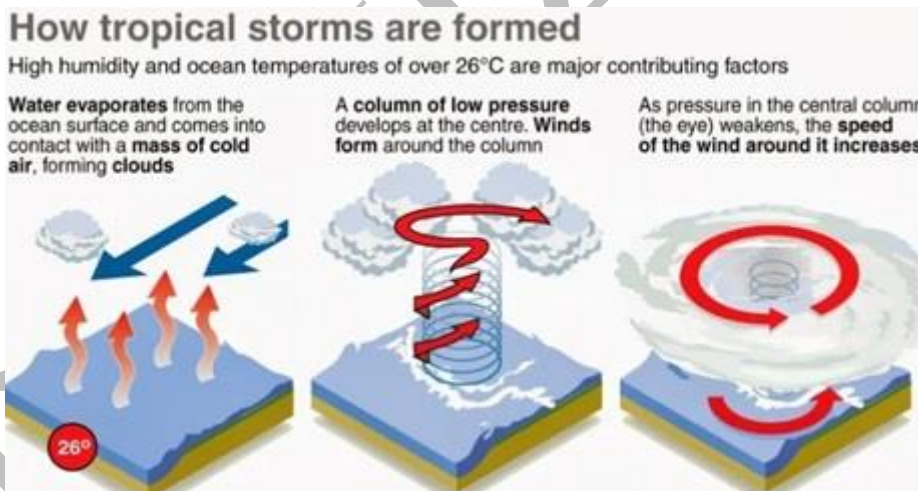
Details:

- The **India Meteorological Department (IMD)** forecasts it will cross the coast between **Sagar Island (West Bengal)** and **Khepupara (Bangladesh)** on May 26 with **wind speeds of 110-120 kmph, gusts at 135 kmph.**



Some facts about Indian tropical storms:

- Climatologically, the **North Indian Ocean basin, encompassing the Bay of Bengal and the Arabian Sea**, experiences the development of **approximately five cyclones each year. Of these, an average of four cyclones develop over the Bay of Bengal**, while one typically forms over the Arabian Sea.
- **Cyclones occurring in the Arabian Sea often achieve higher intensities**, posing an increased risk of causing widespread damage.
- The North Indian Ocean basin is most susceptible to cyclone development during the **pre-monsoon months (April-June)** and **post-monsoon months (October-December).**
- **Cyclones formed in May and November tend to reach higher intensities** compared to storms **originating at other times** due to favourable ocean conditions.



How are Cyclones Classified

- Cyclones are **classified based on wind speed** by the Indian Meteorological Department
 - **Depression:** Wind speeds of between **31–49 km/h**
 - **Deep Depression:** Between **50-61 km/h**
 - **Cyclonic Storm:** Between **62–88 km/h**
 - **Severe Cyclonic Storm:** Between **89-117 Km/h**
 - **Very Severe Cyclonic Storm:** Between **118-166 Km/h**
 - **Extremely Severe Cyclonic Storm:** Between **167-221 Km/h**
 - **Super Cyclonic Storm:** Above **222 Km/h**

How Storm intensification happens:

- Tropical cyclones are **fueled by ocean heat** in addition to other factors.

- Ocean temperatures of 26 degrees Celsius or more, prevailing at depths between 50 metres and 100 metres, are conducive to cyclogenesis, which refers to the processes that lead to the development and strengthening of a cyclone.
- Warm oceans contribute to a cyclone's rapid intensification while at sea.
- An oceanographic parameter called the Tropical Cyclone Heat Potential (TCHP) is considered an important factor in cyclone genesis, intensification, and propagation.
- The intensification process of tropical cyclones is a complex phenomenon influenced by various favorable atmospheric conditions.
- These include boundary layers (the fluid layer adjacent to a bounding surface), wind shear (changes in wind direction and/or speed over a vertical or horizontal distance), convection (the transfer of heat within a fluid), Rossby waves (which occur in rotating fluids), upper ocean circulation, and air-sea interaction.
- The interaction of these factors contributes to the development and strengthening of tropical cyclones.

What is the landfall of a cyclone?

- Landfall occurs when a tropical cyclone moves from a position over water to coming onto land.
- According to the IMD, a tropical cyclone is considered to have made landfall when its centre, or eye, crosses the coast.
- The "eye" of a cyclone is a zone of relatively calm weather situated at the center of the storm, characterized by light winds, clear or partly cloudy skies, and reduced precipitation.
- Within the eye, winds are gentle and variable, often accompanied by clear or partially cloudy skies.
- The size of the eye can vary widely, ranging from a few kilometers to over 50 kilometers in diameter in larger cyclones.
- During landfall, the outer bands of the storm may have already reached the coast, bringing strong winds, heavy rain, and storm surge.
- Landfall signifies the official moment when the cyclone reaches the land.
- It's important to note that landfall is distinct from a 'direct hit,' which occurs when the core of high winds (or eyewall) comes onshore while the center of the storm may remain offshore.
- Cyclones lose their intensity once they move over land because of sharp reduction of moisture supply and an increase in surface friction.

Council on Energy, Environment and Water (CEEW):

- CEEW is a Not-for-profit Think Tank and policy institution based in New Delhi, India.
- CEEW was formed to provide independent research-based insights to policymakers for building a sustainable India.
- The Council also has an office in Lucknow, Uttar Pradesh. It has multiple research projects running across 22 Indian states and other parts of the world.
- CEEW's research areas include energy and resource efficiency and security; power sector reforms, industrial decarbonisation, sustainable mobility and cooling, sustainable food systems, climate risks and adaptation, air quality, water resources management, sustainability finance, energy-trade-climate linkages and climate geoengineering governance.
- The think-tank advises the Indian government.

The study by CEEW:

- A study by the Council on Energy, Environment, and Water (CEEW) notes West Bengal's high adaptive capacity against cyclones due to Early Warning Systems (EWS) under the National Cyclone Risk Mitigation Project (NCRMP) Phase II.
- The high teledensity ratio in West Bengal allows people to receive early warnings via telephone or mobile.
- CEEW's study found eastern coastal districts of India are highly exposed to cyclones and highlighted the importance of strengthening adaptive capacity to reduce losses.

Southwest monsoon makes onset over Nicobar Islands: IMD

Sub: Geography

Sec: Climatology

Tags: Southwest monsoon makes onset over Nicobar Islands, Onset of Southwest monsoon

Context:

- Southwest monsoon made its onset over the Nicobar Islands, the southernmost region of the country, the India Meteorological Department (IMD) said.



Details:

- Southwest monsoon has advanced into some parts of the **Maldives**, and the **Comorin area** and some parts of the **South Bay of Bengal, Nicobar Islands** and **South Andaman Sea**.

Date of Monsoon arrival:

- The **date of monsoon onset over Kerala** has **varied** widely over the last **150 years**, the **earliest** being **May 11** in **1918**, and the **most delayed** being **June 18** in **1972**.
- It arrived in the **southern state** on **June 8** last year, **May 29** in **2022**, **June 3** in **2021** and **June 1** in **2020**.

Significance:

- The **monsoon** is **critical** for **India's agricultural landscape**, with **52%** of the **net cultivated area** relying on it.
- It is also **crucial** for **replenishing reservoirs critical for drinking water**, apart from **power generation** across the country.
- **June** and **July** are considered the **most important monsoon months** for **agriculture** because most of the **sowing** for the **Kharif crop** takes place during this period.

Factors influencing Monsoon:

Natural factors

- El-Nino and La-Nina
- Indian Ocean Dipole (IOD)
- Western Disturbances
- Land-Surface conditions

Climate change-induced factors

- Rising sea surface temperature
- Changing aerosol levels due to rising pollution
- Melting of Himalayan snow cover due to global warming
- Changing atmospheric circulation patterns

Warming climate intensifies flash droughts worldwide

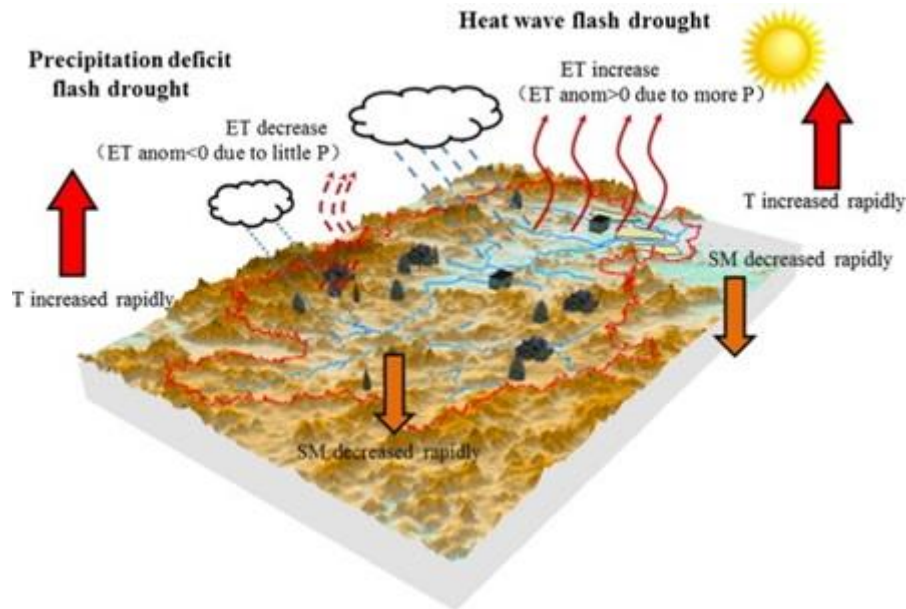
Sub: Geography

Sec: Climatology

Tags: flash drought

Flash Droughts:

- **Flash drought** is simply the **rapid onset or intensification** of drought.
- It is **set in motion** by **lower-than-normal rates of precipitation**, accompanied by **abnormally high temperatures, winds, and radiation**.
- Together, these changes in weather can **rapidly alter the local climate**.
- **Higher temperature** increases **evapotranspiration (ET)**—the process by which **water** is transferred from the land to the atmosphere by evaporation from the soil and by transpiration from plants—and further **lowers soil moisture (SM)**, which **decreases rapidly** as **drought conditions continue**.



Causes of Flash Droughts:

- Unlike **slow-evolving drought** caused by a **decline in precipitation**, **flash drought** occurs with:
 - Low precipitation
 - Abnormally high temperatures (e.g., heat waves)
 - High winds
 - Changes in radiation
- **These rapid changes can quickly:**
 - Raise evapotranspiration rates
 - Remove available water from the landscape
- **Geographic differences and climate patterns impact flash drought development:**
 - Conventional drought can occur year-round at any location
 - Flash drought typically occurs during warm seasons in the central United States
 - Widespread flash drought in the U.S. is often linked to La Niña events

Study on Flash Droughts:

- The study, using **40 years of NASA's MERRA-2 climate data (1980-2019)**, is the first to **systematically quantify global flash drought occurrences**, mapping hotspots and trends.
- **Regions worldwide** are experiencing **larger, longer-lasting flash droughts** with quicker onset.
- The study measured **drought severity** through **onset speed, duration, and geographic extent**.
- **Findings:**
 - **Flash droughts**, characterized by their **sudden and severe onset**, are becoming more **intense** globally, except in **mountainous Central Asia** where their **extent is decreasing**.
 - This trend is driven by **climate change-induced heat and altered precipitation patterns**.
- **Geographical impact of flash droughts:**
 - It highlights **significant intensification** in **South America**, particularly **southern Brazil** and the **Amazon**, linked to **deforestation, high temperatures, and reduced rainfall**.
 - Similarly, parts of **Africa**, including **Congo, Angola, and South Africa**, are also identified as **hotspots**, where **high temperatures** play a crucial role.
 - The **vulnerability to flash droughts** is also influenced by **land cover**, with **savanna and grasslands** in **humid and semi-humid climates** being particularly susceptible.
 - In contrast, **Central Asia's high mountain regions**, such as the **Himalayas** and the **Hindu Kush**, have seen a **reduction in flash drought extent** due to **climate-induced changes in precipitation patterns, melting snowpack, and a shift from snow to rain**, which **maintain soil moisture but increase the risk of flash floods**.

Monsoon sets in over Kerala and northeast earlier than forecast

Sub: Geography

Sec: Climatology

Tags : Onset of monsoon

Context:

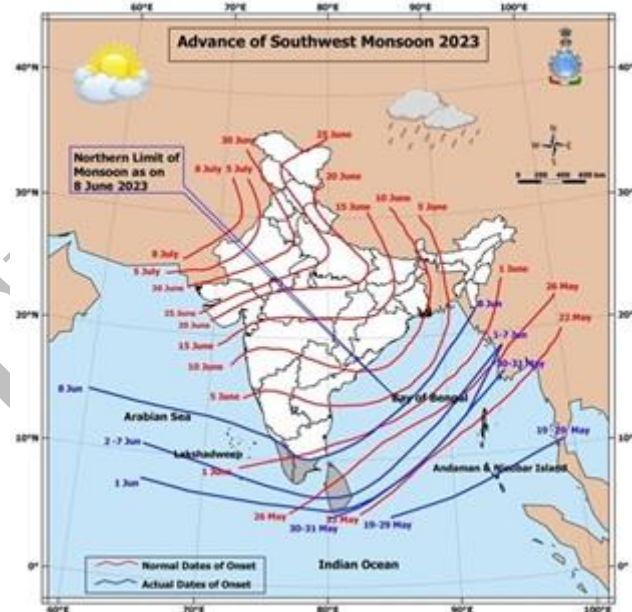
- The **Southwest monsoon** arrived in Kerala a day earlier than forecasted by the **India Meteorological Department (IMD)**, which had predicted a **May 31 onset**.

Details:

- Typically, the **monsoon** begins around **June 1** and gradually **covers the entire country by mid-July**.
- All criteria** for the **monsoon's declaration** were met, with **significant rainfall over Kerala** and surrounding areas and appropriate **Outgoing Longwave Radiation** and **wind patterns**.
- Kerala** usually receives an average of **2018.7 mm** of rain during the four-month monsoon season, with **June** typically getting around **648.3 mm** and **July** being the **wettest month** with **653.4 mm** on average.
- The **IMD** has forecasted **above-normal rainfall** for **Kerala** and the entire country this year, partly due to the **expected development of La Nina**.
- Additionally, **Cyclone Remal**, which affected **West Bengal** and **Bangladesh**, has influenced the **monsoon's early onset** over the **northeast regions**, which usually experience it by **June 5**.

“Onset of the Monsoon”:

- A **monsoon** is a seasonal reversing wind accompanied by corresponding changes in precipitation and associated with the annual latitudinal oscillation of the **Intertropical Convergence Zone (ITCZ)**.
- The **onset of the monsoon over Kerala** signals the beginning of the four-month (June-September) **southwest monsoon season**, during which **India** gets **more than 70%** of its annual rainfall.
- The monsoon covers the **entire country by July 15**.
- Contrary to what is sometimes assumed, the **onset does not mean the first rain of the season**.
 - For example, the **Andaman and Nicobar Islands** usually **start receiving monsoon rainfall between May 15 and May 20**, and it starts raining along the **Kerala coast** in the last week of May.
- However, ‘**onset**’ is a **technical expression** with a specific definition and the **IMD** does not officially declare onset until **certain prescribed conditions are met**.



Conditions Determining the Onset of Monsoon:

- According to the **IMD**, the **onset of the monsoon** happens when there is a **significant transition** in the **large-scale atmospheric and ocean circulations** in the **Indo-Pacific region**.
- The **IMD** essentially looks at the **consistency of rainfall** over a defined geography, the **intensity of the rainfall**, and the **wind speed**.
- Rainfall:** The onset is declared if **at least 60%** of **14 designated meteorological stations** in **Kerala** and **Lakshadweep** record at least **2.5 mm** of rain for two consecutive days at any time after **May 10**.
- Wind field:** The **depth of westerlies** should be **up to 600 hectopascal** (1 hPa is equal to 1 millibar of pressure) in the area that is bound by the **equator to 10°N latitude** (passes through Kochi), and from **longitude 55°E to 80°E**.
- Heat:** The measure of the energy emitted to space by the Earth's surface, oceans, and atmosphere should be **below 200 watts per sq m (wm²)** in the area between the **5°N and 10°N latitudes**, and **70°E and 75°E longitudes**.

Swell waves hit coastal Kerala

Sub: Geo

Sec: Oceanography

Context: Tension gripped the residents of coastal areas in Kerala on Saturday night after high swell waves pounded the coast

What are Swell Waves?

- These waves are formed by an ocean swell; hence the name swell surge.
- Ocean swells occur not due to the local winds, but rather due to **distant storms like hurricanes** or even long periods of **fierce gale winds**.
- During such storms, huge energy transfer takes place from the air into the water, leading to the formation of very high waves. Such waves can travel thousands of kilometres from the storm centre until they strike shore.

What is the Difference Between Swell Waves and Tsunamis?

- Unlike swell waves, a tsunami is a series of enormous waves created by an underwater disturbance usually associated with earthquakes occurring below or near the ocean.
- Tsunamis are around 10 times faster than swell waves. Although both swell waves and tsunamis slow down near the coast, the latter hit land at 30–50 km/h.

Which are the Most Vulnerable Regions in India?

- Usually, states like Kerala witness swell waves as a result of strong winds in the southern part of the Indian Ocean.
- The March swell waves were generated after a low atmospheric pressure system moved over the region from the South Atlantic Ocean — 10,000 kilometres off the Indian coast. The arrival of the pressure system resulted in strong winds, which led to the formation of swell waves of up to 11 metres in height. These waves hit the Kerala coast and Lakshadweep.
- In March 2024, swell waves led to flooding in several areas of Kerala - the worst affected were Alappuzha, Kollam, and Thiruvananthapuram districts.
- Such flooding events are called **Kallakkadal** in Kerala.

Forecasting:

- To forecast swell waves, INCOIS launched the **Swell Surge Forecast System in 2020** which can give warning seven days in advance.

Coral bleaching grips Indian coasts; Lakshadweep, Andamans are most affected

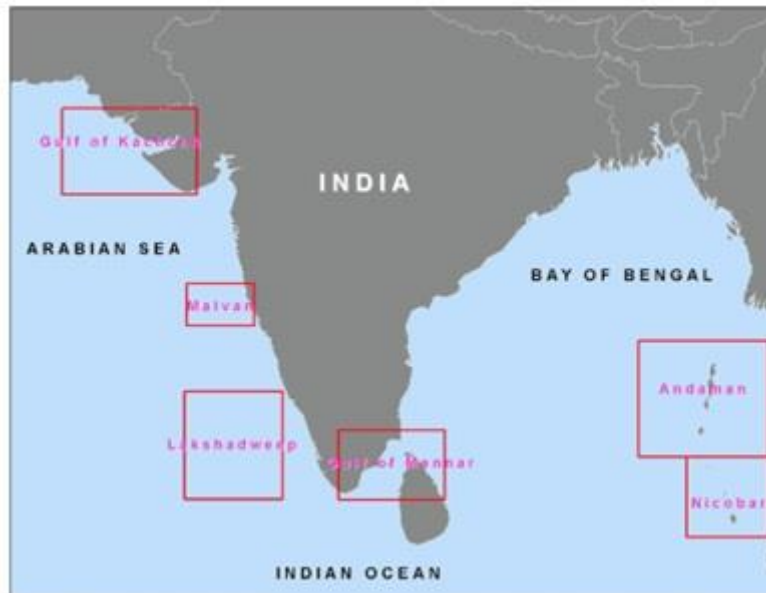
Subject: Geography

Sec: Oceanography

Tag: Coral bleaching, Lakshadweep, Andamans

Coral Bleaching in India:

- **Coral reefs in India**, found in **regions** such as **Lakshadweep, Gulf of Kutch, Goa, Maharashtra**, and **along the eastern coast** including the **Gulf of Mannar** and **Tamil Nadu**, are experiencing **instances of coral bleaching**.
- Notably, **Lakshadweep** has reported **widespread bleaching**, especially around **Kavaratti Island**.
- The **bleaching** affects **both hard and soft coral species**, extending **down to depths of 30 meters**.
- While some islands like **Agatti** report **lesser severity**, areas like **Goa** and the **Andaman islands** are **witnessing the onset of bleaching**, which could escalate if **high temperatures persist**.



What is Coral Bleaching?

- When corals face **stress** by changes in conditions such as **temperature, light, or nutrients**, they **expel the symbiotic algae zooxanthellae** living in their tissues, causing them to turn **completely white**. This phenomenon is called **coral bleaching**.
- The **pale white colour** is of the **translucent tissues of calcium carbonate** which are visible due to the loss of **pigment-producing zooxanthellae**.
- **Bleached corals can survive** depending on the levels of bleaching and the recovery of sea temperatures to normal levels.
- If **heat pollutions subside in time**, over a few weeks, the **zooxanthellae** can come back to the corals and restart the partnership but **severe bleaching and prolonged stress in the external environment can lead to coral death**.
- Over the last couple of decades, **climate change** and **increased global warming** owing to **rising carbon emissions** and other **greenhouse gases** have made seas warmer than usual.
- **Coral bleaching** has occurred in the **Caribbean, Indian, and Pacific** oceans regularly.

Mass Coral Bleaching:

- To **officially declare a global mass bleaching event**, widespread bleaching must be observed in three major ocean basins: the **Atlantic, Pacific, and Indian Oceans**.

Fourth Mass Coral Bleaching Event:

- The current **coral bleaching event** is part of a **global trend**, identified as the **fourth mass coral bleaching event**, which has **affected over 50 regions worldwide since 2023**.
- **Triggered by elevated sea surface temperatures** due to an **ongoing El Niño event**, this phenomenon **threatens marine biodiversity**, as corals act as **crucial ecosystems for various marine species**.
- Historical data from global events in **1998, 2010, 2014, and 2017** highlight the **recurring and severe nature of these bleaching events**, emphasizing the urgent need for effective marine environmental management.

Previous Mass Coral Bleaching:

- **First Mass Bleaching:** It occurred in **1998** when the **El Niño weather pattern** caused **sea surfaces in the Pacific Ocean to heat up**; this event caused **8% of the world's coral to die**.
- **Second Mass Bleaching:** This event took place in **2002**. In the past decade, however, **mass bleaching** occurrences have become more closely spaced in time, with the longest and most damaging bleaching event taking place from **2014 to 2017**.
- **Third Mass Bleaching:** The event that took place between **2014-17** affected reefs in **Guam** in the **Western Pacific region**, the **North, South-Pacific**, and the **Indian Ocean**.

Coral reef:

- **Corals** are **invertebrate animals** belonging to a large group of colourful and fascinating animals called **Cnidaria**.
- Each **coral animal** is called a **polyp**, and most live in groups of hundreds to thousands of **genetically identical polyps** that form a '**colony**'.
- Coral polyps host a **microscopic symbiotic alga** called **zooxanthella** that **photosynthesizes** just like **plants**, providing **food to the coral**.
- Coral is generally classified as either **hard coral** or **soft coral**.

Importance of Coral Reefs:

- Coral reefs, often described as the "rainforests of the sea," play a vital role in **marine life** by providing **essential habitat, food, and breeding grounds for numerous marine organisms.**
- The **health of coral reefs is directly linked** to the **broader ecological balance and biodiversity of the oceans.**

Freshwater quest, the likely new gold hunt

Sub: Geo

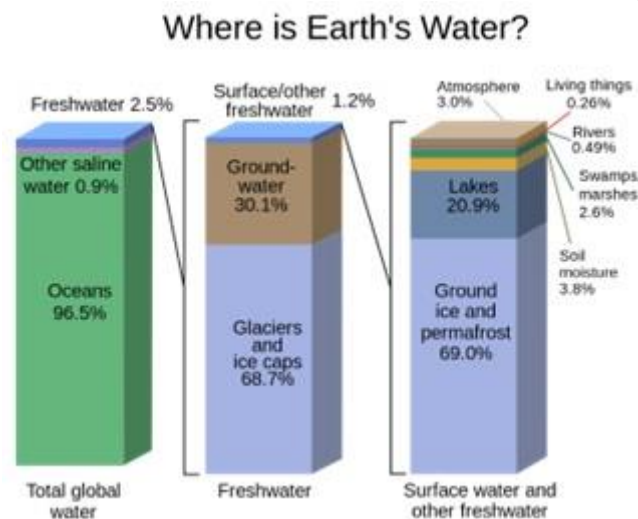
Sec: Oceanography

Undersea Freshwater Sources:

- Substantial freshwater reserves have been discovered **under the ocean**, as evidenced by findings from the **1960s** by the **U.S. Geological Survey** off **New Jersey coast** and more recent discoveries including a **river under the Black Sea.**
- This river appears to be over a **100 feet deep** and has a **flow rate** of about **four miles per hour**; about **22,000 cubic meters** of water passes through this particular channel.
- It would be among **one of the largest rivers** in the world when **compared to land-based rivers.**

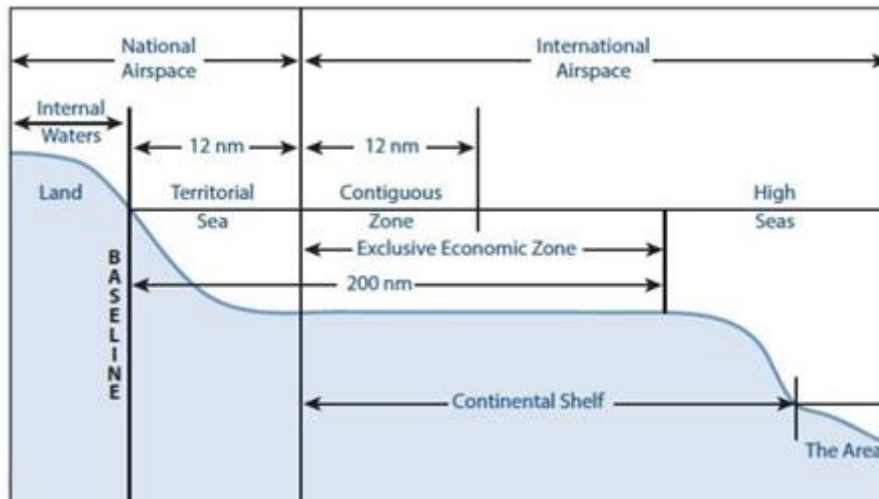
Global Freshwater Statistics:

- Of **Earth's total water volume** (1.386 billion km³), **97.5% is saline** and **only 2.5% is freshwater.**
- A mere **0.3% of freshwater is available in liquid form** on the **surface**, highlighting the vast majority that resides underground, including beneath the ocean bed.



United Nations Law of the Sea Convention, 1982 (UNCLOS):

- Adopted in **1982.**
 - It lays down a comprehensive regime of **law and order** in the **world's oceans and seas** establishing rules governing all uses of the oceans and their resources.
 - The **Division for Ocean Affairs and the Law of the Sea (DOALOS)** of the **Office of Legal Affairs** of the **United Nations** serves as the **secretariat** of the **Convention on the Law of the Sea** and **reports annually** to the **General Assembly.**
- **UNCLOS**, along with the **Geneva Conventions on the Law of the Sea, 1958**, govern **international maritime law.**
- **UNCLOS** outlines the concept of the "Area," (area beyond the **EEZ of a nation or Area beyond natural jurisdiction of a country**) defining it as the **common heritage of mankind**, intended for the **collective benefit of all**, including future generations.
- This area is **beyond national jurisdictions** and **largely unregulated** concerning **non-mineral resources** such as **freshwater.**
- The **International Seabed Authority** is **empowered** under **UNCLOS** to administer and control the activities in the Area.
- **UNCLOS prevails over the Geneva Conventions for signatory states (as per Article 311 of UNCLOS)**, but the **United States recognizes only the Geneva Conventions**, complicating international consensus on maritime law.



Regulation of Freshwater Under UNCLOS:

- **Exploration and exploitation** under UNCLOS are restricted to "resources" defined typically as minerals.
- It remains ambiguous whether this definition **extends to freshwater**.
- The International Seabed Authority administers activities in the "Area," but **there's no clear directive on regulating freshwater exploration** for states **adhering only to the Geneva Conventions**.

BBNJ Treaty:

- **Treaty on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction**, commonly referred to as **Treaty of the High Seas**.
- Legally Binding in nature
- The treaty **aims** to address the challenges faced by the high seas, which constitute areas beyond 200 nautical miles from the exclusive economic zones of coastal countries.
- So far, **88 countries have signed the treaty**, with **Chile and Palau** being the **only two to have ratified it**.
- However, at least **60 ratifications** are necessary for it to **come into force**.
- **Objectives:**
 - The treaty seeks to **increase the percentage of protected areas on the high seas**, which currently stands at a mere **1.44%**, despite covering **more than two-thirds of the global ocean**.
 - Additionally, it **aims** to ensure **fair and equitable sharing of profits from marine genetic resources (MGR)** and establish **rules** for conducting **Environmental Impact Assessments (EIA)**, which deal with **identifying and evaluating** the potential impacts an activity could have on the ocean.
 - This aligns with the **30x30 target**, it is a global commitment to protect at least 30% of the planet for nature by 2030. It was agreed upon at the **Convention on Biological Diversity (CBD)** at the **Conference of Parties (COP15)** to the **UN Convention on Biological Diversity in 2022** and is included in the Kunming-Montreal Global Biodiversity Framework.

Pine needle power projects to check Uttarakhand forest fires prove to be inadequate

Sub: Geography

Sec: Indian Physical geography

Tags: Pine tree, Uttarakhand forest fires

Uttarakhand's Bio-energy Projects Using Pine Needles:

- **Project established in 2021**
- **Agency Involved:** Uttarakhand Renewable Energy Development Agency (UREDA).
- **Project Objective:** Utilize flammable pine needles to generate electricity, aiming to address the dual issues of energy generation and forest fire mitigation.
 - **Forest Coverage and Biomass:** Chir pine forests cover **16.36%** of the state's forest area, producing over **15 lakh tonnes of pine leaves** annually.
- **Implementation:** the plan was to establish **multiple units** ranging from **10kW to 250 kW** across the State in three phases (worth about 150 MW).
 - Though the government expected **58 units** to be set up, **only six units of 250 kW (totally worth 750 kW) have been established**.

- **Project Outcome:** The projects have been deemed unsuccessful. Six plants with a total capacity of 750 kW were set up against an expectation of 58 units.

Challenges and Issues:

- The **technology to efficiently use pine needles for electricity generation** is **not** yet sustainable.
- **Increased severity of annual forest fires**, exacerbated by **climate change-induced droughts**, contribute to **high accumulations of pine needles** which pose a fire risk.
- The Supreme Court reprimanded the Uttarakhand government following **severe forest fires**. In response, the government initially planned and later scaled down the **bio-energy projects**, and **increased the procurement price of pine needles** to incentivize collection.
- The **collection of pine needles** is hindered by **geographical** (steep slopes), **ecological** (vulnerability to attacks by animals, competition with local flora), and **socio-economic factors** (lack of sufficient labour).
- Failure to meet **Renewable Power Purchase Obligations** partly due to unmet expectations from pine needle projects.
- The state **increased the price paid for collected pine needles** from **₹3/kg to ₹50/kg** to motivate more extensive collection efforts.

Pinus roxburghii (Chir Pine or longleaf Indian pine):

- A species of pine tree **native** to the **Himalayas**. It was named after **William Roxburgh**.
- The native range extends from **Tibet** and **Afghanistan** through **Pakistan**, across **northern India** (in Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh), **Nepal** and **Bhutan**, to **Myanmar**.
- It generally occurs at **lower altitudes** than other pines in the Himalayas.
- Owing to its **shallow roots** it is attributed to **soil erosion**, particularly in the **Himalayas**. It **does not allow any vegetation to grow around it** by **making the soil more acidic** through its fallen needles.



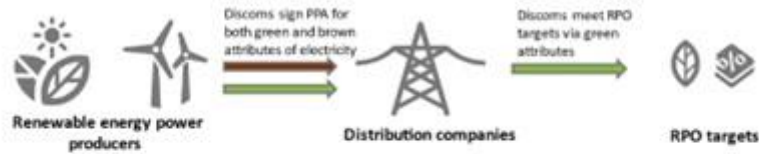
Renewable Power Purchase Obligation (RPO):

- **RPO** was instituted in **2011**, it is a **mandate** that requires **large power procurers** to buy a **predetermined fraction of their electricity** from **renewable sources**.
- Under RPO bulk purchasers like **discoms**, **open-access consumers** and **capacitive users** are required to **buy a certain proportion of RECs**. They can buy **RECs** from renewable energy producers.

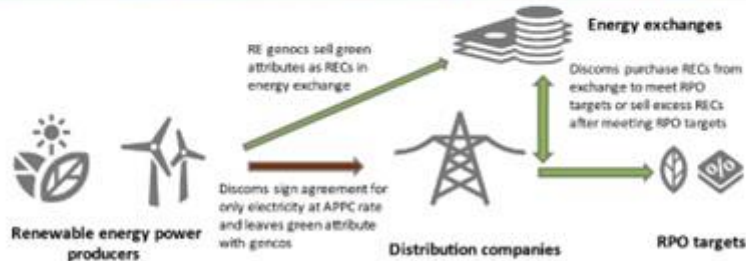
Renewable Energy Certificates (REC):

- **Renewable Energy Certificates (RECs)** are a **market-based instrument** to **promote renewable sources of energy** and the development of the market in electricity.
- **One REC** is created when **one-megawatt hour of electricity** is **generated** from an **eligible renewable energy source**.

Route 1 – Obligated entities meeting their RPOs



Route 2 – Obligated entities meeting their RPOs via RECs



CEEW | Centre for Energy Finance
THE SOURCE

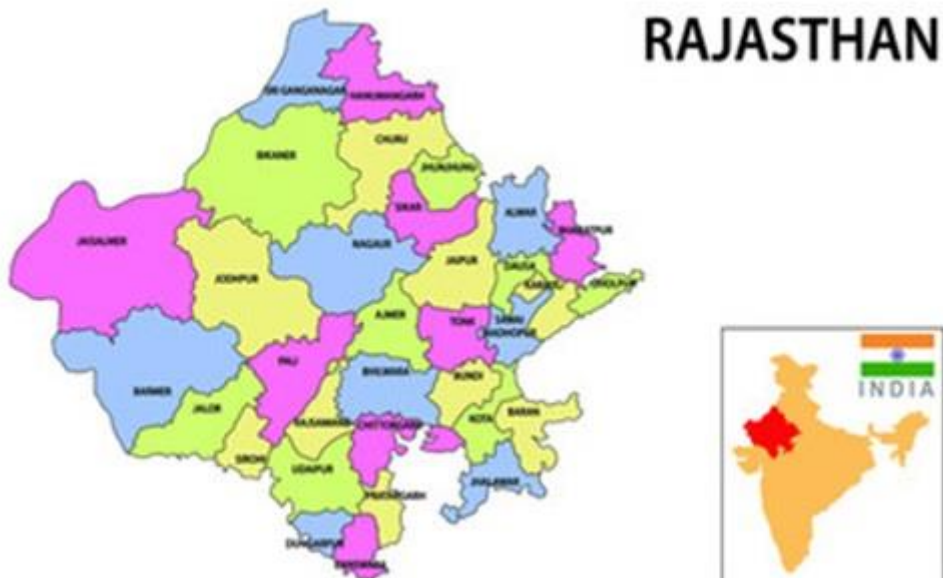
Why have Bikaner and Barmer in Rajasthan reported land sinking in the last month?

Sub: Geography

Sec: Indian Physical geography

Context:

- Two incidents of land subsidence occurred in Rajasthan within a month.
- In Sahajrasar village, Bikaner district, 1.5 bigha of land collapsed forming a 70-foot deep pit, narrowly missing a passing train.
- In Nagana village, Barmer district, two parallel cracks appeared over a 1.5 km area.



Barmer Incident:

- Cracks appeared near the wells of a crude oil company.
- GSI officer suggests water dissolution of soil causing underground space, leading to cracks.
- Residents allege groundwater overexploitation by the oil company, which GSI is investigating further.



Geological Concerns and reason behind the land subsidence:

- Both incidents in **desert districts** raised concerns among geologists and the public.
- **Preliminary reports** suggest **water as a common factor**.
- **Excessive groundwater exploitation** and **reduced rainfall** are cited as **primary causes**.
 - Analysis of **groundwater, rainfall and other relevant data** along with **geological field observations** showed that the area has been experiencing a **high degree of groundwater depletion over the years**.
 - It may lead to **drying up the water-bearing aquifer rocks/sediments** at the **contact zone** of the **sub-surface hard rocks** and **aeolian deposits** which may induce compaction of **dried-up pore spaces/voids**, consequently reducing of volume of sub-surface strata and resultant **loose sand bearing land subsidence**.
- Residents dispute claims of groundwater exploitation, citing minimal borewells and reliance on external sources for agriculture.
- The historical context suggests the **sinking land** in **Sahajrasar** has precedence dating back decades.

Land subsidence:

- According to the **National Oceanic and Atmospheric Administration (NOAA)**, subsidence is the “sinking of the ground because of underground material movement”.
- **Major causes for land subsidence:**
 - **Natural factors:** Land subsidence happens due to gradual or sudden natural compaction or collapse of soils due to reasons like –
 - Tectonic activities (e.g. earthquake and faulting).
 - Volcanic activities.
 - Landslide
 - Formation of sinkholes.
 - Thawing of permafrost.
 - **Anthropogenic causes:**
 - Compaction of aquifer systems due to extensive groundwater withdrawals: When water is extracted from aquifers, the clay between pockets of water collapse gradually, leading to land subsidence.
 - Development of underground infrastructure such as metro, tunnels, etc.
 - Excessive underground mining of minerals, oil, and gas.
 - High load of constructions such as high-rise buildings



Solutions To Reduce Land Subsidence:

- **Slope stabilization:** Using methods like terracing or erecting retaining walls, slopes can be stabilized to prevent landslides and erosion.
- **Planting vegetation:** Vegetation planting on slopes can aid in soil stabilization and erosion prevention. Slope stabilization is particularly effective with trees and other deep-rooted plants.
- **Control of drainage:** In hilly areas, it is crucial to effectively manage and maintain drainage systems since poor drainage can cause the land to sag. Installing culverts or other drainage systems may be necessary to direct water away from slopes and stop erosion.
- **Strengthening foundations:** Buildings in mountainous communities may occasionally need to have their foundations reinforced to stop them from sliding or collapsing. This can entail adding strength to the foundations or underpinning them.
- **Planning and zoning:** With careful planning and zoning, structures can be kept out of locations that are vulnerable to landslides or erosion. To do this, certain regions could need to be declared no-build zones or high-risk areas might need to use special construction methods.

As right as rain – monsoon-inspired marketing ideas

Sub: Geography

Sec: Indian geography

Discovery of Cherrapunji Gin:

- **Cherrapunji Gin**, a new product in a colourful metal bottle with graphics inspired by **Meghalaya's forests** is found In **Shillong's Police Bazaar**.
- The **gin** is made using **rainwater** harvested in **Mawsynram, Cherrapunji's sister town**, and local botanicals such as **Khasi mandarin** and **sohmarit wild peppers**, giving it **spicy and citrus notes**.
- The **gin** offers a taste of Meghalaya and the experience of drinking in the rain of the wettest place on earth. The product has received positive initial responses.
- **Ingredients in Cherrapunji gin:** **Juniper** from **eastern Himalayas**, GI tagged (geographical indication) **Khasi mandarin**, **smoked tea** from **Lushai hills** and **Kaji** (aromatic lime) from **Assam valley** makes it like no other gin.



Rainwater in Marketing

- Other brands globally use **rainwater**, marketed as a **natural** and **pure alternative** to **conventional water**. Examples include **Oregon Rain (US)** and **Cloud Rain (Tasmania)**, noted for their purity due to **low nitrate** and **mineral content**.
- There's potential for **Indian brands** to introduce **rainwater variants in bottled water**.

Rain-Inspired Perfumes

- **Mitti Attar:** In **Kannauj, Uttar Pradesh**, the **centuries-old technique** of **distilling rainwater** and **soil** produces “**Mitti Attar**,” capturing the **scent of first rain and soil**, known as **Petrichor**.
 - It has received a **GI (geographical indication) status**.
- Leading perfume brands have created scents inspired by rain, such as **Marc Jacobs' “Rain,” Floraiku's “In the Rain,”** and **Demeter's “Petrichor.”**

Emotional Connection with Rain:

- Rain evokes **nostalgic** and **romantic emotions**, reminding people of childhood, monsoons, and the nurturing aspects of rain.
- Products incorporating rainwater or rain themes can appeal to these emotions.

- Future possibilities include **rainwater in soaps, shampoos, gourmet dishes, and designs in jewellery or garments** inspired by **rain**.

Dangers of Landslide

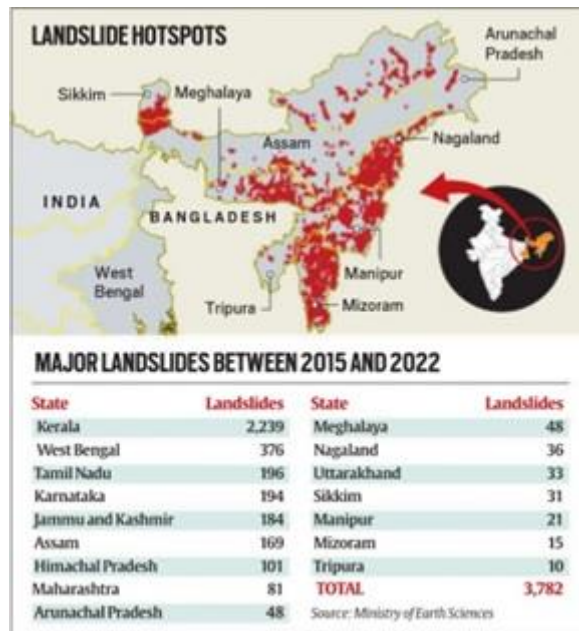
Sub: Geography

Sec: Physical geography

Tags: Landslides

Cyclone Remal impact:

- **West Bengal:** Six fatalities and damage to 27,000 houses due to **Cyclone Remal**.
- **Northeast India:** **Cyclone-triggered landslides** in **Meghalaya, Mizoram, Assam, and Nagaland** resulted in at least 30 deaths, including 14 from a stone quarry collapse in **Aizawl, Mizoram**.
- **Cyclone Aila** in **May 2009** also triggered **landslides** in the **Northeastern region**.

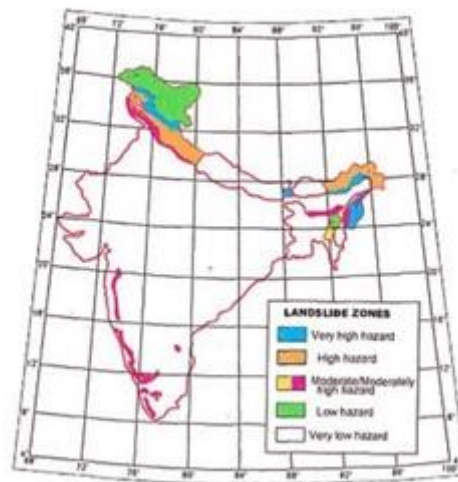


Need for Resilience:

- **Multi-Hazard Disasters:** India faces **multiple interconnected disasters** such as heavy rainfall causing **glacial lake** breaches and **flash floods**, leading to **landslides**.
 - One event can trigger another and can lead to multiple disasters simultaneously.
- **Infrastructure and Services Impact:** Resulting in power outages, transport and communication failures, and disruption of health services, complicating rescue and relief efforts.

Landslide Vulnerability in India

- **0.42 million sq km**, or **13%** of India's landmass, is **landslide-prone**, covering **15 states and 4 Union Territories**.
- **0.18 million sq km**, or **42%** of the vulnerable area, is in the **Northeast**, a hilly and earthquake-prone region.
- The **Northeast** recorded **378 major landslides** during **2015-2022**, constituting **10%** of **all major landslides in India**. **Kerala** witnessed the **highest number**, largely **post-2018 floods**.

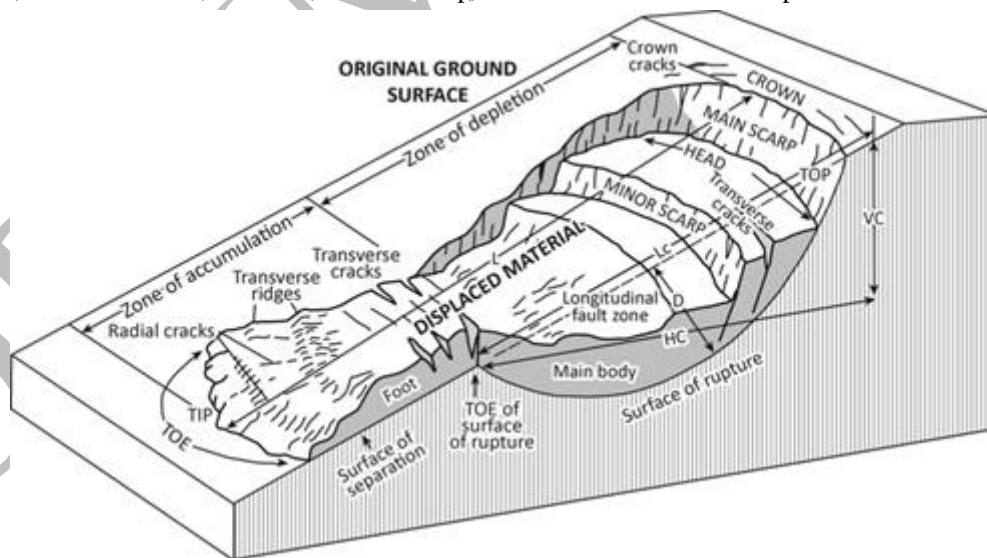


Risk Management Efforts:

- The **Disaster Management Act, of 2005** provides a **comprehensive legal and institutional framework** for the management of various disasters including landslides.
- The **National Landslide Risk Management Strategy (2019)** covers all aspects of landslide disaster risk reduction and management, such as **hazard mapping, monitoring, and early warning systems.**
 - **Early Warning Systems:** Trial-based systems linked to IMD rainfall forecasts to predict soil displacement. Few systems deployed, with installations in **Nagaland, Sikkim, Uttarakhand, and Kerala.**
- The **National Disaster Management Authority (NDMA)** has issued **Guidelines on Landslide Hazard Management (2009)** that outline the steps that should be taken to reduce the risk of landslides.
- The **National Institute of Disaster Management (NIDM)** has been providing capacity building and other support to various national and state-level disaster management authorities.
- Efforts have been made towards better prediction of weather. E.g. **Ensemble Prediction System.** This will help predict disasters like landslides.

What is Landslide?

- A **landslide** is defined as the **movement of a mass of rock, debris, or earth**, down a slope due to the action of **gravity.**
- Areas with **steep slopes**, for example, mountainous regions, are particularly susceptible to landslide hazards.
- Earth flow, mass movement, mudflow, rotational slip, and avalanches are all examples of landslides.



Causes of Landslide:

Geological causes	Morphological causes	Human causes
<ul style="list-style-type: none"> • Weak or sensitive materials • Weathered materials • Sheared, jointed, or fissured materials 	<ul style="list-style-type: none"> • Tectonic or volcanic uplift • Glacial rebound 	<ul style="list-style-type: none"> • Excavation of slope or its toe • Loading of slope or its crest

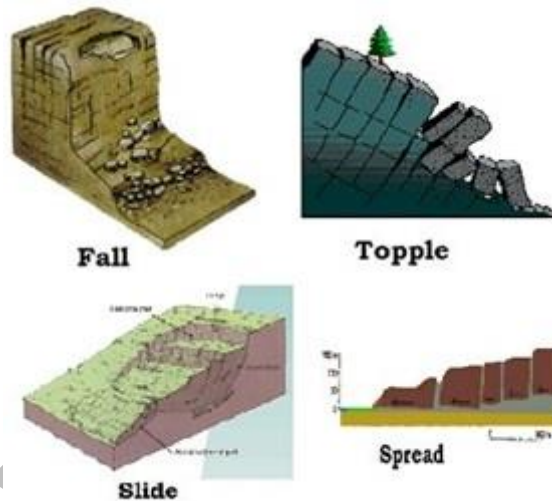
- Adversely oriented discontinuity (bedding, schistosity, fault, unconformity, contact, and so forth)
- Contrast in permeability and/or stiffness of materials

- Fluvial, wave, or glacial erosion of slope toe or lateral margins
- Subterranean erosion (solution, piping)
- Deposition loading slope or its crest
- Vegetation removal (by fire, drought)
- Thawing
- Freeze-and-thaw weathering
- Shrink-and-swell weathering

- Drawdown (of reservoirs)
- Deforestation
- Irrigation
- Mining
- Artificial vibration
- Water leakage from utilities

Types of Landslides

- **Falls:** It happens due to the abrupt movements of the mass of geologic materials, such as rocks and boulders, that become detached from steep slopes or cliffs.
- **Topples:** It happens due to the forward rotation of a unit or units about some pivotal point, under the actions of gravity and forces exerted by adjacent units or by fluids in cracks.
- **Slides:** In this type, rocks, debris, or soil slide through slope forming material.
- **Spread:** It usually occurs on very gentle slopes or flat terrain.



Half of world's rangelands are degraded, UN study finds: What are rangelands, why they matter

Sub: Geography

Sec: Economic geo

Context:

- About **half of the world's rangelands** are **degraded** and need policy interventions, and **communities** depending on them need focused support, according to a new report of the **United Nations Convention on Combating Desertification (UNCCD)**.

What are rangelands?

- The **UNCCD report** defines rangelands as **natural or semi-natural ecosystems** that are **grazed by livestock or wild animals**.
- **Rangelands** contain **vegetation** such as **grasses, shrubs, bushes, open forests, and agroforestry systems** (land which contains trees and crops or pastures).
- The exact nature of rangelands' vegetation is influenced by **rainfall, temperature, and other climate phenomena**.
- **Rangeland Atlas** is prepared by a **consortium of international non-profits and United Nations agencies**.
- **Extant of rangelands:**
 - Currently, **rangelands** cover **80 million sq km** of **Earth's terrestrial surface area** (over half of Earth's land) and are thus the **largest land cover** or **land use type** in the world.
 - In **India**, rangelands occupy about **1.21 million sq km**, from the **Thar Desert** to **Himalayan meadows**.

- **Environmental and social significance:**
 - They act as **carbon sinks, storehouses of fresh water, and prevent desertification** of land.
 - They provide **food security and livelihoods** to millions of people.
 - Rangelands generate **16% of global food production** and **70% of feed for domesticated herbivores**, most significantly in **Africa and South America**.

UNCCD Report Findings:

- Approximately **50%** of the **world's rangelands** are classified as "**degraded**" and are in decline.
- **Factors** contributing to this degradation include **climate change, unsustainable land and livestock management practices, biodiversity loss, and conversion of rangelands to farmlands**.
- Uncertainty over **land rights** among **pastoralist communities** exacerbates degradation.
- **Impact on Communities:**
 - Deterioration of rangelands adversely affects communities dependent on them.
 - Consequences include reduced soil fertility, biodiversity loss, decreased incomes, and increased conflicts over grazing rights with authorities.

Who are Pastoralists?

- **Pastoralism** is a **livelihood** centred around **livestock production, including dairy, meat, wool, and leather**.
- **Pastoralists** are **communities, both indigenous and non-indigenous, engaged in livestock rearing**.
- They rear a **variety of animals** including **sheep, goats, cattle, horses, donkeys, camels, yaks, llamas, alpacas, pigs, ducks, and chickens**.
- Their **livelihood** depends significantly on **access to quality pasturelands (rangelands)** and their **rights over them**.
- **Global and Indian Context:**
 - Globally, an estimated **500 million pastoralists** are involved in livestock production.
 - In **India**, approximately **13 million pastoralists** are part of **46 groups** such as **Gujjars, Bakarwals, Rebaris, Raikas, Kurubas, and Maldharis**.

Economic Contributions in India:

- **India** holds **20%** of the **world's livestock population**, with **77%** reared in **pastoralist systems**.
- **Pastoralists** play a **crucial role** in **protecting indigenous livestock breeds** and **preserving traditional knowledge of animal rearing**.
- **India** leads **globally** in **milk production** (23% of global output), **buffalo meat production**, and **sheep and goat meat exports**, with **pastoralists** making significant contributions to these sectors.
- **Some important pastoral communities and regions they belong:**

Pastoralist community	Region
Gujjar Bakarwals	Jammu and Kashmir
Gaddis	Himachal Pradesh
Bhotiyas, Sherpas and Kinnauris	Himalayan region
Dhangars	Maharashtra
Raika (Maru Raika- a subgroup)	Rajasthan
Gollas, Kurumas and Kurubas	Andhra and Karnataka region
Banjaras	Uttar Pradesh, Punjab, Rajasthan, Madhya Pradesh and Maharashtra
Maldhari	Rann of Kutch region
Rebari	Rajasthan, Kutch region of Gujarat, Haryana, Punjab and Sindh province of Pakistan



Pastoralism in Africa

- In Africa, even today, **over 22 million Africans** depend on some form of pastoral activity for their livelihood.
- Like pastoralists in India, the lives of African pastoralists have changed dramatically over the colonial and post-colonial periods.
- **Some pastoralist communities in Africa:**
 - Bedouins, Berber, Maasai, Somali, Boran, Turkana and Kaokoland herders (Namibia).



Fig.13 – Pastoral communities in Africa.
The inset shows the location of the Maais in Kenya and Tanzania.

Sweet sorghum is a hardy, nutritious, biofuel crop that offers solutions in drought-hit southern Africa

Sub: Geography

Sec: Eco geography

Tag: Sweet sorghum

The southern African region is battling with drought at present.

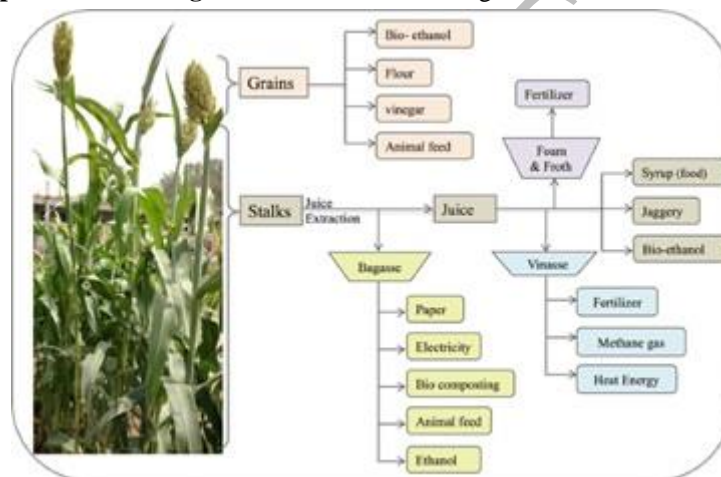
- **Drought Cause:** Result of **El Nino**, affecting global weather patterns.
- **Impact:** Severe drought in southern Africa, hitting **agricultural productivity** hard.
- **Affected Countries:** **Malawi, Zambia, and Zimbabwe** have **declared a state of disaster** and are seeking food aid.
- **Economic Implications:** Over **70%** of **rural populations** in the region rely on agriculture for their livelihoods.

Agricultural Sector's Response to Climate Change

- **Need for Adaptation:** Importance of preparing for and mitigating climate impacts in agriculture.
- **Biofuel Crops:** Cultivation of biofuel crops as a measure to **reduce greenhouse gas emissions**.
- **Biofuel Crops**
 - **Conventional Crops:** Sugarcane, maize, grain sorghum, sugar beet, rapeseed, and sunflower.
 - **Drawbacks:** Susceptibility to extreme weather, high investment costs, competition with food production.

Sweet Sorghum:

- **Origin:** Most likely **Ethiopia** region.
- **Sweet sorghum** or **sorgo** is any of the many varieties of **sorghum grass** whose **stalks** have a **high sugar content**.
- It **thrives** better under **drier** and **warmer conditions** than many other crops and is **grown primarily** for **forage, silage, and syrup production**.
- **Sweet sorghum syrup** is known as **sorghum molasses** in some regions of the **United States**.



Potential of Sweet Sorghum:

- **Multipurpose Use:** Provides **grains, animal feed, and sugary juice**.
- **Nutritional Value:** Comparable to **maize**, **rich in energy, proteins, carbohydrates, fibre, and essential minerals** such as **potassium, calcium, sodium and iron**.
 - It has good **antioxidant** properties.
- **Bioethanol Production:** High yield of **8,102 litres per hectare**, significantly more than maize.
- **Resilience:** Drought resistance, can go dormant and resume growth post-drought, uses **stalk juice** during **water scarcity**.
- **Other Uses:**
 - **Animal Feed:** High nutritional residue post-harvest.
 - **Ethanol Production:** Contains **sucrose, glucose, and fructose** for **bioethanol**.

Recommendations for Investment and Awareness

- **Underutilized Crop:** Despite its potential, **sweet sorghum** is **not widely cultivated** or researched in **Africa**.
- **Government Role:** Use **agriculture extension services** to promote awareness and benefits of sweet sorghum.
- **Research and Development:** Invest in developing recipes and industrial products to enhance the feasibility of sweet sorghum farming.
- **Global Examples:** Successfully cultivated in the **US, Brazil, and China**.

Why dal imports have hit a seven-year high

Sub: Geography

Sec: Eco geography

Tag: dal imports

Context:

- In April 2024, the consumer price index for cereals rose by 8.63% compared to April 2023.

Details:

- Despite this, the price increase for roti has not significantly impacted the majority of poor and lower middle-class Indians due to the government's food security scheme, which provides 5 kg of rice or wheat monthly to approximately 813.5 million people for free.

Pulse Inflation:

- However, the inflation in pulses, which recorded an annual retail inflation of 16.84% in April 2024, has severely affected consumers.
- Unlike cereals, pulses are not widely distributed through the public distribution system, forcing low-income households to rely heavily on open-market purchases.
- The price of chana (chickpea), the cheapest dal, rose from Rs 70 to Rs 85 per kg, while arhar/tur (pigeon pea) increased from Rs 120 to Rs 160 per kg.
- Prices for urad (black gram) and moong (green gram) also saw rises, whereas masoor (red lentil) prices slightly decreased.

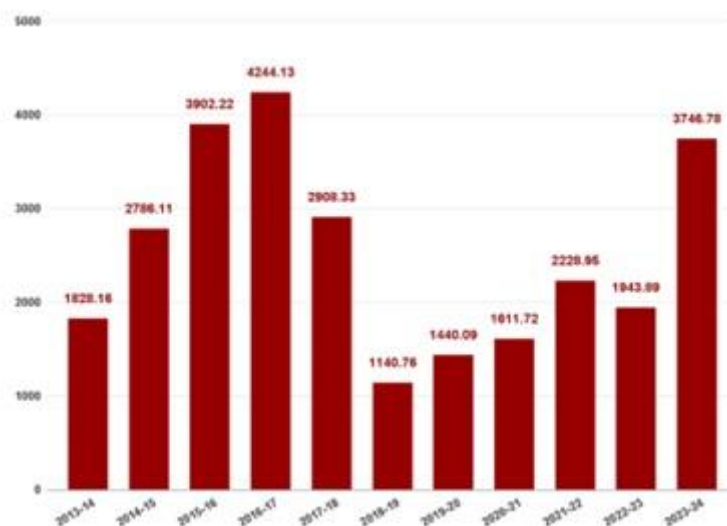
Causes of this inflation:

- The primary cause for the surge in dal prices is the El Niño-induced irregular monsoon and winter rains, which led to a drop in domestic pulses production from 27.30 million tonnes in 2021-22 to 23.44 million tonnes in 2023-24.
- Significant production declines were observed in chana and arhar/tur, with chana production dropping from 13.54 million tonnes in 2021-22 to an estimated less than 10 million tonnes in 2023-24, and arhar/tur from 4.22 million tonnes to below 3 million tonnes.
- These poor harvests, particularly in Karnataka, Maharashtra, Andhra Pradesh, and Telangana, have driven chana and arhar/tur prices well above their minimum support prices (MSP) (Rs 5,440 for chana dal and Rs 7,000 per quintal for tur/arhar dal).

Import of pulses:

- As a result, India's pulses imports surged, reaching \$3.75 billion in 2023-24, the highest since 2016-17, with major pulse imports totalling 4.54 million tonnes, up from the preceding two fiscal years.

Value of Pulses Imports (\$ Million)



IMPORTS OF MAJOR PULSES (in thousand tonnes)

	Peas (Matar)	Chickpea (Chana)	Lentil (Masoor)	Pigeonpea (Tur/Arhar)	Urad & Moong
2013-14	1330.43	276.13	708.71	465.82	624.23
2014-15	1951.97	418.88	816.47	575.22	622.89
2015-16	2245.39	1031.49	1260.19	462.71	581.60
2016-17	3172.76	1080.63	829.44	703.54	574.52

2017-18	2877.03	981.32	796.62	412.95	346.97
2018-19	851.41	185.95	248.97	530.67	574.24
2019-20	666.70	370.67	854.46	449.78	381.52
2020-21	46.33	294.53	1116.17	442.62	416.63
2021-22	0.85	202.10	667.43	840.46	807.17
2022-23	0.86	62.92	858.44	894.42	556.71
2023-24	1176.11	284.68	1676.09	771.02	628.51

*Look out for the trends of imports from the chart.

Reversal of improved pulse production:

- The **resurgence in imports** marks a **reversal** of the relative **self-sufficiency** achieved by the country, with **domestic pulses production** increasing from **16.32 mt** to **27.30 mt** between **2015-16** and **2021-22**.
- That was **enabled** by **government policy measures** incentivising farmers to grow pulses.
- These included **MSP-based procurement** and **levying of duties** leading to a **near stoppage of imports**, particularly of **yellow/white peas (matar)** and **chana**, by **2022-23**.
- **Domestic production** got a further **boost** with the **breeding** of **short-duration chana and moong varieties**, making it possible to **cultivate** these with **little or no irrigation**, using the **residual soil moisture** left by the previous crops.
- The **50-75 day varieties of moong** now **allow** planting of as many as **four crops a year: kharif (post-monsoon), rabi (winter), spring and summer**.

Government policy to reduce food inflation:

- Government policy responses to tackle **food inflation** included **lifting tariffs** and **quantitative restrictions** on **pulse imports**.
- These measures were partly due to **El Niño** and **electoral pressures** to **control dal prices**.
- For instance, **restrictions on yellow/white pea imports** and **tariffs on chana** were **removed**, **boosting imports** from countries like **Canada, Australia, Russia, and Africa**.

Future prospects:

- The future of dal prices depends on the upcoming **southwest monsoon**.
- Climate models suggest a **possible transition** from **El Niño** to **La Niña**, which could bring good rainfall.
- However, given the **low domestic supply** and **monsoon uncertainties**, **higher imports are expected to continue**.
- The government has **allowed duty-free imports** of **several pulses** until **March 31, 2025**, and may need to extend this for **yellow/white peas** beyond **October 31, 2024**.
- **Imports** of these **cheaper pulses** are likely to **increase**, substituting more expensive varieties in the market.

In 1950-2015, the Hindu population dipped from 85% to 78%, and Muslims rose to 14% from 10% — PM-EAC paper

Subject: Geography

Sec: Human geo

Context:

- A working paper of the **Economic Advisory Council to the Prime Minister (EAC-PM)** was released on the **share of religious minorities in 167 countries, including India**.

Key Findings:

- The **share of the Hindu population in India** decreased by **7.82%** from **1950** to **2015**, declining from **84.68%** to **78.06%**.
- **Muslim population in India** rose significantly by **43.15%**, increasing from **9.84%** in **1950** to **14.09%** in **2015**.
- **Other religious minorities in India except for Parsis and Jains** saw an **increase** in their population share up to **6.58 percent**.
- **Christians, Sikhs, and Buddhists all experienced growth**, whereas **Jains (from 0.45 to 0.36 per cent)** and **Parsis** saw a **decline**, with **Parsis** witnessing a substantial **85% reduction**.
- **Globally, the majority religious group's share decreased** in **123** out of **167 countries** studied, reflecting a **trend towards greater religious heterogeneity**.

Regional Comparison:

- In contrast to **India**, neighbouring countries like **Bangladesh, Pakistan, Sri Lanka, Bhutan, and Afghanistan** have seen an **increase** in the share of their **majority religious groups** and an **alarming decline in minority populations**.

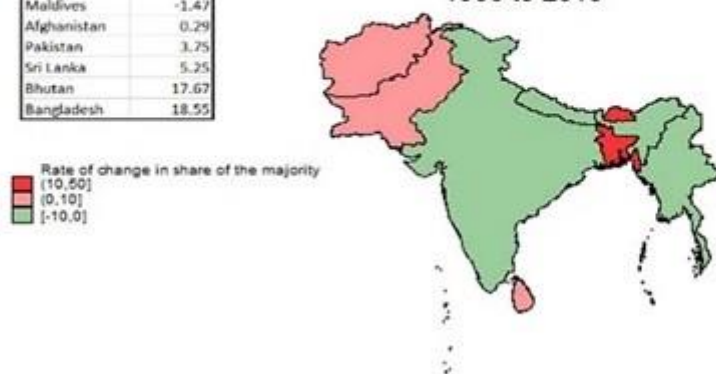
- The **Indian subcontinent** (excluding **Maldives** where a **slight decrease of 1.47 per cent occurred**) generally showed **growth** in the **Muslim-majority populations**.
- Among the **five non-Muslim majority countries**, **Myanmar, India and Nepal** saw a **decline** in the share of the **majority religious denomination** while **Sri Lanka and Bhutan** saw their share **increase**.

RATE OF CHANGE IN SHARE OF THE MAJORITY RELIGION IN MYANMAR AND SAARC COUNTRIES

Sl. No.	Country	Religious denomination (1950)	Major Religion (1950)	Majority Religion Share (1950)	Majority Religion Share (2015)	Rate of change in share	Religious denomination (2015)
1	Myanmar	Theravada Buddhists	Buddhist	78.53	70.80	-9.84	Theravada Buddhists
2	India	Hindus	Hindus	84.68	78.06	-7.82	Hindus
3	Nepal	Hindus	Hindus	84.30	81.26	-3.61	Hindus
4	Maldives	Shafii Sunnis	Muslim	99.83	98.36	-1.47	Shafii Sunnis
5	Afghanistan	Hanafi	Muslim	88.75	89.01	0.29	Hanafi
6	Pakistan	Hanafi	Muslim	77.45	80.36	3.75	Hanafi
7	Sri Lanka	Theravada Buddhists	Buddhist	64.28	67.65	5.25	Theravada Buddhists
8	Bhutan	Tibetan Buddhists	Buddhist	71.44	84.07	17.67	Tibetan Buddhists
9	Bangladesh	Hanafi	Muslim	74.24	88.02	18.55	Hanafi

Country	Rate of change in share
Myanmar	-9.84
India	-7.82
Nepal	-3.61
Maldives	-1.47
Afghanistan	0.29
Pakistan	3.75
Sri Lanka	5.25
Bhutan	17.67
Bangladesh	18.55

Religious Demographic Changes
1950 to 2015



Global Perspective:

- Globally, the **share of the majority population** has **decreased** in **123 countries** while it **went up** in **44 countries only**.
 - In **1950, Animism** had a **majority status** in **24 countries** (almost all of them in Africa). **Animism** did not just lose its share in the overall population but it is **no longer a majority population** in any of these **24 countries by 2015**.
- The **global decline in majority religious groups** is **marked**, particularly among **Christian-majority countries** where **77 out of 94 reported decreases**.
- Conversely, **Muslim-majority countries** mostly saw **increases**, with **25 out of 38** noting **growth**.

- Of the **eight member countries** of the **South Asian Association for Regional Cooperation (SAARC)** and **Myanmar**, the **share of the majority religious denomination** has **decreased in four** while it **increased in five**.
- The **Indian subcontinent** accounts for **one-fifth of the global population**.

RELIGION-WISE CHANGE IN SHARE OF MAJORITY RELIGIOUS GROUP GLOBALLY

Major Religion in 1950 (number of countries)	Number of Countries with Reduced Majority Share in 2015	Number of Countries with Increased Majority Share in 2015
Animists (24)	24	0
Buddhist (7)	5	2
Chinese Folk (1)	1	0
Christian (94)	77	17
Hindus (2)	2	0
Muslim (38)	13	25
Not Religious (1)	1	0
Grand Total (167)	123	44

What are the Implications?

- The data suggests that **India** offers a **relatively conducive environment** for the **diversity** and **growth of minority religions** and is the outcome of **“progressive policies and inclusive institutions”**, contrary to the **decrease in minority populations in many neighbouring countries**.
- The paper highlights the **role of demographic changes** as a part of **structural transformations in societies**, indicating that these shifts might reflect broader societal trends rather than immediate political conditions alone.

Relevance of the findings:

- The findings are relevant in the context of recent political developments such as **India's Citizenship Amendment Act**, which **aims to provide refuge to persecuted minorities from specific neighbouring countries**.
- The trends underscore the **comparative stability and growth of minority populations in India**, a notable contrast to patterns observed in some other **South Asian countries**.

Indian forces using Kuki and Myanmar groups to wage war: NSCN

Sub: Geography

Sec: Human geo

Tag: Kuki

Context:

- The **Indian armed forces** are using a **Kuki extremist outfit** and a **pro-democracy armed group in civil war-torn Myanmar** to wage a war against the **Naga Army** along the **India-Myanmar border**, the **National Socialist Council of Nagalim (NSCN)** said.

Details:

- The NSCN said the **Assam Rifles (AR)** and the **India Army's para regiment** have been using the **Kuki National Army (Burma)**, or **KNA(B)**, and the **People's Defence Force (PDF)** for a proxy war to kill its members.
- The **KNA(B)** has a **Manipur-based wing** called the **KNA**.
- The **PDF** is the **armed wing** of the **exiled National Unity Government** that has been fighting the **Tatmadaw**, which staged a **coup** on February 1, 2021.
 - The **Tatmadaw** or **Sit-Tat** is the **military of Myanmar**. It is administered by the **Ministry of Defence** and composed of the **Myanmar Army**, the **Myanmar Navy** and the **Myanmar Air Force**.
- The **Assam Rifles** is in charge of **guarding the 1,643 km India-Myanmar border**.
- The NSCN claimed the **Indian armed forces** supplied **combat materials** to the **KNA(B)** and the **PDF** in **Myanmar's Chin Province** bordering **Mizoram and Manipur**.
- **Phaiyang** is a village in **Myanmar** close to the **border with India** facing **Namlee village** in **Manipur's Kamjong district**.

List of extremist/insurgent organizations of the Northeast region declared as "unlawful associations" and/or "terrorist organizations" under the Unlawful Activities (Prevention) Act, 1967:

Name of group	Listed/declared as
ASSAM	
(i) United Liberation Front of Assam (ULFA)	Terrorist organization and unlawful association
(ii) National Democratic Front of Bodoland (NDFB)	-do-
(iii) Kamtapur Liberation Organization (KLO)	Terrorist organization
MANIPUR	
(i) People's Liberation Army(PLA) and its political wing the Revolutionary People's Front(RPF)	Terrorist organization and unlawful association
(ii) United National Liberation Front(UNLF) and its Armed wing the Manipur People's Army(MPA)	-do-
(iii) Peoples' Revolutionary Party of Kangleipak(PREPAK)	-do-
(iv) Kangleipak Communist Party (KCP)	-do-
(v) Kanglei Yaol Kanba Lup (KYKL)	-do-
(vi) Coordination Committee [Cor-Com]	Unlawful association
(vii) Alliance for Socialist Unity Kangleipak (ASUK)	-do-
(viii) Manipur People's Liberation Front(MPLF)	Terrorist organization
MEGHALAYA	
(i) Hynniewtrep National Liberation Council (HNLC)	Unlawful association
(ii) Garo National Liberation Army (GNLA)	Terrorist organization
TRIPURA	
(i) All Tripura Tiger Force (ATTF)	Terrorist organization and unlawful association
(ii) National Liberation Front of Tripura (NLFT)	-do-
NAGALAND	
(i) The National Socialist Council of Nagaland (Khaplang) [NSCN/K]	Terrorist organization and unlawful association

Main ethnic groupings of Manipur:

- The **Meitei, Naga and Kuki-Zomi-Mizo** are the **three main ethnic groupings** in Manipur.
- The **Meiteis**, the **largest community**, account for about **53%** of the State's total population of 27.21 lakh (2011 Census).
- The **Nagas** and the **Kuki-Zo** which are categorised into **34 Scheduled Tribes** constitute **17%** and **26%** of the population respectively.

Suspension of Operation (SoO):

- **Suspension of Operations (SoO)** is a **tripartite agreement** between the **Government of India, the Manipur government, and Kuki-Zo insurgent groups** that was signed in **2008**.
- The agreement requires insurgents to remain in designated camps and keep their weapons in locked storage for regular monitoring.

Naga Insurgency and origin of NSCN:

Background:

- The **Naga National Council (NNC)** was formed in **April 1946** to carry out social and political upliftment of the Nagas.
- After the return of the radical leader of the Naga cause, **Angami Zapu Phizo**, from **Burma** in **1947**, the faction of **NNC** demanding **full impendence** grew strong.

Shillong Accord and the split of NNC:

- The **Shillong Accord** was signed in **1975** by the **Government of India** with a section of the **NNC** leaders.
- As part of the accord, the leaders agreed to abjure violence and work towards the solution of the Naga problem within the framework of the Indian Constitution.
- It was opposed by **Phizo, Isak Swu and Muivah**. Later, **Isak Swu and Muivah** formed the "**National Socialist Council of Nagaland (NSCN)**" in **January 1980**.
- Later, **NSCN** split into **two factions**, namely **NCSN (I-M)** led by **Isak & Muivah** and **NCSN (K)** led by **Khaplang**.

Demand for Greater Nagaland:

- **The NSCN-IM has been demanding:**
 - **'Greater Nagaland,'** an extension of **Nagaland's borders** by including **Naga-dominated areas** in neighbouring **Assam, Manipur and Arunachal Pradesh**, to unite more than 1.2 million Nagas,
 - a **separate flag** and
 - a **constitution**.

Naga Peace Accord:

- Since 1997, **NSCN (I-M)** has been involved in negotiations with the **Government of India** and **signed many ceasefire agreements**.

2015 Framework Agreement (FA)

- On **August 3, 2015**, the Centre signed a framework agreement with the **NSCN (I-M)** to resolve the **Naga issue**.

- The agreement was **only** a framework, with many details still to be hammered out.
- Talks were being held regularly to chart out the finer details of the FA.
- In **June 2022**, talks **broke down** after the NSCN accused the **interlocutor** appointed by the Centre of **excluding three political points**.

About Assam Rifles:

- The Assam Rifles, one of the central armed police forces, is the leading counter-insurgency force in the Northeast.
- **Background:**
 - It is the **oldest paramilitary force** in India.
 - The unit can trace its lineage back to a **paramilitary police force** that was formed under the **British** in **1835** called **Cachar Levy**.
 - Since then, the **Assam Rifles** have undergone a number of name changes—the **Assam Frontier Police (1883)**, the **Assam Military Police (1891)** and **Eastern Bengal and Assam Military Police (1913)**, before finally becoming the **Assam Rifles in 1917**.
 - **Role:** It is tasked with the maintenance of law and order in the North East along with the Indian Army and also guards the Indo-Myanmar border in the region.
 - It is also known as ‘**Sentinels of the Northeast**’.
 - **HQ:** Shillong, Meghalaya.
 - **Motto:** Friends of the Hill People.
- **Control:**
 - It is the **only paramilitary force** with a **dual control structure**.
 - While the **administrative control** of the force is with the **Ministry of Home Affairs**, its **operational control** is with the **Indian Army**, which is under the **Ministry of Defence**.



India-Myanmar border:

- India and Myanmar share a **1,643-km border** along the **Northeastern states of Manipur, Mizoram, Nagaland and Arunachal Pradesh**.
- It is a porous border of which **only 10 km is fenced in Manipur**.



About Free Movement Regime (FMR):

- The **FMR with Myanmar** was **formalized in 2018** following the agreement between **India** and **Myanmar** on land border crossing.
- It allowed **tribes living along the border on either side to travel up to 16 km inside** the other country without a visa and stay up to two weeks.
- It was implemented in **2018** as part of the **Narendra Modi government’s Act East policy**.

Benefits of FMR:

- **FMR** is considered an “enabling arrangement for movement of people” which would “facilitate regulation and harmonization” of the already existing free movement rights of people living along this border.
 - The **Chin people living in the Chin state of Myanmar** is contiguous with **Mizoram** and are of the same ethnicity as the **Mizos** and the **Kuki-Zomis of Manipur**.
 - There is also a sizable **Naga population in Myanmar** residing largely in the **Naga Self-Administered Zone** in **Myanmar’s Sagaing region**.
- The **Mizo-Chins and Nagas** on both sides of the border share close **social, economic and day-to-day ties**.

Why did the Indian government end FMR?

- **Security issues with respect to the FMR.**
- **To check the influx of illegal immigrants, drugs and gold smuggling.**
- To “**stop the misuse of FMR**” by insurgent groups to carry out attacks on the Indian side and **escape into Myanmar**.
- “**Fears of a demographic change**” which had been triggered by the settling of “**Kuki brothers**” in the forests of **Manipur**.

Brazil's Amazon fires off to record 2024 start as green union blames firefighting budget cut

Sub: Geography

Sec: Mapping

Context:

- Brazil's Amazon rainforest has experienced its largest blazes on record in the first four months of the year

Details:

- Partial blame on **lower government spending** on firefighting.
- **President Lula da Silva** aims to protect the Amazon and enhance Brazil's climate policy leadership.
- **Record drought**, driven by **El Nino** and **global warming**, contributing to **dry conditions and fires**.
- **Fires** are generally ignited by people clearing land for agriculture.
- The firefighting budget for **environmental agency Ibama** is **24% lower** than in 2023.
- 380 firefighters were sent to the **hardest-hit northern Amazon state of Roraima**.

Brazilian Institute of Environment and Renewable Natural Resources (IBAMA):

- **Ibama** is a **federal agency** under the **Ministry of Environment**, which has the following purposes: exercise the environmental police role; implement proceedings of the national policies for the environment related to environmental permits, environment quality control, authorization of use of natural resources and its supervision, environmental monitoring and control; and perform subsidiary actions of Union competence in compliance with environmental regulations.

ASCEMA:

- The **Brazilian National Association of Environmental Careers (ASCEMA)** is a nonprofit that organizes the **rights of workers** from an **environmental perspective**.

About the Amazon rainforest:

- The **Amazon rainforests** cover about **80 per cent** of the basin and as per **NASA’s Earth Observatory**, they are home to nearly a **fifth of the world’s land species** and are also home to **about 30 million people** including **indigenous groups** and several isolated tribes.
- The **Amazon basin** is huge with an area covering **over 6 million square kilometres**, it is nearly **twice the size of India**.
- The **Amazon forests** have absorbed **CO2** from the atmosphere, helping to moderate the global climate
- The basin produces **about 20 per cent** of the **world’s flow of freshwater** into the oceans. Over the last few years, the forest has been under threat due to deforestation and burning.
- Forest fires have doubled since 2013.



- **Pantanal wetland:**

- The **Pantanal** is a **natural region** encompassing the **world's largest tropical wetland area** and the **world's largest flooded grasslands**.
- It is located mostly within **Brazil** and extends to some portions of **Bolivia** and **Paraguay**.
- It is fed through the **Paraguay River** and tributaries.

Myanmar junta revives plans for China-backed mega-dam

Sub: Geography

Sec: Mapping

Tags: Myitsone dam, Myanmar junta revives plans for China-backed mega-dam

Context:

- **Myanmar's junta** has revived plans for a **\$3.6 billion Chinese-backed dam** in the north of the country that was suspended more than 10 years ago following huge public opposition.

Details:

- Myanmar is a vital piece of **China's Belt and Road Initiative**, Xi's flagship **\$1 trillion project** that includes **maritime, rail and road projects** in **Asia, Africa and Europe**.
- Last year an **alliance of ethnic minority armed groups** seized swathes of territory in **Shan state** along the **border** with **China's Yunnan province**.

Myitsone dam:

- The project to build the **6,000-megawatt Myitsone dam** in **northern Kachin state** was ended in 2011 under a previous junta.
- The dam will be built on the **Ayeyarwady River**.
- It would have exported around **90%** of the **power** it generated to **China**.
- A **World Wide Fund for Nature (WWF) report** in **2018** estimated that some **34 million people** in **Myanmar** live in the **Ayeyarwady basin**, roughly two-thirds of the country's population.
- Animals potentially impacted due to dam construction include the **endangered Irrawaddy dolphin** and the **critically endangered Ganges shark**.



Ayeyarwady River:

- **The geographical source:** Ridong Qu headwaters, southeast Tibet, China.
- The **Irrawaddy River** (official Romanisation: **Ayeyarwady**) is the **largest river in Myanmar**.
- Originating from the **confluence** of the **N'mai** and **Mali** rivers, it flows from north to south before **emptying** through the **Irrawaddy Delta** in the **Ayeyarwady Region** into the **Andaman Sea**.
- **Tributaries:**
 - **Left:** Chindwin River, Mu River
 - **Right:** Myitnge

History

Three Indian literary works included in UNESCO's Memory of the World Regional Register: What is their significance?

Sub: History

Sec: Art and Culture

Tag: UNESCO's Memory of the World Regional Register

Context:

- Three Indian literary works, Ramcharitmanas, Panchatantra, and Sahṛdayaloka-Locana, were added to UNESCO's Memory of the World Asia-Pacific Regional Register.

More on news:

- The tenth meeting of the Memory of the World Committee for Asia and the Pacific (MOWCAP) was held earlier this week in Ulaanbaatar, Mongolia.

What is UNESCO MOWCAP?

- **The Memory of the World Programme is an international programme aimed at safeguarding, preserving and facilitating access to and the use of documentary heritage.**
- **UNESCO launched the Program in 1992.**
- The Programme includes the inscription of significant documentary heritage on national, regional and international registers.

What is the significance of the works?

Ramcharitmanas:

- **Ramcharitmanas** is an epic poem in the Awadhi language, composed by the 16th-century Indian bhakti poet Tulsidas (c. 1511–1623).
- **It has many inspirations, the primary being the Ramayana of Valmiki.**
- This work is also called, in popular parlance, **Tulsi Ramayana, Tulsikrit Ramayana, Tulsidas Ramayana** or simply **Manas**.
- The word Ramcharitmanas literally means "Lake of the deeds of Rama".
- Tulsidas began writing the **Ramcharitmanas in Ayodhya in Vikram Samvat 1631 (1574 CE)**.

- Another version was written in Arabic in the 18th century, highlighting the appeal of the text for West Asia and other parts of the world as well, according to Gaur.
- The Ramayana and Ramcharitmanas are read in not only India but also in other Southeast Asian countries such as Cambodia, Thailand, Sri Lanka, and Indonesia.

Panchatantra:

- The **Panchatantra is an ancient Indian collection of interrelated animal fables in Sanskrit verse and prose, arranged within a frame story.**
- The surviving work is dated to about 200 BCE, but the fables are likely much more ancient.
- **Vishnu Sharma** was an Indian scholar and author who wrote the Panchatantra, a collection of fables
- It is likely a Hindu text, and based on older oral traditions with animal fables that are as old as we are able to imagine.
- The Panchatantra fables were zeroed in owing to their universal moral values.

Sahrdyaloka-Locana:

- The Sahrdyaloka-Locana by **Acharya Anandvardhana** is a critical work that explores aesthetics and literary theory, shaping Indian literary discourse.
- The **15th-century Sahrdyaloka-Locana, by Kashmiri scholars Acharya Anandvardhan and Abhinavagupta, was chosen because of its aesthetics.**

What is the MoW register?

- **UNESCO's MOW programme is an international cooperation strategy aimed at safeguarding, protecting, and facilitating access to and the use of documentary heritage, especially heritage that is rare and endangered.**
- UNESCO launched the initiative in **1992 "to guard against collective amnesia"**.
- It aimed at the preservation of invaluable archive holdings and library collections all over the world and ensuring their wide dissemination.
- The programme recognises documentary heritage of international, regional and national significance, maintains registers of it, and awards a logo to identified collections.
- It facilitates preservation and access without discrimination.
- It campaigns to raise awareness of the documentary heritage to alert governments, the general public, businesses and commerce to preservation needs and to raise funds.

What are the other items on the list?

- There are 494 inscriptions on the International MoW Register, as of May 2023, according to the UNESCO website.
- It was established in **1998, the MOWCAP Regional Register has inscribed 65 items from Asia-Pacific countries.**
- Along with the three Indian items on the list, the Member States inscribed 20 items during the 2024 cycle, at the tenth General Meeting in Ulaanbaatar.
- These included three each from **China and Indonesia, and two each from Malaysia, Mongolia, the Philippines, and Uzbekistan.**
- Documents recording significant innovations in business and industrial technology were recognised, such as tea-drinking business entrepreneurship in China.
- Globally applied sugar research and regional cement production in Indonesia.
- Regional literary traditions were celebrated through the recognition of the Philippines' Indigenous Hinilawod chants, the East Asian legend of the Nine Tripods found on the bronze bas-reliefs in Viet Nam's Nine Dynastic Urns.

Archaeologist finds first evidence of rock art in form of footprints in Mangaluru city

Sub : History

Sec: Art and Culture

Tags: Rock Art, Mangaluru city

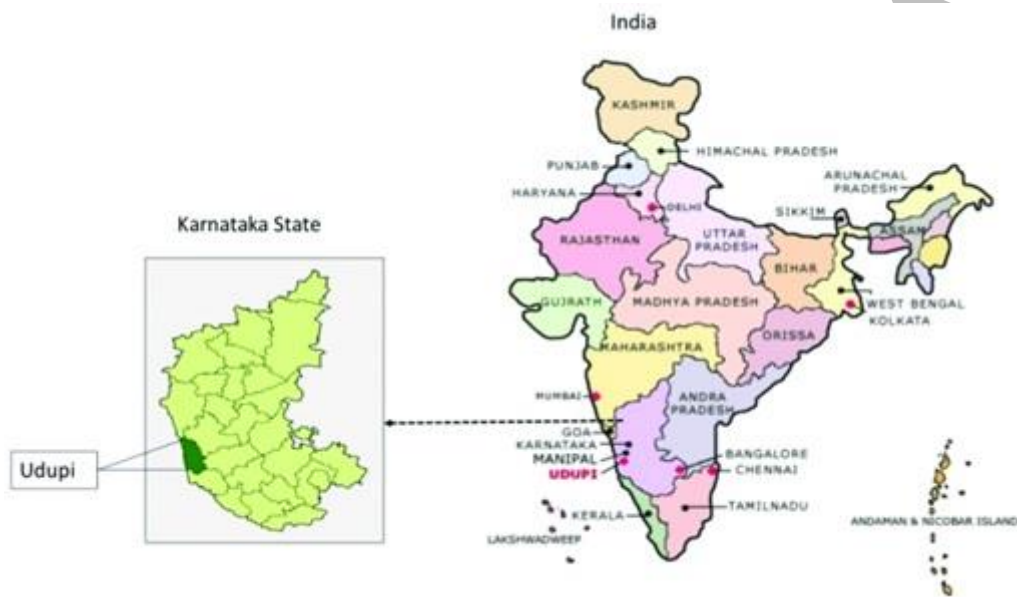
Context:

- The **first evidence of rock art in Mangaluru city** has been found near **Boloor Panne Koteda Babbu Swamy shrine.**



Details of the discovery:

- The rock art is in the form of a **pair of human footprints**.
- Found on a **natural stone boulder** near the shrine.
- These footprints might have been created in the **first or second century A.D.**



Significance:

- **Rock art** refers to **paintings and rock paintings**, which were **unquestionable cognitive evidence** of **illiterate societies**.
- This discovery is part of the work of **recreating the history of Babbu Swamy**.
- This discovery gives a clue to search for **similar art forms** near **other shrines of Babbu Swamy**.
- Need further exploration to know the **origin of Babbu Swamy**, a revered legend of the region.

Babbu Swamy:

- In **Tulunad (Karnataka)**, two types of Daivas are worshipped.
- One type is those Daivas who come to this land with the purpose of achieving some objective.
- The other kind of Daivas are those who are **born in this world like humans** and later on become **Daivas**. **Babbu Swamy** comes under this type.
- **Babbu** was born in **Kemmannu**, a small place near **Udupi** in a **Dalith family**.

Previous discoveries:

- A **rock site** in **Buddhanajeddu** in the **Udupi district** was discovered in 2009, an important **rock art site** near **coastal Karnataka**.
- The site has **more than 20 footprints** on the **laterite surface**, and it belonged to the **first or second century A.D.**
- There was **evidence of pottery and stone tools** of the **Neolithic period** at the **Buddhanajeddu site**.

Portion of Hampi's Virupaksha temple collapses: What is its history and the threats it faces today?

Sub: History

Sec: Art and Culture

Context:

- The **Virupaksha temple pavilion** in **Hampi, Karnataka**, collapsed on May 21 due to **heavy rains**.

Details:

- The pavilion (saalu mantap) suffered damage, with allegations of neglect directed at the Archaeological Survey of India (ASI).
- The stone pillars of the pavilion weakened over time due to natural wear and heavy rains.
- A committee has been formed to assess the damage and restoration needs.
- **Restoration Efforts:**
 - ASI began restoration in **2019**, with two phases completed by The pavilion was slated for future restoration.

Restoration Challenges:

- **Funding, logistics, and sourcing the original type of stone** pose challenges.
- The restoration of the pavilion is estimated to cost **Rs 50 lakhs** and take **three to four months**.
- **Broader Preservation Concerns**
- **Rs 8 crore** was allocated last year for **regional monument restoration**.
- **Continuous worship and commercial activities** around the temple impact its preservation. **UNESCO** highlights the need to balance modern use with conservation efforts.

Virupaksha Temple:

- Located in **Hampi** in the **Vijayanagara** district of **Karnataka, India**.
- The temple dates back to the **7th century**, gaining prominence in the **14th century** under the **Vijayanagara Empire (1336 to 1646)**.
- The temple is dedicated to **Sri Virupaksha**.
- The temple was built by **Lakkan Dandesha**, a **nayaka (chieftain)** under the ruler **Deva Raya II**, also known as **Prauda Deva Raya** of the **Vijayanagara Empire**.
- It exemplifies **Dravidian architecture** with **grand gopurams (towering gateways)**, intricate carvings, and a **sanctum sanctorum** housing a **Shiva lingam**.
- Historians say **all temples had pavilions** where **traders sold articles**, such as those used in **worship**. Sometimes **devotees** visiting the temple also camped under the pavilions.
 - There is also a **Virupakshini Amma temple (mother goddess)** in a village called **Nalagamapalle, Chittoor district, Andhra Pradesh**, approximately 100 km from Tirupati.
- **‘Kalyanamantapa’**, is a notable feature in the temple construction in **Vijayanagar kingdom**.
- **Hampi**, the **empire’s capital**, was a **vital centre for religious and cultural activities**, now recognized as a **UNESCO World Heritage Site**.



Vijayanagar empire:

- The Vijayanagara Empire witnessed the reign of **four dynasties: Sangama, Saluva, Tuluva, and Aravidu**.
- Founded by the brothers **Harihara I** and **Bukka Ray I** of the **Sangama dynasty**, members of a **pastoralist cowherd community** that claimed **Yadava lineage**.
- The **Vijayanagara Empire** expanded from a **strategic position** on the banks of the **Tungabhadra River** to become one of the most powerful kingdoms of its time.
- The Empire stands today as **evidence** of what is known as the **last ‘great Hindu empire’ of South India**.

- It at its height ruled the lands of the modern states of **Karnataka, Andhra Pradesh, Tamil Nadu, Kerala, Goa, and some parts of Telangana, Maharashtra and some parts of Sri Lanka.**
- The wealth and fame of the empire inspired visits by and writings of medieval European travellers such as **Domingo Paes, Fernão Nunes, and Niccolò de' Conti.**
- The **empire** lasted until **1646**, although its **power greatly declined** after a **major military defeat** in the **Battle of Talikota** in **1565** by the **combined armies** of the **Deccan sultanates.**



Sources of the Vijayanagara Empire

Literary Sources	Sources	Information
Foreign Travelers' Accounts	<ul style="list-style-type: none"> • Rehla or Tuhfat-un-Nuzzar by Ibn Battuta (Moroccan traveler) 	<ul style="list-style-type: none"> • Account of the empire under Harihara I.
Indigenous Works	<ul style="list-style-type: none"> • Amuktamalyada by Krishnadevaraya • Manucharitam by Allasani Peddan • Gangadasa Pratapa Vilasam by Gangadhara 	<ul style="list-style-type: none"> • Polity and political ideas of the ruler's society and caste system
Archaeological Sources	<ul style="list-style-type: none"> • Salu Vabhyudayam by Rajanatha Dindima 	<ul style="list-style-type: none"> • A contemporary drama deals with the siege of Vijayanagara city by Bahmanis and the Gajapatis of Orissa after the death of DEVA Raya II Historical Ecology of the Saluva Dynasty,
Inscriptions	<ul style="list-style-type: none"> • Bagpelsi copper plate inscription, Bitragunta grant of Sangama II – Channa Raya Patika inscription of Harihara II – Srirangam copper plates of Deva Raya II • Devulapalli copper plates of Immadi Narasimha 	<ul style="list-style-type: none"> • Achievements of Harihara I Genealogy of 5 Sangama brothers Successful invasions of Bukka I Achievements of Bukka I Genealogy of Saluva Dynasty

IR

How diplomatic passports, visa regimes work

Subject: IR

Sec: Int convention

Context:

- After allegations of sexual abuse by Janata Dal (Secular) MP Prajwal Revanna came to light, the politician fled to Germany on a diplomatic passport.

What is a diplomatic passport? Who can get one?

- Unlike normal passports, which have dark blue covers and are valid for **10 years (for adults), diplomatic passports have maroon covers, and are valid for five years or less.**
- Holders of such passports are entitled to **certain privileges and immunities as per the international law.**
- Various immunities available to **diplomatic passport holders are immunity from arrest, detention, and certain legal proceedings in the host country.**

- The MEA's Consular, **Passport & Visa Division issues diplomatic passports ('Type D' passports)** to people falling in broadly five categories:
 - those with diplomatic status;
 - government-appointed individuals traveling abroad for official business;
 - officers working under the branches A and B of the Indian Foreign Service (IFS), normally at the rank of Joint Secretary and above; and
 - relatives and immediate family of officers employed in IFS and MEA.
 - Diplomatic passports are also issued to select individuals who are authorized to undertake official travel on behalf of the government.
 - This includes union ministers and MPs who often travel abroad representing the government. The validity of these passports is concurrent with the term of the MP.



Why did Prajwal Revanna not need a visa to travel to Germany?

- **Germany is among the 34 countries** with whom India has operational visa exemption agreements for holders of diplomatic passports.
- According to a **reciprocal deal signed in 2011, holders of Indian diplomatic passports do not require a visa to visit Germany, provided their stay does not exceed 90 days.**
- India has similar agreements with countries such as **France, Austria, Afghanistan, Czech Republic, Italy, Greece, Iran, and Switzerland.**
- India also has agreements with 99 other countries wherein apart from **diplomatic passport holders**, even those holding service and official passports can avail operational visa exemption for stays upto 90 days.
- Countries in this list include **Bahrain, Brazil, Egypt, Hong Kong, Oman, Singapore, and the United Arab Emirates.**

Who can revoke a diplomatic passport?

- As per the Act, the passport authority may impound or revoke a passport in the following cases:
 - **if the holder is in wrongful possession, or**
 - **if it was obtained by the suppression of material information; or**
 - **if the passport authority deems it necessary to do so in the interests of the sovereignty and integrity of India, or**
 - **friendly relations of India with any foreign country.**
- It can also be revoked if the holder has, after the issue of the passport, been convicted by a court in India, and sentenced to imprisonment for not less than two years.
- Finally, a diplomatic passport can be revoked upon orders from a court during proceedings with respect to an offense allegedly carried out by the passport holder before a criminal court.

About Visas:

A visa is an **official document that allows the bearer to legally enter a foreign country.**

The visa is **usually stamped or glued into the bearer's passport.**

There are several different types of visas, each of which afford the bearer different rights in the host country.

About Henley Passport Index:

Henley Passport Index is the **only one of its kind based on exclusive data from the International Air Transport Authority (IATA).**

India ranks 80th in the 2024 **Henley Passport Index.**

France, Germany, Italy, Japan, Singapore, and Spain hold the top spot.

India's passport facilitates visa-free access to 62 countries.

Antarctic Parliament meets in Kochi: What's on the table?

Sub: IR

Sec: Int Conventions

46th Antarctic Treaty Consultative Meeting (ATCM 46)

- Also known as **Antarctic Parliament**
- **Host:** India
- **Location:** Kochi, Kerala
- **Organizer:** National Centre for Polar and Ocean Research, Goa, through the **Ministry of Earth Sciences (MoES)**
- **Participants:** 56 member countries of the **Antarctic Treaty**
- **India** had **last hosted** the ATCM in **New Delhi** in **2007**.

Agenda for ATCM 46:

- Law, logistics, governance, science, and tourism in Antarctica
- Promoting peaceful governance
- Ensuring geopolitical tensions do not impact Antarctica's protection
- **Tourism Regulation:**
 - Introduction of a new working group for tourism regulation
 - Collaboration with **Netherlands, Norway, and other European countries**
 - Formulating regulations and tracking **tourist activities** to protect **Antarctica's ecosystem**
- **Construction Plans:**
 - Officially tabling the plan for **Maitri II**
 - Seeking **ATCM's approval** for new constructions
- **Other Discussions:**
 - Sustainable management of Antarctica's resources
 - Biodiversity prospecting
 - Inspections and data exchange
 - Research collaboration, capacity building, and cooperation
 - Climate change impacts on Antarctica and beyond

The Antarctic Treaty:

- The **Antarctic Treaty** effectively designated **Antarctica** as a "**no man's land**", outside the bounds of international geopolitical competition.
- **Original Signatories (1959):** Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, USSR, UK, USA
- **Signed on December 1, 1959** and **came into force in 1961**.
- **Total Members:** 56 countries (**India** joined in **1983**)
- **Key Features:**
 - Antarctica for peaceful purposes only; no militarisation or fortification
 - Freedom for scientific investigations; sharing of scientific plans, cooperation, and data
 - Prohibition of nuclear testing and radioactive waste disposal

India's Involvement in Antarctica:

- **Consultative Party Status:** Since **1983** (one of 29 consultative parties)
- **Research Stations:**
 - **Dakshin Gangotri:** Established in 1983, 2,500 km from the **South Pole** in **Queen Maud Land**. Operated till 1990.
 - **Maitri:** Established in 1989, operational, located in **Schirmacher Oasis**, a 3-km wide ice-free plateau with over 100 freshwater lakes.
 - Located about 5 km from **Russia's Novolazarevskaya Station**, and 90 km from **Dakshin Gangotri**.
 - **Bharati:** Established in 2012, located on the **Prydz Bay coast**
 - **Use:** Oceanographic and geologic study, the Indian Space Research Organisation (ISRO) utilises it for receiving Indian Remote sensing Satellite (IRS) data.

- **Future Plans:** Construct **Maitri II**, operational by 2029
- **Legislation:** Enacted the **Antarctic Act in 2022**



About the India's Antarctica Act of 2022:

- It is the **first domestic legislation** with regard to **Antarctica** in **India**.
- It seeks to **extend the application of domestic laws** to research stations set up by India in the Antarctic region.
- The Act now puts into place a **comprehensive list of regulations** related to Antarctica, for such scientific expeditions, as well as for individuals, companies and tourists
- The Act **prohibit** Indian expedition to Antarctica **without a permit or written authorisation** of another party to the Antarctic Treaty, provide for inspection by an officer appointed by the government and for penalty for contravention of certain provisions of the legislation.
- It also seeks to **constitute a fund for the welfare of Antarctic research work** and protection of the environment of the icy continent.
- The Antarctic Act **extends the jurisdiction of Indian courts to Antarctica**, for crimes on the continent by Indian citizens, or foreign citizens who are a part of Indian expeditions.
- The Act **prohibits an extensive list of actions on the continent**, including **drilling, dredging, excavation or collection of mineral resources**.
 - An exception can be made if it is done for scientific research with a granted permit.
- It also **restricts** individuals from damaging the environment, including native plants, birds and seals.
- It **disallows** flying or landing helicopters or operating vessels that can disturb the native animals.
- It **prohibits** any activity that could harm the habitat of birds and animals, kill, injure or capture any bird or animal.
- Introducing any non-native animals, birds, plants of microscopic organisms is also **prohibited** under the Act.
- Violating any of the regulations prescribed by the Act will attract high penalties.
 - The lowest penalty comprises an imprisonment between one-two years and a penalty of Rs 10-50 lakh.
- Extraction of any species native to Antarctica, or introduction of an exotic species to the continent can draw imprisonment of seven years and a fine of Rs 50 lakh.

About Antarctica continent:

- Earth's southernmost and least-populated continent.
- Fifth-largest continent on the planet about 40% larger than Europe.
- Antarctica is the **highest continent on Earth**: average elevation is 8,200ft (2500m).
- Antarctica is, on average, the **coldest, driest, and windiest of the continents**.



BIMSTEC acquires 'legal personality' after charter comes into force

Sub: IR

Sec: Int groupings

Context:

- The **Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)** will now be open to new members and observers after a historic first charter of the grouping came into force on 20 May.

Key highlights:

- With the adoption of the charter at the **5th summit of the BIMSTEC leaders**, the grouping has acquired a '**legal personality**' and will be able to enter into structured diplomatic dialogue with other groupings and countries.
- **This BIMSTEC Charter reaffirms India's commitment to a prosperous, peaceful and sustainable neighborhood.**
- **BIMSTEC reflects the synthesis of our Neighbourhood First and Act East policies.**
- Following the pandemic, the leaders of the BIMSTEC nations met virtually on **30 March 2022 under the chairship of Sri Lanka and adopted the charter.**
- The chair of **BIMSTEC was taken up by Thailand after the 5th leaders summit.**
- Last month, Nepal's parliament took up the BIMSTEC charter and ratified it which paved the way for the coming into force of the charter.

About BIMSTEC:

- The **Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)** is a regional multilateral organization.
- Its members lie in the littoral and adjacent areas of the Bay of Bengal constituting a contiguous regional unity.
- Out of the 7 members,
- Five are from **South Asia** –
 - **Bangladesh**
 - **Bhutan**
 - **India**

- **Nepal**
- **Sri Lanka**
- Two are from **Southeast Asia** –
 - **Myanmar**
 - **Thailand**
- This sub-regional organization came into **being in 1997 through the Bangkok Declaration**.
- Initially, it was formed with **four Member States with the acronym 'BIST-EC' (Bangladesh, India, Sri-Lanka and Thailand Economic Cooperation)**.
- It was renamed '**BIMST-EC**' in 1997, following the inclusion of Myanmar.
- With the admission of **Nepal and Bhutan in 2004, the name of the grouping was changed to 'Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation' (BIMSTEC)**.
- The organization received greater attention especially in the backdrop of the near moribund status of the South Asian Association for Regional Cooperation (SAARC) which last met in Kathmandu during November 2014.



Importance of BIMSTEC:

- India is willing to shift its focus from SAARC to BIMSTEC as the latter is in greater harmony with India's 'Act East' policy.
- BIMSTEC not only connects South and Southeast Asia, but also the ecologies of the Great Himalayas and the Bay of Bengal.
- It mainly aims to create an enabling environment for rapid economic development; accelerate social progress; and promote collaboration on matters of common interest in the region.

About SAARC:

- The **South Asian Association for Regional Cooperation (SAARC)** is an economic and political organization of eight countries in South Asia.
- SAARC was established with the signing of the **SAARC Charter in Dhaka on 8 December 1985**.
- SAARC comprises eight Member States: **Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka**.
- The Secretariat of the Association was set up in Kathmandu on 17 January 1987.



Low-lying Maldives seeks easier funding to battle waves

Sub: IR

Sec: Int groupings

Tags: Small Island Developing States (SIDS):

Context:

- **President Mohamed Muizzu** demands **international funding** to combat rising sea levels.

Details:

- **Maldives** contributes just **0.003%** of **global emissions** but faces **severe climate crisis impacts**.
- **Wealthier nations** have a **moral responsibility** to support vulnerable communities like the **Maldives**.
- The **Maldives** needs about **\$500 million** to **mitigate climate change effects**.
- The **tourism-dependent economy** cannot raise these funds independently.
- **Former President Maumoon Abdul Gayoom** initiated **land reclamation** to build an **artificial island above sea level**.
- **President Muizzu** plans a **larger man-made island, "Ras Male,"** with 30,000 apartments.
 - The project is **not eligible for climate funding** as it is considered infrastructure work.

Economic Discrepancy:

- Despite a **higher GDP per capita** than several countries, the **Maldives** is classified as an **emerging economy**.
- This classification excludes the **Maldives** from **cheaper financing options** available to the **lowest-income countries**.
- The **Maldives' tourism industry** skews its **economic metrics**, limiting access to necessary climate funds.

Upcoming SIDS Conference:

- The Maldives will co-chair a **Small Island Developing States (SIDS) conference** in **St John's, Antigua and Barbuda**.
- **Theme:** "Charting the course toward resilient prosperity".
- **SIDS**, often luxury tourism destinations, are **threatened** by **rising sea levels**.
- **SIDS** receive **only about 14%** of the finance that the **least developed countries** get.

About Small Island Developing States (SIDS):

- **SIDS** are a **distinct group of 39 States** and **18 Associate Members of United Nations regional commissions** that face **unique social, economic, and environmental vulnerabilities**.
- The **three geographical regions** in which **SIDS** are located are: **the Caribbean, the Pacific, and the Atlantic, Indian Ocean and South China Sea (AIS)**.
- **SIDS** were recognized as a **special case** both for their **environment and development** at the **1992 United Nations Conference on Environment and Development** held in **Rio de Janeiro, Brazil**.
- They are **highly vulnerable developing countries** as they **suffer from low economic diversification**, often characterised by **high dependence on tourism and remittances**, volatility due to **fluctuations in private income flows** and the prices of raw materials, and debt stress situations.
- For **SIDS**, the **Exclusive Economic Zone (EEZ)**—the ocean under their control—is, on average, **28 times the country's land mass**.
- Thus, for many **SIDS**, the majority of the **natural resources** they have access to come from the ocean.

India backs Palestine's bid for full UN membership

Subject: IR

Section: Int Org

Context:

- A **resolution** was **passed** in the **United Nations** with an **overwhelming majority supporting full membership of Palestine** and pressing the **Security Council** to give "**favourable consideration**" to the bid.

Details of the resolution:

- **Resolution:** 'Admission of new Members to the United Nations', in support of the **State of Palestine's full membership in the UN**.
- Resolution introduced by: **the UAE**, current chair of **Arab League**.
 - **143 votes** in favour, including by **India**.
 - **25 countries** abstained,
 - **9 nations**, including **Israel, the United States, Czechia, Hungary, Argentina, Micronesia, Nauru, Palau, and Papua New Guinea**, voted against the text.
- The **resolution** determined that "**the State of Palestine is qualified for membership in the United Nations**" in accordance with **Article 4** of the **Charter of the U.N.** and "**should therefore be admitted to membership in the United Nations**".
- It recommended that the **Security Council** "**reconsider the matter favourably, in the light of this determination**".

India- Palestine relations:

- **India** was the **first non-Arab country** to recognize the **Palestine Liberation Organisation (PLO)** as the **sole representative of the Palestinian people** in **1974** and recognized the **State of Palestine** in **1988**.
- **India** opened its **Representative Office** to the **Palestine Authority** in **Gaza** in **1996**, relocating it to **Ramallah** in **2003**.

How does a country become a Member of the United Nations?

- **Membership** in the Organization, in accordance with the **Charter of the United Nations**, "**is open to all peace-loving States that accept the obligations contained in the United Nations Charter and, in the judgment of the Organization, are able to carry out these obligations**".
- States are admitted to **membership** in the **United Nations** by a **decision** of the **General Assembly** upon the **recommendation** of the **Security Council**.
- **The procedure is briefly as follows:**
 - The State submits an application to the **Secretary-General** and a letter formally stating that it accepts the obligations under the Charter.
 - The **Security Council** considers the application. Any recommendation for admission **must receive the affirmative votes of 9** of the **15 members** of the **Council**, provided that **none of its five permanent members** — **China, France, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland and the United States of America** — have voted against the application.
 - If the Council recommends admission, the recommendation is presented to the **General Assembly** for consideration. A **two-thirds majority vote** is **necessary** in the **Assembly** for admission of a new State.
 - Membership becomes effective the date the resolution for admission is adopted.

Permanent Observer status to the UN:

- **Non-Member States** of the **United Nations**, which are members of one or more specialized agencies, can apply for the **status of Permanent Observer**.
- The status of a Permanent Observer is **based purely on practice**, and there are **no provisions for it in the United Nations Charter**.
- The practice dates from **1946**, when the **Secretary-General** accepted the designation of the **Swiss Government** as a **Permanent Observer** to the **United Nations**.
 - Observers were subsequently put forward by certain States that later became United Nations Members, including Austria, Finland, Italy, and Japan. Switzerland became a UN Member on 10 September 2002.
- **Permanent Observers** have **free access to most meetings** and **relevant documentation**.
- **Many regional and international organizations** are also **observers** in the work and annual sessions of the General Assembly.

Additional Rights and Privileges of Palestine as an observer state:

- As of the **79th session** of the **UN General Assembly** in **September 2024**, **Palestine** will receive **additional rights and privileges**, despite being an **observer state**.
- These **rights** include **seating among member states** in alphabetical order, making statements on behalf of groups, eligibility for election as officers in the **General Assembly** and its **Main Committees**, and **full participation in UN conferences** and **international meetings** under the **General Assembly auspices**.
- However, **Palestine**, as an **observer state**, **does not have voting rights** in the **General Assembly** or the **ability to put forward its candidature** for UN organs.

Arab League:

- A **regional multi-national organization** of **Arabic-speaking countries** in the **Middle East and North Africa**.
- Established in **1945**, the League is **headquartered** in **Cairo**.
- **Mission** is to promote trade and economic growth as well as sovereignty and political stability in the region.
- **Founding members:** Jordan, Syria, Lebanon, Saudi Arabia, Yemen, Egypt and Iraq.
- **22 member states** and **four observer nations**.
 - **Members:** Algeria, Jordan, Oman, Syria, Bahrain, Kuwait, Palestine, Tunisia (1958), Comoros, Lebanon, Qatar, United Arab Emirates, Djibouti, Libya, Saudi Arabia, Yemen, Egypt, Mauritania, Somalia, Iraq, Morocco, Sudan.
- Members of the Arab League adhere to the charter, which is an agreement of 20 articles and three annexes.

The World Health Assembly to prepare a global toolkit for future pandemics

Sub: IR

Context:

- **The World Health Assembly** will convene from May 27 to June 1 to discuss amendments to the International Health Regulations.

Key Amendments:

- A package of amendments, based on 300 proposals made by member countries after the pandemic, will be the star of the agenda.
- These amendments to the International Health Regulations will target improving the ability of countries to respond to public health emergencies of international concern.

About The International Health Regulations (IHR):

- The **International Health Regulations (IHR)** was first adopted by the **WHA** in **1969** and last revised in **2005**.
- It was aimed **to maximize collective efforts to manage public health events while minimizing disruption to travel and trade**.
- There are 196 State Parties to the IHR, comprising all 194 WHO Member States plus Liechtenstein and the Holy See.
- The IHR provides an overarching legal framework that defines countries' rights and obligations in handling public health events and emergencies that have the potential to cross borders.
- They also introduce important safeguards to protect the rights of travelers and other persons in relation to the treatment of personal data, informed consent and non-discrimination in the application of health measures under the Regulations.
- The IHR is an instrument of international law that is legally binding on 196 countries.
- The IHR focuses on building countries' capacities to detect and respond to public health events, which could take on international dimensions.
- The draft pandemic accord focuses on a coordinated international response to pandemics, with equitable access to vaccines, therapeutics, and diagnostics at the center.

Various Surveillance systems in IHR:

- The IHR requires that all countries have surveillance systems capable of detecting acute public health events in a timely manner.
- The goal of country implementation is to limit the spread of health risks to neighboring countries and to prevent unwarranted travel and trade restrictions.

About World Health Assembly:

- The World Health Assembly is the forum through which the World Health Organization is governed by its 194 member states.
- It is the world's highest health policy setting body and is composed of health ministers from member states.
- The members of the WHA generally meet every year in May in Geneva at the Palace of Nations, the location of WHO Headquarters.
- The main tasks of the WHA are to decide major policy questions, as well as to approve the WHO work programme and budget and elect its Director-General (every fifth year) and annually to elect ten members to renew part of its executive board.
- Its main functions are to determine the policies of the Organization, supervise financial policies, and review and approve the proposed programme budget.

EU's Borrell urges Israel 'not to intimidate', 'threaten' ICC judges

Sub: IR

Sec: Int Organisation

Tags: International Criminal Court (ICC)

Context:

- EU foreign affairs chief Josep Borrell on Friday urged Israel "not to intimidate" or "threaten" the judges of the International Criminal Court.

More on news:

- ICC prosecutor Karim Khan has requested arrest warrants for Israel's Prime Minister Benjamin Netanyahu and Defence Minister Yoav Gallant, as well as top Hamas leaders Yahya Sinwar, Ismail Haniyeh and Mohamed Deif, on suspicions of war crimes and crimes against humanity.
- He said that Palestinian militant chiefs could be culpable of extermination, rape and other acts of sexual violence and taking hostages as a war crime, he accused the Israelis of starvation, wilful killing, and extermination and/or murder.

What is the International Criminal Court (ICC)?

- The court is located in The Hague, is the court of last resort for prosecution of genocide, war crimes, and crimes against humanity.
- It is the first permanent, treaty based, international criminal court established to help end impunity for the perpetrators of the most serious crimes of concern to the international community.
- Its founding treaty, the Rome Statute, entered into force on July 1, 2002.
- Although the Court's expenses are funded primarily by States Parties, it also receives voluntary contributions from governments, international organizations, individuals, corporations and other entities.

Composition and voting power of ICC:

- The Court's management oversight and legislative body, the Assembly of States Parties, consists of one representative from each state party.
- Each state party has one vote and "every effort" has to be made to reach decisions by consensus. If consensus cannot be reached, decisions are made by vote.

Process of Appointment of ICC judges:

- Judges are elected to the ICC by the Assembly of States Parties, the court's governing body.
- They serve nine-year terms and are not generally eligible for re-election.
- The procedures for the nomination and election of ICC judges are outlined in articles 36 and 37 of the Rome Statute.
- By the time of their election, all judges must be nationals of states parties to the Rome Statute, and no two judges may be nationals of the same state.
- The International Criminal Court (ICC) is composed of 18 judges, who are elected for terms of office of nine years by the Assembly of States Parties (ASP) to the Rome Statute, the founding instrument of the Court.
- They are not eligible for re-election.

Nomination of candidates by ICC states parties:

- Judicial candidates are nominated by **ICC state parties and must be nationals of a state party.**
- Each state party can put forward one candidate in each election.
- In order to nominate a candidate, states parties can follow
 - **(i) the procedure for the nomination of candidates for appointment to the highest national judicial offices in the state in question, or**
 - **(ii) the procedure for the nomination of candidates judge to the International Court of Justice**
- Election by the **ICC Assembly of States Parties**
- ICC judges are elected by the Assembly of States Parties during its annual session.
- Each state party can vote, unless it has lost voting rights.
- **Voting takes place by secret ballot.**

The necessary qualifications:

- **Article 36 of the Rome Statute establishes the qualifications required for ICC judges.**
- **Judges shall be chosen from among persons** of high moral character, impartiality, and integrity who possess the qualifications required in their respective States for appointment to the highest judicial offices.
- Every candidate shall have:
 - **(i) established competence in criminal law** and procedure, and the necessary relevant experience, whether as judge, prosecutor, advocate or in other similar capacity, in **criminal proceedings, known as “List A”**, or
 - **(ii) established competence in relevant areas of international law** such as international humanitarian law and the law of human rights, and extensive experience in a professional legal capacity which is of relevance to the **judicial work of the Court, known as “List B”**.
- Every candidate shall have an excellent knowledge of and be fluent in at least one of the working languages of the Court: **English and French.**
- To be elected, candidates must **receive a two-thirds majority of the States Parties present and voting.**
- **ICC judges are elected for non-renewable 9-year terms.**
- When selecting judges, **ICC states parties shall also take into account the need for the representation of the principal legal systems of the world, equitable geographical representation, and a fair representation of female and male judges.**
- ICC states parties shall also consider the need to elect judges with legal expertise on specific issues, including, but not limited to, violence against women or children.

Brazil and EU urge India for timely notifications on sugar subsidies at WTO

Sub: IR

Sec: Int org

Context:

- A group of WTO member countries, including Brazil, Canada and the European Union, have urged India to submit timely notifications on sugar subsidies in the World Trade Organisation.

More on news:

- The issue came up for discussion during the meeting of the WTO's agriculture committee on May 23-24 in Geneva.
- **Brazil, Canada, Costa Rica, Paraguay, New Zealand, the EU, and Guatemala** have urged India to submit timely notifications on the subsidies.
- According to study, over the four-year period from 2018-19 to 2021-22, India has provided market price support on sugarcane in excess of the limits set out in the Agreement on Agriculture (10 percent of the total value of sugarcane production) by a margin of 92-101 per cent.

India's Stand:

- **India has stated that the Indian central and state governments** neither paid for nor procured sugarcane from farmers, as all purchases were made by private sugar mills.
- In its appeal, India has stated that the WTO's dispute panel ruling has made certain erroneous findings about domestic schemes to support sugarcane producers and exports and the findings of the panel are completely unacceptable to it.
- Hence, **this information was not included in its notifications of domestic support.**
- In 2022, India appealed against a ruling of the World Trade Organization's (WTO) trade dispute settlement panel which ruled that the country's domestic support measures for sugar and sugarcane are inconsistent with global trade norms.

- The appeal was filed by India in the WTO's Appellate Body, which is the final authority on such trade disputes and is not functioning.
- **Brazil, Australia, and Guatemala** had filed the cases against India on these support measures.

About WTO:

- The **World Trade Organization is an intergovernmental organization headquartered in Geneva, Switzerland that regulates and facilitates international trade.**
- Governments use the organization to establish, revise, and enforce the rules that govern international trade in cooperation with the United Nations System.
- **The World Trade Organization (WTO) is a multilateral organization headquartered in Geneva, Switzerland.**
- It came into existence on **January 1, 1995, as a successor to the General Agreement on Tariffs and Trade (GATT).**
- The organization functions as a central body that facilitates global trade.

How close is the World Health Organization to agreeing on pandemic response rules?

Sub: IR

Sec: Int org

WHO Health Assembly Negotiations

- Health officials from the **194 member states** of the **World Health Organization (WHO)** will meet in **Geneva** from May 27-June 1.
- **Purpose:** To finalize negotiations on **new rules for responding to pandemics** after more than two years of discussions.

Key Objectives:

- Revising the **International Health Regulations (IHR)** to improve responses to outbreaks.
- Creating a **legally-binding Pandemic treaty** to enhance global defences against future pandemics.

Significance:

- Seen as the most important meeting since the **WHO's creation in 1948**, pivotal for **Director-General Tedros Adhanom Ghebreyesus's legacy.**
- **Challenges:** While some reforms may be agreed upon, other elements might face delays.

Current International Health Regulations (IHR):

- Came into existence in **2005**
- Adopted after the **2002/3 SARS outbreak**
- **Obligates** countries to **report public health events with potential cross-border impact** and includes measures on trade and travel.
- **Inadequacies:** Effective for **regional epidemics** (such as **Ebola**) but **insufficient for global pandemics** (Eg.- Covid-19).

Changes to Global Health Rules:

- **Update in the IHR (2005):**
 - **New Alerts System:** Introduces **different risk levels** for outbreaks, including an **"early action alert"** and a **"pandemic emergency"** for severe threats.
 - Currently, the **WHO has only one level** of emergency – a **public health emergency of international concern (PHEIC)**. The new system envisages an **intermediary stage** called an **"early action alert"**.
 - **Strengthening Obligations:** Enhances state obligations to report public health events from **"may"** to **"should"**.

WHO Pandemic Treaty:

- **Aim:** Address **COVID-19** shortcomings, particularly **vaccine distribution inequities** (avoiding a repeat of the **"vaccine apartheid"**) and **improve transparency and cooperation.**

Key Provisions:

- **Establishment of the COP:**
 - The current negotiating texts have also proposed an establishment of the **Conference of Parties (COP)** to oversee the **implementation** of the WHO Pandemic Agreement.
- **International Treaty:**
 - The proposed establishment of a **COP** suggests that an agreement could be a classic international treaty adopted under **Article 19** of the **WHO Constitution** as opposed to the alternative **Article 21 opt-out regulations.**
- **Pathogen Access and Benefit-Sharing (PABS):**
 - To address this issue, the current draft of the Agreement proposes a **quid pro quo mechanism**, formally titled the **WHO PABS System.**

- It **compels countries** to **share genome sequence information** and samples with **WHO-coordinated networks and databases**.
- In return for access to this data, manufacturers will be required to provide **10%** of their products free of charge and **10%** at not-for-profit prices.
- **Legal Obligations on Benefits-Sharing:**
 - The current text of the provision aims to **establish legal obligations** on **benefits-sharing** for **all users of biological materials** and **genetic sequence data under PABS**.
 - A robust PABS system, particularly for **low- and middle-income countries**, including some African nations, seems non-negotiable for promoting equity in access to medical countermeasures.
- **Article 12:** Proposes reserving **20%** of tests, treatments, and vaccines for **WHO distribution to poorer countries** during **emergencies** (the exact portion still debated).
- **Comparison:** Would be the **second major health treaty** after the **2003 Framework Convention on Tobacco Control** (a treaty which aims to reduce smoking via taxation and rules on labelling and advertising).

Negotiation Dynamics

- **Country Positions:**
 - **Wealthy vs. Poorer Countries:** Major rifts and technicalities have complicated negotiations.
 - **Missed Deadlines:** The **May 10 deadline** was missed, and emergency meetings have been held to boost morale.
- **Contentious Issues:**
 - **Drug and Vaccine Sharing:** A major point of contention.
 - **Financing:** Debate over creating a **dedicated fund** or using existing resources like the **World Bank's \$1 billion pandemic fund**.
 - **Political Pressure:** Right-wing groups and politicians argue the **treaty threatens national sovereignty**, which the **WHO denies**.

Future Actions:

- **IHR Rules:** More advanced in negotiations, likely to pass, and take effect automatically after 12 months unless opted out.
- **Pandemic Treaty:** This will **require ratification** and is **unlikely to be finalized** by the WHA meeting. Planning for further negotiations will continue.

The question of Palestine's U.N. membership

Sub: IR

Sec: Int Org

Palestine's U.N. Membership Application:

- **Palestine** has **renewed** its application for **U.N. membership**, facing **opposition** mainly from **the U.S.** at the **UNSC**, which argues membership should follow a negotiated solution to the conflict.
- Earlier, in **2011**, **Palestine's** request for **U.N. membership** was also **opposed** by the **U.S.**, leading to its **current non-member observer status**.
- In April 2024, the **UNGA** supported **Palestine's** application despite the **U.S. veto**, adopting a **resolution** in May **affirming Palestine's** eligibility and urging the **UNSC** to favourably consider its request.

How does a country become a Member of the United Nations?

- **Membership** in the Organization, in accordance with the **Charter of the United Nations**, “**is open to all peace-loving States that accept the obligations contained in the United Nations Charter and, in the judgment of the Organization, are able to carry out these obligations**”.
- States are admitted to **membership** in the **United Nations** by a **decision** of the **General Assembly** upon the **recommendation** of the **Security Council**.
- Membership applications need **UNSC recommendation without opposition from any P5 member**.
 - **Mongolia's** **membership** application initially stuck at the **UNSC**, was eventually approved following **UNGA intervention**, similar to the **Palestine situation**.
- **The procedure is briefly as follows:**
 - The State submits an application to the **Secretary-General** and a letter formally stating that it accepts the obligations under the Charter.
 - The **Security Council** considers the application. Any recommendation for admission **must receive the affirmative votes** of **9** of the **15** members of the **Council**, provided that **none of its five permanent members** — **China, France, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland and the United States of America** — have voted against the application.

- If the Council recommends admission, the recommendation is presented to the **General Assembly** for consideration. A **two-thirds majority vote** is **necessary** in the **Assembly** for admission of a new State.
- Membership becomes effective from the date the resolution for admission is adopted.

India's Stance

- **India** supported the **May 2024 UNGA resolution** favouring **Palestine's membership**, believing it could enhance prospects for a two-state solution.
- **India's support** aligns with its **historical stance** of **non-discrimination** in U.N. **membership admissions**, as seen with **Pakistan** in **1947** and **China** in **1971**.

Possible Outcomes and Future Steps

- **Palestine's membership** cannot bypass the **UNSC** and the **U.S.** **China** and **Russia** fear this could set a precedent for **Taiwan** or **Kosovo**.
- The **U.S.** might **abstain** from **vetoing** as a **protest against Israel**, allowing **Palestine's membership to proceed**, although **Israel** might **quit** the U.N. in response.
- If the stalemate continues, the **UNGA** might **exclude Israel from its deliberations**, a tactic used previously with **South Africa** and the **Serb Republic of Yugoslavia**.

Incremental Steps

- **Granting Palestine participatory privileges** short of **full voting rights** and **eligibility for principal organs** from September would signal a move towards **justice without bypassing the UNSC entirely**.

Countries that recognise Palestine:



ICJ orders Israel to halt military assault in Rafah: The case and the ruling

Sub: IR

Sec: Int Org

Tags : ICJ

Context:

- The **International Court of Justice (ICJ) at The Hague, Netherlands**, on May 24 ordered Israel to halt its military assault in the city of Rafah.

More on news:

- The new order has come in regard to a fresh request made by South Africa on May 10.
- The **March 28 order said that Israel**, in conformity with its obligations under the Convention on the Prevention and Punishment of the Crime of Genocide and in view of the worsening conditions faced by Palestinians in Gaza must take all necessary and effective action to ensure basic food supplies arrive without delay to the Palestinians in Gaza.

About the case:

- South Africa approached ICJ, asking for an urgent order to protect the Palestinians in Gaza from grave and irreparable violation of their rights, owing to Israel's ongoing military assault on Rafah.
- The situation brought about by the Israeli assault on Rafah, and the extreme risk it poses to humanitarian supplies and basic services into Gaza.
- The country accused Israel of conducting a brutal military attack on the sole remaining refuge of the Palestinian people in Gaza, who were simultaneously being subjected to a humanitarian aid blockage. South Africa called for an urgent ceasefire for the sake of humanity and to prevent further violations of the Genocide Convention.

About the ruling:

- The ICJ, in a 13:2 majority, ruled that Israel must immediately halt its military offensive and any other action in the Rafah Governorate that may inflict on the Palestinian group in Gaza conditions of life that could bring about its physical destruction in whole or in part.
- The court also directed Israel to open the Rafah crossing between Egypt and Gaza to allow the flow of humanitarian aid.
- It asked the Jewish state to provide access for any fact-finding or investigative missions sent by the UN to investigate the genocide allegations in Gaza.
- Israel was ordered to report back on its progress to the ICJ within a month.
- Rulings by ICJ are legally binding but it has no way of enforcing them.

Article 76 of the Rules of Court:

- It says that the ICJ at the request of a party or on its own, may at any time before the final judgment, revoke or modify any decision concerning provisional measures if in its opinion, “some change in the situation” justifies such revocation or modification.

About Genocide Convention:

- The **Convention on the Prevention and Punishment of the Crime of Genocide (Genocide Convention)** is an instrument of international law that codified for the first time the crime of genocide.
- The **Genocide Convention was the first human rights treaty** adopted by the **General Assembly of the UN on 9 December 1948.**

About International Court of Justice (ICJ):

- The **International Court of Justice (ICJ) is the principal judicial organ of the United Nations (UN).**
- It was established in June 1945 by the Charter of the United Nations and began work in April 1946.
- The seat of the Court is at the Peace Palace in The Hague (Netherlands).
- The Court’s role is to settle, in accordance with international law, legal disputes submitted to it by States and to give advisory opinions on legal questions referred to it by authorized United Nations organs and specialized agencies.
- The Court is composed of 15 judges, who are elected for terms of office of nine years by the United Nations General Assembly and the Security Council.

What was the three-phase ceasefire deal that Hamas backed, Israel rejected as ‘soft’?

Subject: IR

Sec: Places in news

Tags: Gaza strip, Israel -Palestine, three-phase ceasefire deal

Context:

- **Israeli forces seized the control of Gaza’s vital Rafah border crossing — the sole crossing between Egypt and southern Gaza — on Tuesday.**

More on news:

- **The development** came a day after Palestinian militant group Hamas had agreed to a three-phased deal for a ceasefire and hostages-for-prisoners swap.



Various phases of the deal:

Phases	About
--------	-------

Phase one	<ul style="list-style-type: none"> • A 42-day ceasefire, during which Hamas would free 33 Israeli hostages, alive or dead, in return for Israel releasing 30 children and women for each released Israeli hostage, based on lists provided by Hamas according to the earliest date of detention. • From the first day, entry of intensive and sufficient quantities of humanitarian aid, relief materials, and fuel would be allowed. • Hamas would release three Israeli hostages on the third day of the agreement, and then release three more hostages every seven days, prioritizing women if possible, including civilians and conscripts. • In the sixth week, Hamas would release all remaining civilian hostages covered by this phase. • Israel would release the agreed number of Palestinian prisoners in Israeli prisons. • Israel would then partially withdraw troops from Gaza, and allow the free movement of Palestinians from south to north Gaza. • On the third day after releasing the first Palestinian prisoners, Israeli forces would completely withdraw from al-Rashid street in northern Gaza, and all military sites would be dismantled. • On the 22nd day of the first phase, Israeli forces withdrew from the center of the strip, east of Salah al-Din road to an area near the Israeli border.
Phase two	<ul style="list-style-type: none"> • Another 42 days with an agreement to restore a “sustainable calm” in Gaza. • The complete withdrawal of most Israeli troops from Gaza. • Hamas would release Israeli reservists and some soldiers in return for Israel releasing Palestinians from jail.
Phase three	<ul style="list-style-type: none"> • Completion of exchanging bodies. • Blockade of the Gaza Strip would end. • Implementation of a 3-5-year plan for reconstruction of Gaza would start. • Homes, civilian facilities, and infrastructure, would be rebuilt. • Compensation would be given to all those affected, under the supervision of a number of countries and organizations including Egypt, Qatar, and the UN. REUTERS.

Areas in news:

Israel:



Red Sea:

- The Red Sea (Erythraean Sea) is a seawater inlet of the Indian Ocean, **lying between Africa and Asia.**

- The connection to the ocean is in the south through the **Bab el Mandeb strait and the Gulf of Aden**.
- To the north lie the **Sinai Peninsula, the Gulf of Aqaba, and the Gulf of Suez (leading to the Suez Canal)**.
- The sea is underlain by the **Red Sea Rift which is part of the Great Rift Valley**.
- The six countries bordering the Red Sea are: **Saudi Arabia, Yemen, Egypt, Sudan, Eritrea, Djibouti**.



Polish farmers march in Warsaw against EU climate policies and the country's pro-EU leader

Subject: IR

Section: Places in news

Context:

- In **Warsaw, Poland**, a significant **protest by farmers** took place against the **European Union's Green Deal** and its **impact on agriculture**.

Farm protests across Europe:

- Farmers from at least **nine European countries** have united in protest, including **Greece, Poland, Spain, Germany, France, Romania, Italy, Belgium, Portugal, and Lithuania**.
- The roots of this discontent extend back to **2019** when **Dutch farmers** blocked roads in opposition to **new nitrogen emission restrictions**.
- **Reasons include:**
 - **Spiking energy, transport and fertiliser costs, import of cheap products like grains and meat.**
 - **Russia's invasion of Ukraine in February 2022.**
 - **Climate change, Extreme weather events such as floods and droughts**
 - **EU's environmental regulations**

Climate change and Europe's agriculture sector:

- **Global warming** has led to **more frequent and intense weather extremes** across **Europe**, adversely affecting **agriculture**.
- Recent decades have seen **increased occurrences of droughts, forest fires, heat waves, storms, and heavy rainfall in Europe**.
- **The agriculture sector has been significantly impacted:**
 - **EU's olive oil production** hit a **record low** from July 2022 to June 2023 due to **severe droughts** affecting major producers.
 - In **Spain**, the production of **wheat, barley, and rice** has **substantially decreased** over the past decade.

- **Heavy rainfall** in parts of **France, Germany, and Poland** last year delayed **wheat harvests** and caused **crop damage**.
- In **Italy and Greece**, **wet conditions** fostered **fungal outbreaks** that damaged **apples and pears**.
- **Greece** experienced **devastating wildfires** in **2023**, destroying around **20%** of its **annual farm revenue**.
- The UN's **IPCC** warns that if **global temperatures rise by 2 degrees Celsius above pre-industrial levels**, a **third of Southern Europe** could face **water scarcity**, indicating worsening conditions for agriculture.

Europe's plan to deal with the problem:

- In **2020**, the **European Commission** adopted the **European Green Deal** aiming for the **EU to be climate-neutral by 2050**, involving **drastic reductions in greenhouse gas (GHG) emissions** and **offsetting unavoidable emissions**.
- The plan includes a target to cut **GHG emissions** by **at least 55% by 2030**.
- The **"From Farm to Fork"** strategy was introduced to **transform the EU's agriculture sector**, which is responsible for **11%** of the **EU's total GHG emissions** and is considered a significant contributor to climate issues.
- **Agriculture emits nitrous oxide (N2O)**, a **potent greenhouse gas**, primarily from the use of **synthetic nitrogen fertilizers in farm soils**. **N2O is 298 times more potent than CO2**.
- **Key goals of the "From Farm to Fork" strategy include:**
 - Reducing fertilizer use by **20% by 2030**.
 - Cutting pesticide use by **50% by 2030**.
 - Increasing the share of agricultural land under organic farming to **25%**.
 - Allocating more land for non-agricultural purposes to reduce overall GHG emissions from agriculture.

Protests against 'Green deal' and roll back of policies:

- **European farmers** are **protesting strict and economically challenging environmental regulations** introduced as part of the **EU's green transition**, arguing that these rules exacerbate already tight margins worsened by factors such as the **Russian invasion of Ukraine** and **rising energy costs**.
- The **financial burden of stringent climate regulations** could lead to **reduced production** and **increased farmer protests**.
- In response to growing opposition, the **EU** has begun to **roll back some environmental policies**.
- **European Commission President Ursula von der Leyen** announced the **withdrawal** of a proposal to **reduce pesticide use**, citing its polarizing nature.
- Furthermore, the **EU's newly recommended 2040 climate targets do not specify reductions for methane and NO2 emissions from agriculture**, even as other environmental regulations are being relaxed in countries like **Germany and France**.
- Despite these rollbacks, the **EU** continues to face the challenge of **reducing agricultural emissions** to meet the **objectives of the Green Deal** without further alienating farmers and jeopardizing their livelihoods.

What are India's stakes in Iran's Chabahar port?

Sub: IR

Sec: Places in news

Context:

- **India and Iran** signed a **10-year contract** for the **operation of a terminal** at the **strategically important Chabahar port in Iran**.
- Signing a **long-term contract with Iran** is part of **India's strategic and economic vision for Central Asia and beyond**.

Location:

- **Chabahar** is a **deep-water port** in **Iran's Sistan-Baluchistan province**, closest to **India** among **Iranian ports**, and provides **direct access to the open sea**, facilitating **large cargo ships**.
- Located **72 km west of Pakistan's Gwadar port**.



Development of Chabahar Port- Timeline:

- Discussions on **developing Chabahar** started in **2002** between **India** and **Iran**, underlining its strategic importance during the **Iran-Iraq war**. It gained a formal structure with the **New Delhi Declaration in 2003**, aiming to **link South Asia with the Persian Gulf and beyond**.
- The project faced delays due to **changing international dynamics**, particularly **India's growing ties with the U.S.**, which had adversarial relations with **Iran**.
- The situation **improved post-2015** following **Iran's nuclear deal** with world powers, leading to the signing of a **trilateral agreement** between **India, Iran, and Afghanistan** in **2016** to **establish a transport and transit corridor**.
 - **India** constructed a **218-km road** from **Delaram** in **western Afghanistan** to **Zaranj** on the **Iran-Afghan border** to link with **Chabahar**.
- As of **2018**, **India** has been operating the port through **India Ports Global Chabahar Free Zone (IPGCFZ)**, handling substantial cargo and container traffic.
- **Chabahar** has been **pivotal** in delivering **humanitarian aid**, particularly during the **COVID-19 pandemic**, and facilitating **trade routes** to **Afghanistan** and **Central Asia**.

Strategic Connectivity and Significance:

- **Chabahar** is crucial in the context of the **International North-South Transport Corridor (INSTC)**, aiming to **enhance connectivity between India, Central Asia, and Europe via Iran**.
- Despite international pressures and challenges, **India's strategic focus on Chabahar** underlines its commitment to **securing economic and geopolitical leverage** in the region.
- The port **not only enhances India's connectivity to Central Asia** but also serves as a **counterbalance to Chinese expansionist strategies** under its **Belt and Road Initiative**.



International North-South Transport Corridor (INSTC):

- Proposed in **2000**, the **INSTC** was designed as a **transport route from India to Russia via Iran**, offering an **alternative to the conventional Suez Canal route**.

- The **corridor** spans **7,200 km** incorporating **sea, rail, and road components**, crossing multiple countries and **aimed at enhancing India's access to Central Asian and Eurasian markets**.
- **Planned route:**
 - The INSTC envisages the movement of goods from **Mumbai to Bandar Abbas in Iran** by sea; from **Bandar Abbas to Bandar-e-Anzali, an Iranian port on the Caspian Sea**, by road; from **Bandar-e-Anzali to Astrakhan, a Caspian port in the Russian Federation** by ship across the **Caspian Sea**; and onward to other parts of the **Russian Federation and Europe by rail**.
- **Participating Countries:** Besides **India, Russia, and Iran**, countries such as **Azerbaijan, Armenia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkey, Ukraine, Belarus, Oman, and Syria** have signed onto the project. **Bulgaria** has joined as an observer state.



Operationalisation:

- - Dry runs conducted in **2014 and 2017** demonstrated that the **INSTC route is more cost-effective and faster** than the **Suez Canal route**, leading to the **operational start between 2018-19**. The **first major commercial consignment** through INSTC was sent in **July 2022**.
- **Geopolitical significance:**
 - The INSTC serves as an **economic alternative for Russia amid Western sanctions** and provides **India** with a route that **bypasses Pakistan**.
 - However, **European** hesitancy towards routing through **Russia** post-Ukraine conflict brings alternative routes, such as **Armenia's proposed corridor to Europe via Bulgaria**, into focus.
- **Challenges:**
 - Russia- Ukraine conflict
 - Armenia- Azerbaijan conflict
 - **China** advances the "**Middle Corridor**" as part of its global infrastructure strategy, potentially **competing with the INSTC**.
 - Lack of proper finances



Saudi Arabia's Vision 2030 and NEOM Project

Sub: IR

Sec: Places in news

Tags: NEOM Project

Vision 2030 of Saudi Arabia:

- Launched in **2016**, it **aims** to develop various sectors and introduce large-scale projects, known as **giga-projects**, to prepare for a **post-oil future**.
- It is built around **three main themes** which set out **specific objectives** that are to be **achieved by 2030**:
 1. **A vibrant society** – urbanism, culture and entertainment, sports, Umrah, UNESCO heritage sites, life expectancy
 2. **A thriving economy** – employment, women in the workforce, international competitiveness, Public Investment Fund, foreign direct investment, non-oil exports
 3. **An ambitious nation** – non-oil revenues, government effectiveness, e-government, household savings and income, non-profits, and volunteering.
- **Progress:** The program is more than halfway through its timeline, with multiple giga-projects in the planning and execution stages.
- **Challenges:** The initiative has faced challenges such as the **COVID-19 pandemic**, **geopolitical tensions**, **inflation**, and **supply chain disruptions**.

NEOM: A Flagship Giga-Project:

- It is an urban area being built by **Saudi Arabia** in **Tabuk**.
- **NEOM** is planned as a **mega-city**, featuring futuristic elements like a **ski resort** and **twin skyscrapers** extending **170 kilometres**, known as **The Line**.
 - The first three letters come from the Ancient Greek prefix **neo** – **meaning 'new'**. The 'M' is the first from '**Mustaqbal**', an Arabic word meaning '**future**'. The **M** is also the first letter of the **Crown Prince, Mohammed bin Salman**.
- The site is at the **northern tip** of the **Red Sea**, due **east of Egypt** across the **Gulf of Aqaba** and **south of Jordan**.
- **Population Goals:** Initially projected to house **over one million residents by 2030**, with ambitions to **grow to nine million by 2045**. However, recent reports suggest a scaled-back target of **300,000 residents by 2030**, with **2.4 kilometres** of **The Line** completed.
- Despite revised projections, **NEOM's** leadership remains committed to achieving the **long-term population goals**.



Violence rages in New Caledonia as France rushes security forces to islands

Sub: IR

Sec: Places in news

Context:

- Violence continued in **New Caledonia** for a third day, following **France's declaration of a state of emergency** in the **French Pacific territory**.

Details:

- This move was intended to address **deadly unrest** fueled by **long-standing independence desires** among some residents.
- The violence, which erupted after **protests against voting reforms** by **President Emmanuel Macron's government**, has resulted in five deaths.
- Among the deceased were two members of the **Indigenous Kanak community**.
- The **pro-independence movement** is known as **The Field Acton Coordination Unit**.



About New Caledonia:

- **New Caledonia** is a **sui generis collectivity of overseas France** in the **southwest Pacific Ocean**, south of **Vanuatu**, about **1,210 km (750 mi)** east of **Australia**, and **17,000 km (11,000 mi)** from **Metropolitan France**.
- Capital- **Nouméa**.
- The **archipelago**, part of the **Melanesia subregion**, includes the **main island of Grande Terre**, the **Loyalty Islands**, the **Chesterfield Islands**, the **Belep archipelago**, the **Isle of Pines**, and a few remote islets.
- The **Chesterfield Islands** are in the **Coral Sea**.
- French people, especially locals, call **Grande Terre "Le Caillou"** ("the pebble").
- **New Caledonia** is one of the **European Union's Overseas Countries and Territories (OCTs)** but is **not part of the European Union**.
- **New Caledonia** has a land area of **18,575 km² (7,172 sq mi)** divided into **three provinces**.
- The **North** and **South Provinces** are on the **New Caledonian mainland**, while the **Loyalty Islands Province** is a series of **three islands** off the east coast of the mainland.

- **Demography:**
 - **New Caledonia's population** is of **diverse origins** and varies by geography; in the **North and Loyalty Islands Provinces**, the **indigenous Kanak people predominate**, while the **wealthy South Province** contains significant populations of **European** (Caldoches and Metropolitan French), **Kanak**, and **Polynesian** (mostly Wallisian) origin, as well as smaller groups of **Southeast Asian, Pied-Noir, and North African heritage**.
- **Geography:**
 - **New Caledonia** was part of the **continent Zealandia**, which **broke off** from the **supercontinent Gondwana** between 79 million and 83 million years ago
- **Cultural significance:**
 - In **2008**, six lagoons of the **New Caledonian barrier reef**, the **world's longest continuous barrier reef system**, were inscribed on the **UNESCO World Heritage List**.
- **British exploration:**
 - **British explorer James Cook** was the **first European** to sight **New Caledonia**.
- **French colonialism:**
 - On **24 September 1853**, under orders from **Emperor Napoleon III**, **Admiral Febvrier Despointes** took **formal possession** of **New Caledonia**.
 - **Captain Louis-Marie-François Tardy de Montravel** founded **Port-de-France (Nouméa)** on **25 June 1854**.
 - In **1946**, **New Caledonia** became an **overseas territory**.
 - By **1953**, **French citizenship** had been **granted** to **all New Caledonians**, regardless of ethnicity.
- **Kanak Independence Movement:**
 - **1976 and 1988:** The periods of serious violence and disorder by the **Kanak indigenous people**, referred to as **'the events'**.
- The **Matignon Agreements**, signed on **26 June 1988**, ensured a decade of stability. The **Nouméa Accord**, signed on **5 May 1998**, set the groundwork for a **20-year transition** that **gradually transferred competencies to the local government**.



U.S. faces strategic setback in Africa as it is set to withdraw troops from Niger

Sub: IR

Sec: Places in news

Context:

- On **April 19th, 2024** the **United States** announced the **withdrawal of its military forces** from **Niger** under pressure from the **ruling junta**, the **Council for the Safeguard of the Homeland (CNSP)**.

US-Niger Relations:

- Previously, the **US** considered **Niger** a **crucial partner** in **combating Islamist extremism**.
- The **coup in July 2023** significantly strained these relations, leading to the **suspension of US aid and military operations in Niger**.
- **Reasons for Withdrawal:**
 - **Sovereignty and Legitimacy:** The **CNSP** framed the decision to **expel US troops** as a move to **reclaim sovereignty** and **gain legitimacy** for its **non-democratic government**.

- **Anti-Western Sentiment:** Similar to the **expulsion of French forces**, the **removal of US troops** played into **local anti-Western sentiments**, which bolstered support for the junta.
- **Fact:** Niger was colonised by the **French** and got independence in **1960**.

Impact and Analysis:

- The withdrawal is expected to **hinder the fight against terrorism** in the region. The **US military presence** was **vital for operations against al-Qaida and ISIS**.
- **Strategic Shift:** This move represents a **setback for US influence in the Sahel**, as **Russia and China** are increasingly filling the vacuum left by **Western powers**.
- The **US** seeks to maintain strong ties across **Africa**, focusing on **democratic governance** and **economic partnerships**. However, growing **anti-Western sentiment** and **local political dynamics** pose challenges.

Influence of Russia and China:

- **Russia** has been actively **disrupting Western influence in Africa**, using **military aid** and **mercenaries** to establish ties with regimes like the **CNSP**. The arrival of Russian forces in **Niger** underscores this trend.
- While **Russia** is making **strategic inroads**, **China's economic engagement** and **long-term investments** present a more significant challenge to **US interests in Africa**.

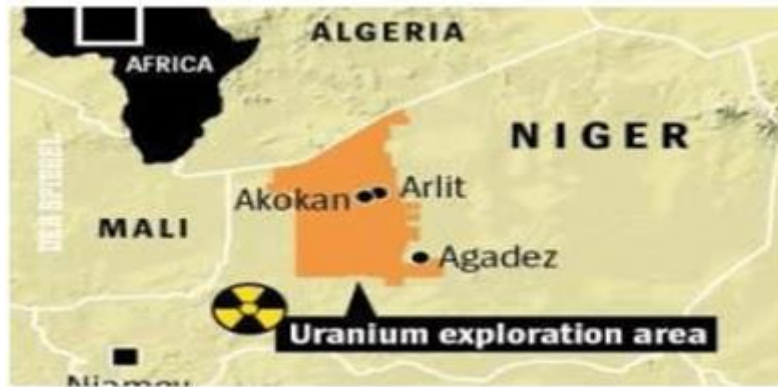
Niger:

- A landlocked country in **West Africa**.
- Bordered by **Libya** to the **northeast**, **Chad** to the **east**, **Nigeria** to the **south**, **Benin** and **Burkina Faso** to the **southwest**, **Mali** to the **west**, and **Algeria** to the **northwest**.
- **Largest landlocked country in West Africa** and the **second largest landlocked nation in Africa** behind **Chad**.
- Over **80%** of its land area lies in the **Sahara**.
- Capital- **Niamey**



What is Niger's uranium history?

- **Uranium** was **first discovered** at **Azelik** in **Niger** in **1957**, and commercial uranium production began at **Arlit** - **900 km northeast** of the capital **Niamey** - in **1971**.
- **COMINAK (Compagnie Minière d'Akouta)** - also majority-owned by **Orano (French company)** - began production from an underground mine at **Akouta** in **1978**.
- The **Societe des Mines d'Azelik SA (SOMINA)** joint venture was set up in **2007** to mine at **Azelik/Teguidda**, **160km southwest** of **Arlit**, in the **Agadez region**.
- **China National Uranium Corporation** has recently been carrying out studies towards the restart of production at **SOMINA**.
- **Imouraren project:** Located about **50 miles south** of **Arlit** and about **100 miles north** of **Agadez**, this deposit, discovered in **1966**, contains **one of the largest reserves in the world**.



How much uranium does Niger produce?

- Niger produced **2020 tU** in 2022, just over **4% of world uranium output**.
- Current production is from the **open-pit operations of SOMAÏR (Société des Mines de l'Air)**, near the town of **Arlit**.
- **SOMAÏR** is **63.4%** owned by **French company Orano** and **36.66%** owned by **Sopamin (Société du Patrimoine des Mines du Niger)**. Sopamin manages Niger's state participation in mining ventures.
- According to data from the **World Bank**, **uranium is Niger's second largest export**, in monetary terms, after **gold**.
- **Export:**
 - Niger supplies around **5% of the world's uranium** but is a **leading supplier of uranium** to the **European Union**.



- **Highest Uranium producers globally:** **Kazakhstan**, followed by **Canada, Namibia, Australia, Uzbekistan, Russia, Niger, China and India**.

Burkina Faso, Mali and Niger Finalise Regional Alliance Project

Sub: IR

Sec: Places in news

Context:

- Junta-run **Burkina Faso, Mali and Niger** have finalised plans to form a confederation.

Historical perspective:

- The **Sahel region** has faced years of **deadly jihadist violence**.
- In January, the **three countries** announced their departure from the **Economic Community of West African States (ECOWAS)**, criticizing it for being under **French influence** and deciding to establish their own regional grouping.
- These three nations, all former French colonies recently overtaken by military regimes.

Confederation of the Alliance of Sahel States (AES):

- **Countries Involved:** Burkina Faso, Mali, Niger
- **Background and Motivation:** These three nations have **severed ties with their former colonial ruler, France**, and are **seeking closer relations with Russia**.
- The decision is influenced by dissatisfaction with **France's inability to curb jihadist violence** in the **Sahel region**.
- The foreign ministers of the three countries met in **Niamey, Niger's capital**, to finalize a text for establishing the **Confederation of the Alliance of Sahel States (AES)**.



About the Liptako-Gourma Charter:

- The **Liptako-Gourma Charter** establishes the **Alliance of Sahel States (AES)**.
- It aims to "establish an architecture of collective defence and mutual assistance for the benefit of the population".
- This alliance will be a **combination of military and economic efforts** between the three countries.
- The charter **binds** the signatories to assist one another, including militarily — in the event of an attack on any one of them.
- It also **binds** the three countries to work to prevent or settle armed rebellions.

Liptako-Gourma region:

- It is the region where the **Mali, Burkina Faso, and Niger borders meet**.
- It has been ravaged by jihadist insurgency in recent years.



Significance:

- The creation of AES marks a **significant geopolitical shift** in the **Sahel region**, highlighting the countries' intent to pursue **greater autonomy** and **regional cooperation**, distancing themselves from **traditional Western influence**.

About the Economic Community of West African States (ECOWAS):

- Also known as **CEDEAO** in **French**.
- It is the regional group which was **established** in **1975** through the **Lagos Treaty**.
- Headquarters: **Abuja, Nigeria**.
- **Mandate:** Promoting economic integration among its members.
- The **vision of ECOWAS** is the creation of a **"borderless region"** that is well-integrated and governed in accordance with the principles of democracy, rule of law and good governance.
- **Members:** Benin, Cape Verde, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Nigeria, Sierra Leone, Senegal and Togo.
- **ECOWAS' larger aims** are to have a **single common currency** and **create a single, large trading bloc** in areas of industry, transport, telecommunications, energy, financial issues, and social and cultural matters.
- Along with the goals of **economic cooperation**, it has attempted to quell military conflicts in the region.
- It also operated a **regional peacekeeping operation** known as **ECOMOG**, led by **Nigeria** in the **1990s** and early **2000s**.



Helicopter crash kills Iran President, Foreign Minister

Sub: IR

Sec: Places in news

Context:

- **Iranian President Ebrahim Raisi and Foreign Minister Hossein Amir-Abdollahian were confirmed dead** after their helicopter crashed in a foggy mountain region.

Details:

- **Crashed Helicopter:** Bell 212 helicopter
- **Helicopter crash site-** Varzaghan of Iran.
- **Supreme Leader Ayatollah Ali Khamenei** appointed **Vice-President Mohammad Mokhber** as **interim leader** until elections on June 28.
- **Ali Bagheri** was named **Acting Foreign Minister**.

Fatal crashes involving very very important persons (VVIPs):

- **On June 23, 1980, Sanjay Gandhi**, the son of Indira Gandhi, died while piloting his aircraft at **Safdarjung Airport in Delhi**.
- **On September 2, 2009, a Bell helicopter crash** claimed the life of the Chief Minister of Andhra Pradesh, Y.S. Rajasekhara Reddy.
- **On April 30, 2011, a helicopter carrying Dorjee Khandu**, the **Chief Minister of Arunachal Pradesh**, crashed.
- **On December 8, 2021, India's first Chief of Defence Staff, General Bipin Rawat**, and his entourage died in an **Indian Air Force Mi-17 helicopter** crash near Coonoor, Tamil Nadu.
- **On April 10, 2010, the aircraft carrying the President of Poland, Lech Kaczyński**, and his wife, **Maria**, crashed in fog killing 96 people.

Bell 212 helicopter:

- The **Bell 212** is a **two-blade, medium helicopter** that first flew in 1968.
- Originally manufactured by **Bell Helicopter in Fort Worth, Texas, United States**, production was moved to **Mirabel, Quebec, Canada** in 1988, along with all Bell commercial helicopter production after that plant opened in 1986.
- The 212 was marketed to **civilian operators** and has up to a **15-seat capacity**, with one pilot and fourteen passengers.



About Iranian President Ebrahim Raisi:

- Born on **14 December 1960** to a clerical family in the **Noghan district of Mashhad**.

- **Ebrahim Raisolsadati** served as the **eighth president of Iran** from **2021** until his death in **2024**.
- A Principlist and a Muslim jurist, he became president after the **2021** election.
- Raisi served in several positions in **Iran's judicial system**.
- Raisi was criticized for his role in the **1988 executions of Iranian political prisoners**; **United Nations special rapporteurs** and other organizations accused him of **crimes against humanity**.
- **Raisi's presidency** saw deadlock in negotiations with the **U.S.** over the **Joint Comprehensive Plan of Action (JCPOA)**.
- During Raisi's term, **Iran intensified uranium enrichment**, hindered **international inspections**, and supported **Russia in its invasion of Ukraine**.

Philippines blames China for loss of giant clams in disputed shoal and urges environmental inquiry

Sub: IR

Sec: Places in news

Context:

- The **Philippines** accused **Chinese** fishermen of causing **significant damage** to giant clams at the disputed **Scarborough Shoal**, which is controlled by **China's coast guard**.

Scarborough Shoal:

- **Scarborough Shoal**, also known as **Bajo de Masinloc**, **Huangyan Island**, **Minzhu Jiao**, and **Panatang Shoal**, consists of **two skerries**.
- Located between Macclesfield Bank and **Luzon**, with Luzon 220 km away, in **South China Sea**.
- Disputed territory claimed by the **Philippines**, **China**, and **Taiwan**.
- The Philippines claims it through the **1734 Velarde map**.
- **China** and **Taiwan** claim it through the **nine-dash line** (**eleven-dash line for Taiwan**).
- Related to broader **South China Sea territorial disputes**, including the **Spratly Islands**.



The previous standoff between the Philippines and China:

- In **2012**, a standoff occurred between **the Philippines** and **China** over **illegal fishing activities**.
- **The Philippines** initiated an **international case** against **China** in **2013**.
- **In 2016**, **The Hague's arbitration court** ruled **China's nine-dash line claim invalid**, affirming the **Philippines' sovereign rights**.
- **China rejected the ruling** and **increased its military presence** at **Scarborough Shoal** and the **Spratly Islands**.
- The Tribunal's ruling was supported by various nations, including **Malaysia**, **the Philippines**, and **Vietnam**.

What is the South China Sea dispute?

- Several countries claim various parts of the sea, and these claims often overlap.
- In particular, China's sweeping claims – which include sovereignty claims over land parcels and their adjacent waters – have angered competing claimants like **Vietnam**, **the Philippines**, **Taiwan**, **Malaysia** and **Brunei**.
- Other countries have staked claims on islands and various zones in the sea, such as the **Paracels** and the **Spratlys**.
- **Nine-dash line:**

- China claims by far the largest portion of territory in an area demarcated by its so-called “nine-dash line”.
- The line comprises nine dashes, which extend hundreds of miles south and east from its most southerly province of Hainan.

About the South China Sea:

- It is an arm of the western Pacific Ocean that borders the Southeast Asian mainland.
- **Boundaries:** It is bordered by **China, Taiwan, the Philippines, Malaysia, Indonesia, Brunei, and Vietnam.**
- It is connected by the **Taiwan Strait** with the **East China Sea** and by the **Luzon Strait** with the **Philippine Sea** (both marginal seas of the Pacific Ocean).
- The **South China Sea** and the **East China Sea** together form the **China Sea.**
- The two major archipelagos are known as the **Paracel Islands, controlled by China, and the Spratly Islands.**
- **Climate:** Weather in the sea is tropical and largely controlled by monsoons.
- It is the second most used sea lane in the world. It is a significant trade route for crude oil from the Persian Gulf and Africa through the Strait of Malacca to Singapore, Thailand, Hong Kong, Taiwan, South Korea, and Japan.
- **Major Ports:** Hong Kong, Singapore, and Kaohsiung in southern Taiwan.



What are clams?

- **Clam** is a common name for several kinds of **bivalve molluscs.**
- The word is often applied **only to those that are edible and live as infauna**, spending most of their lives halfway buried in the sand of the seafloor or riverbeds.
- **Clams** have **two shells of equal size** connected by **two adductor muscles** and have a **powerful burrowing foot.**
- They **live** in both **freshwater** and **marine environments**; in **salt water**, they prefer to burrow down into the mud and the turbidity of the water required varies with species and location; the **greatest diversity** of these is in **North America.**
- **Giant clams** are the **largest living bivalve molluscs.**



Kim Jong Un was ‘sincere’ in denuclearisation talks: former South Korea president

Sub: IR

Sec: Places in news

Tag: denuclearisation of Korean peninsula

Context:

- **Kim Jong Un** offered to give up his **nuclear arsenal** if the **U.S. guaranteed his regime's survival**, according to **former South Korean president Moon Jae-in**.

Details:

- Revelation came in the **former South Korean president Moon Jae-in's** memoir "**From the Periphery to the Centre**".
- **Moon** facilitated **two summits** between **Kim** and **then-U.S. president Donald Trump** to discuss **denuclearisation** and **sanctions relief**.
- The **second summit collapsed in 2019**, leading to a halt in diplomatic outreach and worsening relations between the **Koreas**.
- Kim was aware of international mistrust and questioned how to prove his sincerity to the U.S.
- Pyongyang has since declared itself an "**irreversible**" **nuclear power**, advanced its **weapons development**, and **strengthened ties** with **Moscow**, violating UN sanctions.
- A deal failed because the **U.S. demanded complete denuclearisation** before sanctions relief.
- Analyst Hong Min suggested the only way to verify Kim's sincerity would have been to strike a deal at the **Hanoi summit**.

2019 North Korea–United States Hanoi Summit:

- Commonly known as the **Hanoi Summit**
- It was a two-day summit meeting between **North Korean supreme leader Kim Jong Un** and **U.S. president Donald Trump**, held at the **French Colonial Hôtel Métropole** in **Hanoi, Vietnam**, during February 27–28, 2019.
- It was the second meeting between the leaders of North Korea and the United States following their **first meeting in Singapore** the year prior.
- The White House announced that the summit was cut short and that **no agreement was reached**.

Nuclear Disarmament or Denuclearization:

- **Nuclear disarmament** is the act of **reducing or eliminating nuclear weapons**.
- Its end state can also be a **nuclear-weapons-free world**, in which nuclear weapons are completely eliminated.
- The term **denuclearization** is also used to describe the **process leading to complete nuclear disarmament**.
- **Disarmament** and **non-proliferation treaties** have been agreed upon because of the extreme danger intrinsic to nuclear war and the possession of nuclear weapons.

Treaties Related to Nuclear Disarmament:

- **Treaty on the Non-Proliferation of Nuclear Weapons (NPT)**: Signed in 1968 and entered into force in 1970, the NPT aims to prevent the spread of nuclear weapons and promote disarmament.
 - **Binding treaty**
 - It divides the world into nuclear-weapon states (NWS), recognized as possessing nuclear weapons at the time of the treaty's signing, and non-nuclear-weapon states (NNWS), which agree not to develop or acquire nuclear weapons.
 - It requires NWS to pursue disarmament negotiations in good faith.
- **Treaty on the Prohibition of Nuclear Weapons (TPNW)**: Adopted by the United Nations in 2017 and opened for signature in 2018, the TPNW aims to prohibit the development, testing, production, stockpiling, stationing, transfer, use, and threat of use of nuclear weapons.
 - It represents a significant step towards nuclear disarmament, although it has not been signed by nuclear-armed states.
- **Comprehensive Nuclear-Test-Ban Treaty (CTBT)**: Opened for signature in 1996, the CTBT aims to ban all nuclear explosions for both civilian and military purposes.
 - While the treaty has been signed by 185 countries and ratified by 170, it has not entered into force as nuclear-armed states must ratify it to become operational.
- **Outer Space Treaty**: This multilateral agreement entered into force in 1967 and bans the siting of weapons of mass destruction in space.
 - All nine states believed to have nuclear weapons are parties to this treaty.

Conflict in the Korean Peninsula:

- Rooted in **Japanese occupation (1910-1945)**
- **Post-WWII**, the Allied powers planned a "**four-power trusteeship**" at the **Yalta Conference (1945)**
- **USSR** took control of the **north**; the **south** remained under the **Allies**, mainly the **USA**

- Divided at the **38th parallel**, still the official border
- In **1948**, South Korea and North Korea were established
- Conflict arose as both sought territorial and ideological expansion



Korean War

- **June 25, 1950:** North Korea, backed by the USSR, attacked South Korea
- UN forces, led by the US, retaliated
- **1951:** US forces crossed the 38th parallel, prompting China to support North Korea
- Peace talks began in 1951 to prevent further escalation
- **India played a key role in peace negotiations**
- **1952:** Indian resolution on Korea adopted at the UN
- **July 27, 1953:** Korean Armistice Agreement signed, leading to a ceasefire
- Established the Korean DMZ as a buffer zone
- **December 1991:** North and South Korea signed a **non-aggression pact**

US-North Korea Conflict

- During the **Cold War**, the **US** extended its **Nuclear Umbrella** to **South Korea** and **Japan**
- **North Korea** withdrew from the **Non-Proliferation Treaty (NPT)** in **2003**
- Under **Kim Jong-un**, **North Korea** increased **nuclear missile testing**
- **March 2017:** US deployed **THAAD (Terminal High Altitude Area Defense)** in South Korea
- The conflict evolved from a **North-South Korea issue** to a **US-North Korea standoff**

Russia wants to unilaterally change maritime border with Lithuania, Finland in Baltic Sea

Sub: IR

Sec: Places in news

Context:

- **Russia** has **unilaterally** moved to **change the maritime border** with **Lithuania** and **Finland** in the **Baltic Sea**, according to a decree from May 21 published on the Russian government's website.

Details:

- The change has **not** been **internationally recognized**.
- **Lithuania** and **Finland** have **not** yet reacted to **Russia's decision**.
- **Russia** plans to **appropriate inland sea waters** in the **eastern Gulf of Finland** and near **Baltiysk** and **Zelenogradsk** in **Kaliningrad Oblast**.
- The decree alters **geographic coordinates to redefine Russian territorial sea areas**.
- Changes affect coordinates near several islands and the **Narva River's north cape** on the **Finnish border**.
- Adjustments also include areas near the **Curonian** and **Vistula spits** and **Taran Cape** on the **Lithuanian border**.
- Russia claims previous coordinates, set by a **1985 USSR decree**, were based on outdated, small-scale marine maps from the 20th century.



Bordering countries of Russia:

- Russia shares land borders with **fourteen countries: Poland and Lithuania (both via Kaliningrad Oblast), Norway, Finland, Estonia, Latvia, Belarus, Ukraine, Georgia, Azerbaijan, Kazakhstan, China, Mongolia, and North Korea**
 - **Oblast (province)** is administrative territory of Russia.
 - The port city of **Baltiysk** is **Russia's only port on the Baltic Sea** that remains ice-free in winter.
- **Narva river:**
 - The **Narva** flows **77 kilometres north** into the **Baltic Sea** and is the **largest Estonian river by discharge**.
 - The river draws its water from **Lake Peipsi**, runs along the **border of the Republic of Estonia and the Russian Federation**, and **falls into Narva Bay, Gulf of Finland**.
 - The river gives its name to the **archaeological (Neolithic) Narva culture**, as well as the city of **Narva**.

Lithuania:

- A country in the **Baltic region** of Europe.
- It is **one of three Baltic states** and lies on the **eastern shore** of the **Baltic Sea**.
- It borders **Latvia** to the **north**, **Belarus** to the **east and south**, **Poland** to the **south**, and **Russia** to the **southwest**, with a **maritime border** with **Sweden** to the **west**.

Finland:

- A **Nordic country** in Northern Europe.
- It borders **Sweden** to the **northwest**, **Norway** to the **north**, and **Russia** to the **east**, with the **Gulf of Bothnia** to the **west** and the **Gulf of Finland** to the **south**, opposite **Estonia**.

Ireland, Spain, Norway to formally recognise Palestine

Sub: IR

Sec: Places in news

Context:

- Norway, Ireland and Spain announced on May 22 that they will formally recognise the state of Palestine.

Key Highlights:

- The European countries' announcements come weeks after 143 of 193 countries in the **United Nations (U.N.) General Assembly** voted for full membership to the U.N. for the State of Palestine.

Which countries recognized Palestine?

- **Norway** has been involved in peace talks between Israel and Palestine for decades, including by hosting the beginning of the Oslo process, which culminated in the Oslo Peace Accords in the early-mid 1990s.
- **Spain and Ireland** announced that it would formally recognise Palestine.

About Palestine:

- **Palestine officially the State of Palestine is a country** in the southern Levant region of West Asia.
- It encompasses two disconnected territories i.e. the **West Bank and the Gaza Strip**, collectively known as the **Palestinian territories within the larger region of Palestine**.
- The country shares its borders with Israel to the north, west and south, Jordan to the east and Egypt to the southwest.
- Its **proclaimed capital is Jerusalem** while **Ramallah** serves as its **administrative center** and **Rafah** is currently its **largest city**.
- **Arabic is the official language**.

- The majority of Palestinians practice Islam while Christianity also has a significant presence.



About Oslo Peace Accords:

- The Oslo Accords are a pair of interim agreements between Israel and the Palestine Liberation Organization (PLO).
- The Oslo I Accord, signed in Washington, D.C, in 1993 and the Oslo II Accord, signed in Taba, Egypt in 1995.
- The Oslo process began after secret negotiations in Oslo, Norway, resulting in both the recognition of Israel by the PLO and the recognition by Israel of the PLO as the representative of the Palestinian people and as a partner in bilateral negotiations.

Gelephu Mindfulness City is a lifetime opportunity, says Bhutan PM Tshering Tobgay

Sub: IR

Sec: Places in news

Tags: Gelephu

Context:

- Bhutan's King Jigme Khesar Namgyel Wangchuck announced plans for an "international city" (Gelephu smart city) on a 2,000+ sq. km. area bordering Assam, at the Changlimathang stadium in Thimpu.
- This Economic Corridor aims to connect South Asia with Southeast Asia via India's northeastern states and will enhance the connectivity.
- **Infrastructure Development:** Includes India-Bhutan railway line to Gelephu, linking roadways, trading points, and connections to Myanmar, Thailand, Cambodia, and Singapore.

Bhutan's Gelephu Mindfulness City Project:

- Gelephu's marshland offers a unique and beautiful landscape.
- The city spans 2,000 sq. km and is designed to be carbon-negative.
- Interest from countries including India, Nepal, Bangladesh, Sri Lanka, Thailand, Singapore, and Indonesia.

Economic Challenges and Solutions

- Bhutan announced an Economic Stimulus Programme using ₹1,500 crore from a ₹10,000 crore outlay promised by Indian PM Narendra Modi.
- The programme aims to tackle slow growth, a tourism downturn, and unemployment.
 - Emphasis on free education, healthcare, and a strong democratic governance model.
- Bhutanese youth leave due to a lack of opportunities and better-earning prospects abroad.

Indian Support and Development Plans

- India increased support for Bhutan's Five Year Plan from ₹5,000 crore to ₹10,000 crore.
 - ₹8,500 crore was allocated for infrastructure projects including roads, schools, and hospitals.
 - ₹1,500 crore was dedicated to economic stimulus, particularly for small businesses and tourism.

BBIN Motor Vehicle Agreement

- Bhutan remains hesitant to join the BBIN Motor Vehicle Agreement due to local opposition and demographic concerns.
- Tobgay acknowledges that Bhutan is not ready to revisit the agreement.

More than 2000 buried in Papua New Guinea landslip

Sub: IR

Sec: Places in news

Tag: Papua New Guinea landslip'

Context:

- A deadly landslide which villagers in **Papua New Guinea** say struck like "an exploding bomb" may have buried more than 2,000 people alive.

Details:

- Landslip at **Kaokalam village, Yambali** in **Enga Province** of **Papua New Guinea**.
- The **Mount Mungalo landslide** occurred in the highlands of **Enga**, in the north of the island nation.
- **Reason for the landslide:** Local officials and reporters have attributed the mountain's collapse to **weeks of heavy rain** and **other wet conditions** in the area.
- The ground is quite unstable at the moment and it is at risk of triggering further landslide.

**About Papua New Guinea:**

- **Location:** It is an island country that lies in the **south-western Pacific**.
- It includes the **eastern half of New Guinea** (the world's second-largest island) and **many small offshore islands**.
- **Neighbours:** **Indonesia** to the west, **Australia** to the south, and the **Solomon Islands** to the southeast.
- **Capital:** Port Moresby
- **Terrain:** It is mainly mountainous but has low-lying plains in southern New Guinea.
- The islands that constitute **Papua New Guinea** were settled over a period of **40,000 years** by a **mixture of peoples** who are generally referred to as **Melanesians**.
- **Language:**
 - **English** is the main language of government and commerce. In most everyday contexts, the most widely spoken language is **Tok Pisin**.
 - **Linguistically**, it is the **world's most diverse country**, with **more than 800 languages**.
- **Religion:** The majority of **Papua New Guinea's people** are at least nominally **Christian**.
- **Government:**
 - **Papua New Guinea** became **self-governing** on **December 1, 1973**, and achieved **independence** on **September 16, 1975**.
 - The country is a **constitutional monarchy** and a **member of the Commonwealth**.
 - The **British monarch** (At present '**King Charles III**'), represented by a **governor-general**, is the **head of state**, and the **Prime Minister** is the **head of government**.

India offers \$1-million aid to disaster-hit Papua New Guinea

Sub: IR

Sec: Places in news

Context:

- The **Government of India** has **granted \$1 million** in **immediate assistance** to **Papua New Guinea**, which has experienced **devastating floods** and a **landslip** that has killed 2,000 people.

Details:

- The **Ministry of External Affairs** emphasized **India's solidarity** with Papua New Guinea, a partner under the **Forum for India-Pacific Islands Cooperation (FIPIC)**, in its relief, rehabilitation, and reconstruction efforts.
- **India** has previously supported **Papua New Guinea** during the **2018 earthquake** and **volcanic eruptions** in **2019** and **2023**.

Forum for India-Pacific Islands Cooperation (FIPIC):

- **FIPIC** is a **multinational grouping** developed in **2014** for **cooperation** between the **Republic of India** and **14 Pacific Islands nations** which include Cook Islands, Fiji, Kiribati, Marshall Islands, Federated States of Micronesia, Nauru, Niue, Samoa, Solomon Islands, Palau, Papua New Guinea, Tonga, Tuvalu and Vanuatu.
- **All heads of state** or **heads of government** of the above countries met in **Suva, Fiji** in **November 2014** for the **first time** where the **annual summit** was conceptualised.
- **Objective:**
 - Provide necessary information and facilitation regarding prospects of Trade and Investment
 - Facilitate meetings between the concerned businessmen from both sides
 - Exchange of business delegations between India and Pacific Islands Countries
 - Online & Offline Match-Making Services
 - Organising Events / Trade Fairs
- At this moment, **total annual trade** of about **\$300 million** between the **Indian** and **Pacific Island countries**, whereas **exports** are around **\$200 million** and **imports** are around **\$100 million**.



Belarus halts participation in European military treaty

Sub: IR

Sec: Places in news

Tags: Treaty on Conventional Armed Forces in Europe (CFE), Belarus halts participation in European military treaty

Context:

- **President Alexander Lukashenko** signed a decree **suspending Belarus' participation** in a **treaty limiting conventional forces in Europe**, aligning with **Russia's earlier move**.

Details:

- Although **Belarus** is **not** directly involved in the Ukraine conflict, it hosted **Russian troops** before **Moscow's military operation** against **Kyiv** in February 2022.
- **Russia** provides **financial, military, and diplomatic support** to **Lukashenko's regime**.

Treaty on Conventional Armed Forces in Europe (CFE):

- The **Treaty on Conventional Armed Forces in Europe (CFE)**, first signed by **NATO** and the **Warsaw Pact** in **1990**, **limits the deployment of military equipment** between the **Atlantic** and the **Ural Mountains**.
 - The treaty proposed **equal limits** for the **two "groups of states-parties"**, the **North Atlantic Treaty Organization (NATO)** and the **Warsaw Pact**.
- **Russia** unilaterally suspended its participation in the **CFE treaty** in **December 2007**, calling it outdated.
- **Russia's** suspension followed **Western countries'** and **NATO members'** **refusal to ratify a 1999 amendment** to the **treaty**, contingent on the **withdrawal of Russian forces** from **Transnistria** in **Moldova** and **parts of Georgia**.
- In **2008**, **Russia** deployed troops to the **Georgian regions** of **Abkhazia** and **South Ossetia**.
- **Russian President Vladimir Putin** officially confirmed **Russia's exit** from the **treaty** in **May 2023**.

Belarus bordering countries:

- **Belarus shares a border with five countries: Poland** in the west, **Lithuania** in the northwest, **Latvia** and the **Russian Federation** in the north, northeast and east, and **Ukraine** in the south.



Moldova receives U.S. aid to counter Russian influence

Sub: IR

Sec: Places in news

Tags : Moldova receives U.S. aid

Context:

- **U.S. Secretary of State Antony Blinken** pledged **\$135 million** in aid to **Moldova** for **energy security** and to **counter Russian disinformation** during a visit to **Chisinau** on May 29.

Details:

- This brings the **total U.S. aid to Moldova** since the **Ukraine war** began in February 2022 to **\$774 million**, including **\$300 million for energy security**.
- Blinken's visit, part of a trip to **Eastern Europe**, comes amid concerns about **renewed Russian threats** to **Moldova** and **Georgia**.
- The visit coincides with a **NATO foreign ministers meeting** in **Prague** and follows an **unannounced trip to Ukraine** two weeks earlier to reaffirm U.S. support amid increased Russian attacks.
- **Russia** has **1,500 troops** in **Transnistria**, a **disputed Moldovan territory**, and is allegedly behind **anti-Western moves** in **Georgia**.
- **Moldova** accuses **Russia** of conducting a **“hybrid war”** involving **election meddling** and **disinformation** to **destabilise** its government and hinder its **EU aspirations**, which Russia denies.
- In **Georgia**, **parliament overrode a presidential veto** of a **“foreign agents” bill** requiring **entities** with over **20% foreign funding** to **register as foreign agents**, sparking protests and concerns about **media freedom** and **EU membership prospects**.
- **Georgian President Salome Zourabichvili vetoed the bill**, accusing the ruling party of jeopardizing the country's democratic future.
- The **U.S.** announced **travel bans** on **Georgian officials** undermining democracy and is reviewing its cooperation with **Georgia**.
- The **NATO ministerial meeting** in **Prague** will address issues in **Georgia**, **Moldova**, and **Ukraine** ahead of **NATO's 80th-anniversary summit** in **Washington** in July.

Moldova:

- A landlocked country in Eastern Europe, on the northeastern corner of the Balkans.
- Moldova is bordered by **Romania** to the **west** and **Ukraine** to the **north, east, and south**.
- Capital and largest city: **Tiraspol**
- **Transnistria:**
 - **Transnistria**, officially known as the **Pridnestrovian Moldavian Republic (PMR)**, is a breakaway state **internationally recognized** as part of **Moldova**.



Georgia:

- A transcontinental country in Eastern Europe and West Asia.
- It is part of the **Caucasus region**, bounded by the **Black Sea** to the **west**, **Russia** to the **north** and **northeast**, **Turkey** to the **southwest**, **Armenia** to the **south**, and **Azerbaijan** to the **southeast**.
- Capital and largest city: **Tbilisi**.
- **Abkhazia and South Ossetia:**
 - **Abkhazia** and **South Ossetia** are **separatist regions** of **Georgia** in the **Caucasus**.
 - Most countries recognise them as **part of Georgia**, while **Russia, Venezuela, Nicaragua, Nauru, and Syria** regard them as **independent**.
 - **Russia's initial recognition** of the **independence** of **Abkhazia** and **South Ossetia** occurred in the aftermath of the **Russo-Georgian War** in **2008**.
 - **Abkhazia** and **South Ossetia** recognise each other and also have some **recognition** from **non-UN member states**.



Polity

Supreme Court: Article 39(b) shouldn't be read like there is no protection for private rights

Subject: Polity

Sec: constitution

Tag: Art 39(b), DPSP V/S FR

Context:

- A **nine-judge Constitution bench of the Supreme Court**, which is examining the question whether private property would constitute material resources of the community as appearing in Article 39(b), said that the provision should not be interpreted in such a wide sense that there is no protection for private rights at all.

More on news:

- The reference to the nine-judges had arisen in the context of the two views emerging in the 1978 decision in '**State of Karnataka And Anr Etc vs Shri Ranganatha Reddy & Anr**'.
- In the **Golak Nath case (1967)**, the Supreme Court held that fundamental rights cannot be abridged or diluted to implement DPSP.

- Finally, in the **Kesavananda Bharati case (1973)**, a thirteen-judge Bench of the Supreme Court upheld the validity of **Article 31C** but made it subject to judicial review.
- In the **Minerva Mills case (1980)**, the Supreme Court ruled that the Constitution exists on a harmonious balance between fundamental rights and DPSP.
- The Union also proposed to understand the post-Minerva Mills impact on Article 31C from the standpoint of **Blackstone's Declaratory Theory**.

What does the Constitution provide?

- The **Preamble to the Constitution aims to secure to all citizens social and economic justice, liberty and equality**.
- **Part III of the Constitution** lists down the fundamental rights that guarantee liberty and equality while Part IV contains the DPSP.
- These are principles that the central and State governments should follow to achieve social and economic justice in our country.
- **Article 39(b) and (c) in Part IV** contain principles that are aimed at securing economic justice.
- They provide that ownership and control of material resources of the society should be distributed to serve the common good and that the operation of the economic system does not result in concentration of wealth to the common detriment.

What is the historical context?

- The Constitution originally guaranteed the **right to property as a fundamental right under Article 19(1)(f)**.
- It provided under **Article 31 that the state shall pay compensation in case of acquisition of private property**.

About Right to private property:

- In 1978, in order to avoid excessive litigation directly in the Supreme Court by the propertied class, the **44th amendment act** omitted the right to property as a fundamental right and made it a constitutional right under **Article 300A**.
- **The right to private property continues to be an important constitutional cum legal right**.
- Any law to acquire private property by the state should be only for a public purpose and provide for adequate compensation.

India's Economic model:

- **The Monopolies and Restrictive Trade Practices Act, 1969 (MRTP Act)** was brought with the rationale to reduce inequality and redistribute wealth among the poorer sections who constituted the majority of the population.
- **A new industrial policy was unveiled in July 1991** with the objective of empowering market forces, improving efficiency and rectifying deficiencies in the country's industrial structure.
- **The MRTP Act was repealed and replaced with the Competition Act, 2002** and income tax rates were reduced considerably.
- **Estate duty was abolished in 1985 and wealth tax in 2016**.

Constitutional Provisions in news:

- **Article 39(b)** obligates the state to direct its policy towards securing the ownership and control of the material resources of the community that are so distributed as best to subserve the common good.
- **Article 39(c) of the DPSP** states that the operation of the economic system does not result in the concentration of wealth and means of production to the common detriment.
- **Article 300A** required the state to follow due procedure and authority of law to deprive a person of his or her private property.
- **The right to property** is now considered to be not only a constitutional or statutory right, but also a human right.

About Material resources of the community:

- **Material resources of the community** in the context of reordering the national economy **embraces all the national wealth, not merely natural resources, all the private and public sources of meeting material needs, not merely public possessions**.

About Blackstone's Declaratory Theory:

- Main supporters of declaratory theory are **Hale, Blackstone and carter**.
- According to this **theory judges only declare law; no new law is created by the judges**.
- Their province is to **ascertain and declare what the law is**.
- They only discover the existing laws, **the particular principles that govern the individual cases**.

DISTINCTION BETWEEN FUNDAMENTAL RIGHTS AND DIRECTIVE PRINCIPLES

FUNDAMENTAL RIGHTS	DIRECTIVE PRINCIPLES
--------------------	----------------------

These are negative as they prohibit the State from doing certain things	These are positive as they require the State to do certain things.
These are justiciable, that is, they are legally enforceable by the courts in case of their violation.	These are non-justiciable, that is, they are not legally enforceable by the courts for their violation
They aim at establishing political democracy in the country	They aim at establishing social and economic democracy in the country.
These have legal sanctions	These have moral and political sanctions
They promote the welfare of the individual	They promote the welfare of the community
They do not require any legislation for their implementation. They are automatically enforced.	They require legislation for their implementation. They are not automatically enforced
The courts are bound to declare a law violative if any of the Fundamental Rights is unconstitutional and invalid	The courts cannot declare a law violative if any of the Directive Principles is unconstitutional and invalid. However, they can uphold the validity of a law on the ground that it was enacted to give effect to a directive
Fundamental Rights are analogous with UNHDR	Directive Principles could be considered analogous to the rights enshrined in the International Covenant on Social, Economic and Cultural Rights

RELATIONSHIP BETWEEN DIRECTIVE PRINCIPLES AND FUNDAMENTAL RIGHTS

STAGE		
First Stage: 1950-1966	Directive Principles as subsidiary and subordinate to Fundamental Rights	In case of conflict, FR would prevail over DPSP Eg : Champakam Dorairajan's case (Article 29 vs Article 46 The Constitution (First Amendment Act, 1951): Inserted Articles 31A and 31B of the Constitution. Article 31A provides that no law providing the acquisition by the State of any estate therein shall be deemed to be void on the ground that it is inconsistent with or takes away or abridges any of the rights conferred by any provisions of Part III. 31-B, none of the laws specified in the Ninth Schedule shall be deemed to be void on the ground that it was inconsistent with any of the Fundamental Rights, notwithstanding any judgments, decree or order of any court or tribunal to the contrary
Second Stage: 1967-1971	(Fundamental Rights are Sacrosanct)	Golak Nath's Case: The First, Fourth and Seventeenth Amendment abridged the scope of the Fundamental rights and were, therefore, void under Article 13 of the Constitution. Any amendment of Part III could be made only in so far as it did not take away or

		abridge any of the rights conferred by that part
Third Stage: 1972-1975	Fundamental Rights can be amended to implement Directive Principles	Kesavananda Bharati case (1973) , the Supreme Court declared the above second provision of Article 31C as unconstitutional and invalid on the ground that judicial review is a basic feature of the Constitution and hence, cannot be taken away. However, the above first provision of Article 31C was held to be constitutional and valid
Fourth Stage	Fundamental Rights as Subordinate to Directive Principles	<ul style="list-style-type: none"> • 42nd Constitutional Amendment Act: The Act inter alia gave preponderance to the Directive Principles of State Policy over the Fundamental Rights. It amended Article 31(c) and fundamental rights guaranteed by Articles 14, 19 and 31 were subordinated to all the Directive Principles of State Policy mentioned in Part IV. • It extended the scope of the above first provision of Article 31C by including within its protection any law to implement any of the Directive Principles and not merely those specified in Article 39 (b) and (c) • This was a fundamental change in the Constitution because it has completely changed the relationship between Fundamental Rights and Directive Principles
Fifth Stage: 1980- Till date	Superiority of Fundamental Rights	<ul style="list-style-type: none"> • In Minerva Mills Case some of the provisions of the 42nd Amendment Act were challenged in the Supreme Court. The Supreme Court in its judgment struck down

		<p>section 4 of the 42nd Amendment Act.</p> <p>Concluding view by Minerva Mills Case</p> <ul style="list-style-type: none"> The Supreme Court held that ‘the Indian Constitution is founded on the bedrock of the balance between the Fundamental Rights and the Directive Principles. They together constitute the core of commitment to social revolution. They are like two wheels of a chariot, one no less than the other. To give absolute primacy to one over the other is to disturb the harmony of the Constitution. This harmony and balance between the two are an essential feature of the basic structure of the Constitution. The goals set out by the Directive Principles have to be achieved without the abrogation of the means provided by the Fundamental Rights’
--	--	---

Article 31C: Why the SC is deciding if a fundamental right still exists in a case about private property?

Subject: Polity

Sec: Constitution

Context:

The Supreme Court Constitution Bench reserved its **judgment on the issue of whether private resources form part of the 'material resource of the community' under Article 39(b) of the Constitution.**

More on news:

- A nine-judge Bench of the **Supreme Court led by Chief Justice of India D Y Chandrachud decided to take up another issue of “radical constitutional consequence”**: does Article 31C still exist?
- The court is hearing a challenge to **Chapter VIII-A of the Maharashtra Housing and Area Development Act, 1976 (MHADA).**

Introduction of Article 31C:

- Article 31C was introduced by The Constitution (Twenty-fifth) Amendment Act, 1971.
- In the **“Bank Nationalization Case” (Rustom Cavasjee Cooper vs Union Of India, 1970)**, the Supreme Court stopped the Centre from acquiring control of 14 commercial banks by enacting **The Banking Companies (Acquisition and Transfer of Undertakings) Act, 1969.**
- An eleven-judge Bench struck **the Act down by referring to the now-repealed Article 31(2)**, which states that the government could not acquire any property for public purposes under any law unless the law fixes compensation for the property.
- In the **Bank Nationalization case**, the court held that the **‘right to compensation’ was not appropriately ensured by the Banking Act.**
- The government, through the **25th Amendment sought to surmount the difficulties placed in the way of giving effect to the Directive Principles of State Policy.**
- One of the means employed to do so was the introduction of Article 31C, which stated its two provisions as follows:

- No law giving effect to the policy of the State towards securing the principles specified in clause (b) or clause (c) of article 39 shall be deemed to be void on the ground that it is inconsistent with, or takes away or abridges any of the rights conferred by article 14, article 19 or article 31; and
- no law containing a declaration that it is for giving effect to such policy shall be called in question in any court on the ground that it does not give effect to such policy.

The journey of Article 31C:

- The 25th amendment was challenged in the seminal Kesavananda Bharati case (1973) which held that the Constitution has a “**basic structure**” that cannot be altered, even by a constitutional amendment.
- As a part of this verdict, the court struck down the **last portion of Article 31C, i.e., the part that states “and no law containing a declaration that it is for giving effect to such policy shall be called in question in any court on the ground that it does not give effect to such policy”.**
- This opened the door for the court to examine laws that had been enacted to further **Articles 39(b) and 39(c)**, to determine whether the purpose of those laws actually lined up with the principles espoused in these provisions.
- In 1976, Parliament enacted the **Forty-second Amendment Act**, which expanded the protection under **Article 31C to all or any of the principles laid down in Part IV of the Constitution**, under clause 4.
- As a result, every single **directive principle (Articles 36-51)** was protected from challenges under **Articles 14 and 19 of the Constitution**.
- It was meant to give precedence to the directive principles over those fundamental rights which have been allowed to be relied upon to frustrate socio-economic reforms for implementing the directive principles.
- In 1980, in **Minerva Mills v. Union of India**, the SC struck down **clauses 4 and 5 of the amendment**.
- The five-judge Bench held that **Parliament’s power to amend the Constitution was limited, and it could not be used to remove these limitations and grant itself unlimited and absolute powers of amendment**.

Constitutional Provisions in news:

- **Article 39(b) obligates the state to direct its policy** towards securing the ownership and control of the material resources of the community that are so distributed as best to subserve the common good.
- **Article 39(c) of the DPSP states** that the operation of the economic system does not result in the concentration of wealth and means of production to the common detriment.
- **Article 300A required the state** to follow due procedure and authority of law to deprive a person of his or her private property.

A brief history of religion-based reservations in India; the question of Muslims’ inclusion

Subject: Polity

Sec: Constitution

Context:

- In this election season, India is debating fundamental constitutional questions around reservation.

Various debates regarding reservation:

- Can a secular country like India have religion-based reservation?
- Have Muslims ever been given reservation by reducing the quota for Scheduled Castes (SCs), Scheduled Tribes (STs), or Other Backward Classes (OBCs)?
- Does reservation for SCs that is limited to only certain religious denominations amount to reservation based on religion?

What the Indian Constitution says on religion-based reservations?

- **The Constitution of 1949 dropped the word ‘minorities’ from Article 296** of the draft constitution (Article 335 of the present Constitution), but included **Article 16(4)** that enabled the state to make any provision for reservation in favor of any backward class of citizens which is not adequately represented in the services under the state.
- The **first constitutional amendment inserted Article 15(4)**, which empowered the state to make any special provision for the advancement of any socially and educationally backward classes of citizens or for the Scheduled Castes and the Scheduled Tribes.
- **Article 15** specifically prohibits the state from discriminating against citizens on grounds only of both religion and caste (along with sex, race, and place of birth).
- The crucial word in **Articles 15 and 16 is ‘only’** — which implies that if a religious, racial, or caste group constitutes a “**weaker section**” under **Article 46**, or constitutes a backward class, it would be entitled to special provisions for its advancement.
- **Article 341 of the Constitution** and the 1950 Presidential Order state that only Hindus are entitled to inclusion within SCs.

- However, **Sikhs were included within SCs in 1956, and Buddhists in 1990.**
- **Muslims and Christians** remain excluded.
- It could be argued that this too, is ‘religion-based’ reservation.

Judicial pronouncements:

- The **Supreme Court in E P Royappa vs State Of Tamil Nadu, 1973 case**, has held that equality is a dynamic concept with many aspects and dimensions, and it cannot be “cribbed, cabined and confined” within traditional and doctrinaire limits.
- In **M R Balaji vs State of Mysore (1962)**, the court noted that Muslims or for that matter Christians and Sikhs etc., are not excluded for the purpose of conferring the benefits under Articles 15(4) or 16(4).
- In **Indra Sawhney (1992)**, the Supreme Court held that in a particular state, Muslim community as a whole may be found socially backward.

About Kerala Muslim sub-quota:

- Religion-based reservation was **first introduced in 1936 in Travancore-Cochin state.**
- In 1952, this was replaced by **communal reservation.**
- Muslims, who constituted 22% of the population, were included within the OBCs.
- After the state of **Kerala was formed in 1956**, all Muslims were included in one of eight sub-quota categories, and a sub-quota of 10% (now 12%) was created within the OBC quota.

Committee Recommendations:

- The **Justice Rajinder Sachar Committee (2006)** found that the Muslim community as a whole was almost as backward as SCs and STs, and more backward than non-Muslim OBCs.
- The **Justice Ranganath Misra Committee (2007)** suggested 15% reservation for minorities, including 10% for Muslims.

In Supreme Court, Centre says it sends CBI to States for probes

Subject: Polity

Sec: Constitution

Tag: Art 131, Original jurisdiction of SC

Context:

The Supreme Court on Wednesday refused to accept at face value the Centre’s claim that it has no control over the Central Bureau of Investigation (CBI), asking who else can send the premier investigating agency to States to investigate cases.

What is the issue?

- The SC is hearing an original suit filed by the State of West Bengal under **Article 131** of the Constitution, accusing the **Union government of “interfering”** in cases originating within the **State’s jurisdiction by unilaterally authorising the CBI to probe them.**
- West Bengal said the Centre continues to employ the CBI regardless of the fact that the State had withdrawn its general consent to CBI investigations within its territory under Section 6 of the Delhi Special Police Establishment (DSPE) Act, 1946 way back in November 2018. The CBI has registered over 15 cases in West Bengal.

Article 131:

- According to Article 131, the SC has exclusive and original jurisdiction over legal issues originating between States or between States and the Union.
- Original jurisdiction is the power of the court to hear and determine a dispute in the first instance.
- Original jurisdiction of the SC:
 - between the Government of India and one or more States
 - between the Government of India and any State or States on one side and one or more other States on the other
 - between two or more States, if and in so far as the dispute involves any question (whether of law or fact) on which the existence or extent of a legal right depends.
- The nature of Article 131 is subject to provisions of the Constitution and is limited to disputes involving legal rights, as mentioned in the Article itself.
- Thus, disputes of political nature are not covered under this, unless legal rights are at stake.
- The SC held that the meaning of the word ‘State’ under Article 131 does not include any private citizen, company, or a government department, even if it had filed a complaint along with any State Governments.

Restrictions:

- The original jurisdiction of the SC does not extend to disputes arising out of **any treaty, agreement, covenant, engagement, sanad, or any other similar instrument** which came into being before the commencement of the Constitution.
- The parliament may exclude the jurisdiction of the SC in disputes relating to the use, distribution, or control of the water of any inter-state river;
- Suits brought by **private individuals** against the Government of India.

What is CBI?

- Central Bureau of Investigation (CBI) is the premier investigating police agency in India.
- It functions under the superintendence of the **of Personnel, Ministry of Personnel, Pension & Public Grievances, Government of India** – which falls under the prime minister’s office.
- However for investigations of offences under the Prevention of Corruption Act, its superintendence vests with the Central Vigilance Commission.
- It is also the nodal police agency in India which coordinates investigation on behalf of Interpol Member countries.
- Its conviction rate is as high as 65 to 70% and it is comparable to the best investigation agencies in the world.

Cases Handled by the CBI

- Anti-Corruption Crimes – for investigation of cases under the Prevention of Corruption Act against Public officials and the employees of Central Government, Public Sector Undertakings, Corporations or Bodies owned or controlled by the Government of India.
- Economic Crimes – for investigation of major financial scams and serious economic frauds, including crimes relating to Fake Indian Currency Notes, Bank Frauds and Cyber Crime, bank frauds, Import Export & Foreign Exchange violations, large-scale smuggling of narcotics, antiques, cultural property and smuggling of other contraband items etc.
- Special Crimes – for investigation of serious and organized crime under the Indian Penal Code and other laws on the requests of State Governments or on the orders of the Supreme Court and High Courts – such as cases of terrorism, bomb blasts, kidnapping for ransom and crimes committed by the mafia/the underworld.
- Suo Moto Cases – CBI can suo-moto take up investigation of offences only in the Union Territories.
- The Central Government can authorize CBI to investigate a crime in a State but only with the consent of the concerned State Government.
- The Supreme Court and High Courts, however, can order CBI to investigate a crime anywhere in the country without the consent of the State.

Director of CBI

- Director, CBI as Inspector General of Police, Delhi Special Police Establishment, is responsible for the administration of the organisation.
- Till 2014, the CBI Director was appointed on the basis of the DSPE Act, 1946.
- In 2003, DSPE Act was revised on Supreme Court’s recommendation in the VineetNarain case. A committee that had members from Central Vigilance Commission, Secretaries from Home Ministry, Ministry of Personnel and Public Grievances would send recommendations to Central Government for the appointment of CBI Director.
- In 2014, the Lokpal Act provided a committee for appointment of CBI Director: **Headed by Prime Minister, Other members – Leader of Opposition/ Leader of the single largest opposition party, Chief Justice of India/ a Supreme Court Judge.**
- Home Ministry sends a list of eligible candidates to **DoPT**. Then, the DoPT prepares the final list on basis of seniority, integrity, and experience in the investigation of anti-corruption cases, and sends it to the committee.

General Consent

- The CBI needs consent of the **state government** in whose territorial jurisdiction, the CBI has to conduct an investigation (unlike NIA which enjoys All-India jurisdiction).
- Section 6 of the DPSE Act authorizes the central government to direct CBI to probe a case within the jurisdiction of any state on the recommendation of the concerned state government.
- However, the courts (SC and HC) can also order a CBI probe, and even monitor the progress of investigation in which case it won’t need states consent.
- However, even after withdrawal of the general consent The CBI continues to probe in old cases until specifically taken back by the state government. Further, it continues to investigate cases that were given to it by a court order.
- When a state gives a general consent to the CBI for probing a case, the agency is not required to seek fresh permission every time it enters that state in connection with investigation or for every case.

- If the general consent is withdrawn CBI needs to seek case-wise consent for investigation from the concerned state government. If specific consent is not granted, the CBI officials will not have the power of police personnel when they enter that state.
- In case of lack of general consent the CBI can approach a local court for a search warrant and conduct investigation.

Has the agency's job been affected?

- The withdrawal of general consent **does not affect pending investigation** (KaziLendhupDorji v. CBI, 1994) or the cases registered in another State in relation to which investigation leads into the territory of the State which has withdrawn general consent; nor does the withdrawal circumscribe the power of the jurisdictional High Court to order a CBI investigation.
- However, without the States' general consent, the CBI offices get disrobed of their general status as Police Stations.
- In other words, the CBI gets handcuffed by the State governments with its freedom of action available only in the aforesaid occasions and in cases in which such a State gives specific consent in relation to an offence to be investigated.

What does the law say?

- According to Section 6 of the Delhi Special Police Establishment Act of 1946 under which the CBI functions, the State's consent is required to extend CBI investigation beyond Union Territories.
- The general consent given by the States enables the CBI to investigate corruption charges freely, as "police" is Entry 2 in the State List under the Seventh Schedule of the Constitution.
- The legal foundation of the CBI has been construed to be based on Entry 80 of the Union List which provides for the extension of powers of the police force belonging to one State to any area in another State but not without its permission.
- In the Advance Insurance Co. Ltd case, 1970, a Constitution Bench held that the definition of "State", as contained in the General Clauses Act, includes Union Territories as well and hence the CBI, being a force constituted for Union Territories as recognised under the Delhi Special Police Establishment Act of 1946, can conduct investigation into the territories of the States only with their consent.
- The United Nations Convention against Corruption to which India is a signatory also requires firm impartial steps to combat corruption at all levels.

Reservation within Constitutional bounds

Subject: Polity

Sec: Constitution

Context:

- A political slugfest has emerged over the reservation issues.

Constitutional Basis for Reservation:

- The **Constitution of India** provides for **reservation** in various forms, including:

Article	Reservation
Article 15(4)	Nothing in this article shall prevent the State from making any special provision for the advancement of any socially and educationally backward classes of citizens or the Scheduled Castes and the Scheduled Tribes.
Article 16(4)	Nothing in this article shall 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
Article 16(4A)	Provisions for reservation in the promotion of posts in services under the state for members of the SCs and STs
Article 16(4B)	It enables the state to fill unfilled vacancies reserved for SCs/STs in the following year
Article 39A	The state has to ensure justice and free legal aid to weaker sections of society
Article 243D	Reservation for SCs/STs and Women in Panchayati Raj Institutions
Article 243T	Reservation for SCs/STs and Women in Urban Local Bodies
Article 330 and Article 332	Reservation of seats for the SCs and the STs in the Parliament and in the State Legislative Assemblies respectively

Different types of Reservations in India:

Type	Description
Vertical Reservation	<ul style="list-style-type: none"> It refers to the reservation of seats in educational institutions and jobs in government services for Scheduled Castes (SC), Scheduled Tribes (ST), and Other Backward Classes (OBCs). <ul style="list-style-type: none"> This reservation is based on the proportion of the population of these groups in the country or a specific state.
Horizontal Reservation	<ul style="list-style-type: none"> It refers to the reservation of seats for specific categories of people within the reserved categories. For example, within the SC category reservation, there can be reservations for differently-abled people.
Caste-based Reservation	<ul style="list-style-type: none"> Caste-based reservation is a system that provides opportunities and access to education and employment to people belonging to historically marginalized castes in India, such as Scheduled Castes (SC) and Scheduled Tribes (ST).
Gender-based reservation	<ul style="list-style-type: none"> Gender-based reservation is based on the principle of gender equality. In India, the Constitution has provided one-third reservation to women in local bodies under Articles 243D and 243T.
Income-based reservation	<ul style="list-style-type: none"> It is a system that provides opportunities and access to education and employment to poor sections of society. For example, reservation to the economically weaker sections (EWS) of society.
Reservation for differently-abled	<ul style="list-style-type: none"> It is based on the principle of inclusivity, which aims to create an equal and accessible society for people with disabilities. For example, 4% reservation is provided to disabled persons in government jobs.

Key judgements:

- Indra Sawhney Case (1992):** The Supreme Court upheld **27%** reservation for **OBCs** and maintained a **total reservation cap at 50%**, excluding the "**creamy layer**" (more affluent members) of OBCs from reservation benefits.
 - The reservation of OBC (27%), SC (15%) and ST (7.5%) resulted in a total reservation of 49.5%.
- Nagaraj Case Judgement (2006):** The Supreme Court ruled that the **state was not bound to provide reservation in promotions to SCs/STs**. But if any state wished to make such a provision, it needs to:
 - Collect quantifiable data on the backwardness of the class
 - Prove its inadequate representation in public employment
 - Show no compromise on the efficiency of administration
- Jarnail Singh vs Lachmi Narain Gupta Case Judgement (2018):** The Supreme Court held that **reservation in promotions does not require the state to collect quantifiable data** on the backwardness of the SCs and the STs.
 - The Court also held that **creamy layer exclusion extends to SC/STs** and, hence the **State cannot grant reservations in promoting SC/ST individuals who belong to the creamy layer of their community**.
- Janhit Abhiyan Case (2022):** The Supreme Court upheld the **constitutional validity of the 10% reservation for Economically Weaker Sections (EWS)**, recognizing economic criteria as a basis for reservation.

International Perspective on Affirmative Action:

- The **U.S.** recently moved away from **race-based affirmative action** in college admissions, ruling it unconstitutional.
- The **U.K.** practices "**positive action**," allowing voluntary measures to address the under-representation of disadvantaged groups.
- France** focuses on **educational measures for low-income students without explicit affirmative action** based on race or ethnicity.

Existing Challenges and Recommendations:

- The **G. Rohini Commission** was established to examine **sub-categorization** among **OBC castes** to ensure a **more equitable distribution of reservation benefits**.
- Initial assessments reveal that **approximately 97% of reserved positions and educational slots** have been secured by about **25% of the OBC castes/sub-castes**.
- Notably, **nearly 1,000 out of 2,600 OBC communities** have **not benefited** from reservations in employment or education.
- Although **sub-categorization** has been implemented in **11 states**, it has **not yet been adopted at the central level**.
- Similar issues of benefit concentration are observed among **SC and ST categories**, where **no creamy layer exclusion applies**.
- The government is also examining the extension of **SC reservations** to include **Dalit Christians and Muslims**, addressing **discrimination and lack of opportunities** faced by these groups.

- A commission led by former Chief Justice **K.G. Balakrishnan** is reviewing this aspect.
- The overarching goal of these reforms is to continue the pursuit of social justice while balancing it with the constitutional guarantee of equality, thereby making affirmative action more responsive and equitable across all disadvantaged groups.

What is the legal position on live-in relationships?

Sub: Polity

Sec: Constitution

Context:

- The Lucknow bench of the Allahabad High Court stated that a Muslim cannot claim rights in a live-in relationship when he or she has a living spouse.

What are Live in Relationships?

- The concept of a **live-in relationship is not defined anywhere in India.**
- It refers to a proposal of two individuals living together with consent.
- It allows an individual to understand each other which helps in making an informed decision for marriage.
- **Cohabitation** is an arrangement where people who are not married, usually couples, live together. They are often involved in a romantic or sexually intimate relationship on a long-term or permanent basis.
- The concept of a live-in relationship was recognised in Payal Sharma versus Nari Niketan by the Allahabad High Court.

Recent Case:

- A two judge **Bench of Justices A.R. Masoodi and A.K. Srivastava** called such a relationship against the tenets of Islam while hearing a writ petition.
- The judges stated that **Islamic tenets do not permit live-in relationships during the subsisting marriage.**

Constitutional Dimensions:

Right to Cohabitation:

- **Article 19(1)(e) of the Indian Constitution** states that every citizen has the right to reside and settle in any part of the territory of India.
- So the adults who wish to live together have the right to reside anywhere and cannot be denied accommodation based on their marital status.
- In **Khushboo V Kanniammal case**, the Supreme Court held that a live-in relationship comes within the ambit of Right to life under **Article 21 of the Constitution of India.**

What have the Courts said about live-in relationships?

- India does not have any laws that **directly address live-in partnerships.**
 - For a **man and a woman to live together is part of 'the right to life' and therefore, a live-in relationship is no longer an offense.**
- According to the **Supreme Court judgment in Badri Prasad v. Dy. Director of Consolidation (1978)**, live-in relationships in India are legal but subject to caveats like age of marriage, consent and soundness of mind.
- In **Lata Singh vs state of U.P 2006 case**, **Supreme Court held that a live-in relationship** between two consenting adults of opposite sex, though perceived as immoral, does not amount to any offense under the law.
- The **Punjab and Haryana High Court** stated that a couple living together without obtaining a divorce from their previous spouse cannot be classified as being in a "live-in relationship" or being in a union similar to marriage.

Over 300 people become Indian citizens under the CAA

Sub: Polity

Sec: Constitution

Tag: Citizenship (Amendment) Act (CAA) 2019.

Context:

- The Union Government granted **citizenship certificates to more than 300 people** who applied under the **Citizenship (Amendment) Act (CAA), 2019.**

Details:

- The **country of origin of the applicants** was **not disclosed** by the government but a government source said that most applicants were **Pakistani Hindus.**
- Most **Pakistani Hindus** who **entered India legally** are living in **Gujarat, Chhattisgarh, Rajasthan, Haryana, Punjab, and Delhi.**

- The **citizenship portal** requires applicants to **declare the country of origin**, and also submit **at least one document tracing their roots to Bangladesh, Pakistan or Afghanistan**.
- One of the documents required to apply under the CAA is an **eligibility certificate issued by a “locally reputed community institution”**.
- It was not known how many people from **West Bengal**, including **Matuas and Namasudras**, and those **excluded** from the **National Register of Citizens (NRC)** in **Assam**, had applied under the CAA.
- Since the intended beneficiaries in **West Bengal entered India without any documents**, they are **unable to apply under CAA**.

Citizenship Amendment Act 2019:

- The citizenship laws in India derived their origins from the **constitution under Articles 5-11** and the **Citizenship Act of 1955**. This Act provided provisions for citizenship by **birth, descent, registration and naturalisation**.
- **Eligibility:** It amended the **Citizenship Act of 1955** to make **illegal migrants** who are **Hindus, Sikhs, Buddhists, Jains, Parsis and Christians** from **Afghanistan, Bangladesh and Pakistan, eligible for Indian citizenship**.
 - **Pakistani Hindus** were anyway **eligible for citizenship** under **Section 5 and Section 6 (1)** of the **Citizenship Act, of 1955**. The CAA only helped fast-track the application process.
- **Who are illegal migrants?:** An illegal immigrant enters India **without valid travel documents** or **stays beyond the permitted time**, potentially facing prosecution, deportation, or imprisonment.
- Those from these communities who entered India on or **before December 31, 2014**, would **not be treated as illegal immigrants**, providing a **path to naturalisation**.
- However, it **exempts the Muslim community**.
- **Relaxation:**
 - The amendment relaxed the **residency requirement** from **11 years to 5 years** for these communities to acquire **Indian citizenship by naturalization**.
 - It exempts members of these communities from prosecution under the **Foreigners Act of 1946** and the **Passport Act of 1920**.
 - Applicants are exempt from being considered **"illegal immigrants"**.
- **Exception:**
 - The **amendments for illegal migrants** will **not** apply to certain **tribal** (under Sixth Schedule) areas in **Assam, Meghalaya, Mizoram, and Tripura**, as well as **states** regulated by the **"Inner Line" permit** under the **Bengal Eastern Frontier Regulations 1873**.
- **Consequences of acquiring citizenship:** It states that acquiring citizenship will result in (i) such persons being deemed to be citizens of India from the date of their entry into India, and (ii) all legal proceedings against them in respect of their illegal migration or citizenship being closed.
- **Grounds for cancelling OCI registration:** The **1955 Act** allows the **central government** to **cancel OCI registrations on various grounds**, with the amendment adding a **new ground for cancellation** if the **OCI violates a government-notified law**.

Citizenship Amendment Rules 2024:

- Notified by the **Ministry of Home Affairs**.
- The application process for citizenship under CAA has been made under **Section 6B** of the **Citizenship Act, 1955**. Applicants **need to prove their country of origin, religion, date of entry into India, and knowledge of an Indian language** to **qualify for Indian citizenship**.
- **Proof of Country of Origin:** Relaxed requirements allow various documents, including **birth or educational certificates, identity documents, licenses, land records, or any document proving previous citizenship** of the mentioned countries.
- **Date of Entry into India:** Applicants can provide **20 different documents** as **proof of entry into India**, including **visas, residential permits, census slips, driving licenses, Aadhaar cards, ration cards, government or court letters, birth certificates, and more**.
- **Authority to accord citizenship:**
 - The Rules grant the **final authority to accord citizenship** to an **empowered committee** headed by the **Director, Census Operations**, while the scrutiny of applications filed online on the portal **indiancitizenshiponline.nic.in** was done by a **district-level committee (DLC)** headed by the **Department of Post officials**.
 - On successful verification of documents, the **DLCs** administered the **oath of allegiance** to the applicants.
- **Digital certificate:** Approved applicants will receive a digital citizenship certificate.

State cannot acquire property without proper procedure: Supreme Court

Sub: Polity

Sec: Constitution

Context:

- The Supreme Court on Thursday took a significant step to protect private property from arbitrary state takeover for a “public purpose”.

General assumption of Right to Property:

- It is generally assumed that for a valid acquisition all that is necessary is to possess the **power of eminent domain i.e. power of the sovereign to acquire property of an individual for public use without consent to acquire, followed by grant of reasonable and fair compensation.**

About the ruling:

- It was ruled that **compulsory acquisition without following mandatory procedures followed by a grant of compensation to the owners will not make the accession constitutional.**
- A Bench of Justices P.S. Narasimha and Aravind Kumar declared in a judgment that the right to property is protected as a constitutional right and has even been interpreted to be a human right.
- **Compulsory acquisition will still be unconstitutional if proper procedure is not established and followed before depriving a person of his/her right to property.**
- The judgment upheld a Calcutta High Court order rejecting an appeal filed by the Kolkata Municipal Corporation defending its acquisition of a private land.
- **It was noted that the 44th Constitutional Amendment omitted the right to property as a fundamental right, Article 300A, which was simultaneously inserted into the Constitution, provided that “no person shall be deprived of his property, save by authority of law.**

Other seven basic rights:

- The court laid down seven basic procedural rights of private citizens constituting the “real content of the right to property under Article 300A” that the state should respect before depriving them of their private property.
- They include,
 - **the right to notice or the duty of the state to inform the person that it intends to acquire his property;**
 - **the right of the citizen to be heard or the duty of the state to hear the objections to the acquisition;**
 - **the right of the citizen to a reasoned decision or the duty of the state to inform the person of its decision to acquire property;**
 - **the duty of the state to demonstrate that the acquisition is exclusively for public purpose;**
 - **the right to fair compensation of the citizen;**
 - **the duty of the state to conduct the process of acquisition efficiently and within prescribed timelines; and**
 - **the conclusion of the proceedings leading to vesting or the right of conclusion.**

Acquisition Process:

- The culmination of an acquisition process is not in the payment of compensation, but also in taking over the actual physical possession of the land.
- If possession is not taken, acquisition is not complete.

Constitutional Provisions in news:

Article 300A:

- **Article 300A required the state to follow due procedure and authority of law to deprive a person of his or her private property.**
- The right to property is now considered to be not only a constitutional or statutory right, but also a human right.
- Procedure is an **integral part of the ‘authority of law’ in Article 300A.**
- The phrase **‘authority of law’** in the Article should not be understood as merely the power of eminent domain vested in the state.
- The requirement of a ‘law’ in Article 300A does not end with the mere presence of a legislation which empowers the state to deprive a person of his property.

Doctrine of Eminent Domain:

- **Eminent Domain is the power of the sovereign to acquire property of an individual for public use without the necessity of his consent.**
- This power is based on sovereignty of the State.
- Payment of just compensation to the owner of the land which is acquired is part of exercise of this power.

Supreme Court limits ED's power to arrest PMLA accused

Sub: Polity

Sec: Constitution

Context:

- The Supreme Court said when an accused appears before a court in pursuance of a summons, the agency will have to apply to the court concerned to get his custody.

More on news:

- The judgment was based on an appeal filed by **Tarsem Lal against the ED challenging a Punjab and Haryana High Court denying him anticipatory bail.**

About the recent ruling:

- In a landmark judgment, **the Supreme Court of India ruled that the Enforcement Directorate and its officers cannot arrest an accused under Section 19 of the PMLA after the Special Court has taken cognizance of the complaint.**
- If the accused appears before the special court pursuant to a summons, it cannot be treated that he is in custody.
- If the ED wants custody of such an accused, it will have to apply to court for custody.
- ED can get custody after **application to the special court.**
- The court will only grant custody with reasons satisfying that custodial interrogation is needed.
- The special court can direct the **accused to furnish bonds in terms of Section 88 of the Code of Criminal Procedure.**
- Accused who appeared before the court pursuant to the summons are not required to apply for bail, and thus, the twin conditions of Section 45 of PMLA are not applicable.
- It is not necessary for the accused to apply for bail.
- An accused who appears in a special court pursuant to its summons, could be exempted from personal appearance in the future.
- If an accused does not appear after a summons is served, the special court could issue a bailable warrant followed by a non-bailable one.
- When the ED wants to conduct a further investigation concerning the same offense, it may arrest a person not shown as an accused in the complaint filed under **Section 44(1)(b) of the PMLA, provided the requirements of Section 19 (procedures of arrest) under the Act were fulfilled.**

What are the twin conditions?

- The twin conditions of bail under **Section 45 of the PMLA pose stringent thresholds for an accused.**
 - **The person has to prove in court that he or she is prima facie innocent of the offense.**
 - **The accused should be able to convince the judge he would not commit any offense while on bail.**
- The burden of proof is entirely on the incarcerated accused, who would be often handicapped to fight the might of the state.
- In November 2017, the Supreme Court invalidated Section 45(1) of the PMLA, which concerned the imposition of two extra conditions for granting bail to money laundering accused.
- However, the Center subsequently reinstated this provision through amendments to the PMLA.

What is the PMLA act?

- **Prevention of Money Laundering Act, 2002 (PMLA) was enacted to fight against the criminal offense of legalizing the income/profits from an illegal source.**
- The Prevention of Money Laundering Act, 2002 enables the Government or the public authority to confiscate the property earned from the illegally gained proceeds.
- **Section 19 of the PMLA allows ED officers to arrest an individual on the basis of material in possession (and) reason to believe (to be recorded in writing) that the person is guilty.**

About ED?

- It is a Multi-Disciplinary Organization mandated with the task of enforcing the provisions of two special fiscal laws – **Foreign Exchange Management Act, 1999 (FEMA) and Prevention of Money Laundering Act, 2002 (PMLA).**
- The administrative control of the Directorate was transferred from the Department of Economic Affairs to the Department of Revenue in 1960.
- The Directorate enforces two laws;
 - FEMA, a Civil Law having quasi-judicial powers, for investigating suspected contraventions of the Exchange Control Laws and Regulations with the powers to impose penalties on those adjudged guilty.

- PMLA, a Criminal Law, whereby the Officers are empowered to conduct enquiries to locate, provisionally attach/confiscate assets derived from acts of Schedules Offenses besides arresting and prosecuting the Money Launderers.

What happens during remand hearings? This is what a study suggests

Sub : Polity

Sec: Constitution

Tags: Art 22

Context:

- The Supreme Court directed the release of **jailed journalist Prabir Purkayastha** on the ground that due-process safeguards were not followed in his arrest and detention.

More on news:

- The Supreme Court said that his **constitutional rights had been violated**.
- Purkayastha was produced before a designated judge early in the morning, and sent to seven days police custody.
- He was not given an opportunity to defend himself through **legal counsel of his choice**.
- He was not informed of the grounds of arrest, as required by **Article 22 (1) of the Constitution**.
- The Supreme Court's emphasis on the distinction between the formal reasons for arrest — often included in the **Arrest Memo** — **and meaningful communication of the grounds of arrest in writing**.
- The **Supreme Court highlighted another aspect where the presence of the Arrest Memo alone is not adequate confirmation of due-process rights of the accused**.

Role of the magistrate:

- The judgment spotlights the right of the accused to know the grounds for **arrest to protect their right to life and liberty under Article 21**.
- **Article 22(2) of the Indian Constitution**, says every arrested person shall be produced before a magistrate within 24 hours — **this is called “first production”**.
- The **magistrate/ judge** can authorize further detention in police custody (for interrogation) or judicial custody through remand hearings.
- It requires judicial scrutiny to ensure that statutory and constitutional safeguards are realized in letter and spirit.

Study by Project 39A:

- An ethnographic study by **Project 39A at National Law University Delhi** looked at the everyday functioning of magistrate courts during regular hours across the six district court complexes in Delhi over a three-month period, including the role of the magistrate, lawyers, police, and accused.
- The findings suggest most magistrates do not fully realize the constitutional and statutory protections at first production and remand.

What is Project 39A?

- **Project 39A is a criminal justice** initiative based out of the National Law University in Delhi.
- **Project 39A draws inspiration from Article 39-A** in the Indian Constitution on equal justice and signals the broadening of our work on the criminal justice system in India.

Constitutional Provisions in news:

Article 21:

- **No person shall be deprived of his life or personal liberty except according to procedure established by law, nor shall any person be denied equality before the law or the equal protection of the laws within the territory of India.**

Article 22:

- **Protection against arrest and detention in certain cases.**
- **22(1):**No person who is arrested shall be detained in custody without being informed, as soon as may be, of the grounds for such arrest nor shall he be denied the right to consult, and to be defended by, a legal practitioner of his choice.
- **22(2):**Every person who is arrested and detained in custody shall be produced before the nearest magistrate within a period of twenty-four hours of such arrest excluding the time necessary for the journey from the place of arrest to the court of the magistrate and no such person shall be detained in custody beyond the said period without the authority of a magistrate.

Key findings of the study:

- Most magistrates ensured that the **Arrest Memo** — which contains information on the circumstances of arrest and intimation to family — and **Medico-Legal Certificate (MLC)** — based on a medical examination of the accused — were present on file.

Terminologies in news:

Arrest Memo:

- An **Arrest Memo** or '**Memo of Arrest**' is a document that the police must file at the time of arrest or immediately on bringing the arrested person back to the police station.
- It acts as a safeguard against illegal detention by the police.

Medico-Legal Certificate (MLC):

- A **MLC is defined as any case of injury or ailment** where, the attending doctor after observing history and clinical examination, considers that investigations by law enforcement Agencies are warranted to ascertain circumstances and fix responsibility regarding the said injury or ailment according to the law.

What are the rules on contesting seats?

Sub: Polity

Sec: Elections

Context:

- Congress leader Rahul Gandhi announced that he would contest from **Rae Bareli in Uttar Pradesh**, although he is also contesting the election from Wayanad, Kerala.

Provisions for contesting the election on more than one seat:

- According to the **sub-section, 33 (7) Representation of the People Act (RPA), 1951**, a candidate is **permitted to contest an election from up to two constituencies**, but he or she **can hold only one seat at a time** if elected from both.
 - It was introduced through an **amendment in 1996**, prior to which there was **no bar** on the number of constituencies from which a candidate could contest.
- **Section 70** of the same Act stipulates that a **candidate can hold only one seat at a time**, regardless of whether he or she has been elected from more than one seat.
- Thus, if a candidate wins from two seats, a **byelection** is necessary from the seat he or she vacates.
 - **Former Chief Election Commissioner N. Gopalaswami** said the opposition to a candidate contesting from many seats was basically because **many byelections had to be conducted after polls were over**.
- A person has to be a **voter in a particular State** to **contest Assembly polls** from there. But to **contest in a Lok Sabha election**, a person can be **registered as a voter in any constituency** of the country.
- If a person is a **registered voter** in any constituency, he or she can contest from **any seat in India**, except **Assam, Lakshadweep and Sikkim**.

What is the minimum age to contest?

- The **minimum age** for a person to **contest Lok Sabha and Assembly polls** is **25 years**, while one can become a **member of the Rajya Sabha or the State Legislative Council** only at **30 years**.
- There is **no minimum educational qualification** needed to **contest general elections** in India.
- **Candidates** must be **citizens of India**, registered in some constituency of the country as **valid voters** and **must not have been convicted of any offence punishable by more than two years**.

How can a candidate be disqualified?

- A person shall be **disqualified** from being chosen as or being a member of either House
 - if he holds any office of profit under the Government of India or the Government of any State;
 - if he or she is of unsound mind and stands so declared by a competent court; if he or she is an undischarged insolvent;
 - if he or she is not a citizen of India or has voluntarily acquired the citizenship of a foreign state.
- Under the **RPA Act**, if a person is **convicted of any offence** and sentenced to an **imprisonment of two years or more**, this will lead to his **disqualification to contest elections**.
 - Even if this person is out on bail, after the conviction and his appeal is pending for disposal, he or she is disqualified from contesting an election.
 - For **some categories of serious offences**, one may incur **disqualification for any conviction, regardless of the quantum of punishment**.

Changes undertaken by the ECI regarding candidates:

- The **ECI** has **amended the rules for political party funding during elections**.
- The **new regulations** include **decreasing the cash donation limit** from **₹20,000 to ₹2,000**.
- The **Electoral Bond Scheme**, notified in **January 2018**, allowing **anonymous contributions to limit the use of cash**, was **scrapped by the Supreme Court in 2024**.

- For the 2024 polls, the ECI has **banned cash transportation in bank vehicles** after sunset.
- The Commission is also **monitoring non-scheduled chartered flights** for **cash, liquor, and drug movement**.
- **No law** has been brought in with **regard** to the **muscle power of candidates**.
- The presence of **central paramilitary forces** has been able to put a stop to practices like **booth-capturing**.

Supreme Court denies interim order on booth-wise voter data

Sub: Polity

Sec: Elections

Tag: Form 17C

Context:

- The Supreme Court on **May 24 refused an NGO's plea** to issue the Election Commission of India to upload authenticated, scanned and legible copies of Form 17C showing the account of votes recorded booth wise after each phase of polling in Lok Sabha elections.

Key Highlights of the case:

- A Vacation Bench of **Justices Dipankar Datta and Satish Chandra Sharma** said the nation is on the evening of the **sixth phase of General Elections**.
- The court said it did not want to divert the attention of the **Election Commission (EC)** in the middle of the elections.
- The **NGO had argued the data published by the EC in its April 30** press release had shown a sharp increase (by about 5-6%) from the initial percentages announced by it on the polling day.
- In an interim relief sought by **NGO Association for Democratic Reforms (ADR)** in its application for publication of voter turnout data in **Form 17C** was already part of relief sought in a petition pending since 2019.

What is Form 17C?

- The Conduct of Election Rules, 1961 require the EC to maintain two forms- Forms 17A and 17C.
- **Form 17A records the details of every voter who enters a polling booth and casts their vote.**
- **Form 17C contains the total number of votes cast.**
- **Under rule 49S(2)**, the presiding officer has to provide a copy of the data entered in Form 17C to the polling agents of candidates at the time of the close of polling.
 - The data recorded in Part I of Form 17C includes
 - the unique ID number of the EVM used at a particular polling booth,
 - the total number of voters enlisted at that booth,
 - the total number of voters who entered the polling booth and whose details were validated on Form 17A,
 - the number of voters who did not vote despite signing on the register,
 - the number of voters who were not allowed to vote,
 - the number of test votes, and the number of total votes recorded in the EVM.
- **Part II of Form 17C is used to record the results of the election.**

What makes Form 17C data important?

- The data in **Form 17C** is used by candidates to verify the details provided during counting, such as the ID number of the EVM and the number of votes polled per polling station.
- The candidates can challenge a result if there is a discrepancy between the data in **Form 17C and the data emanating from the counting center**.
- They can also file petitions in the high court challenging the election result on the basis of the mismatch between the counting data and the figures in Form 17C.

The Election Commission's response:

- The Commission maintained there is **no legal mandate** for it to make public the total number of votes cast in each polling station.
- It says copies of **Form 17C** are shared with the polling agents present immediately upon the close of polling.
- It says **candidates are aware and in possession of the exact voter turnout data in absolute numbers even before it is known to the Commission**.
- On the issue of significant difference between the initial voter turnout percentage and the final figures, the Commission said voters continue to vote even after 6pm due to long queues at polling stations.

Nothing 'corrupt' if promises in manifesto work out eventually for public's financial benefit: SC

Sub: Polity

Sec: Elections

Tag: manifesto

Context:

- The **Supreme Court of India** has clarified that promises of financial assistance made by political parties in their election manifestos do not constitute a 'corrupt practice'.

More on news:

- Mr. Sreedharan had challenged the election win of B.Z. Zameer Ahmed Khan, a Congress candidate, in the State Assembly election of 2023.

Key highlights of the case:

- The petitioner had challenged the election win of B.Z. Zameer Ahmed Khan, a Congress candidate, in the **Karnataka Assembly election of 2023**.
- The bench, comprising **Justices Surya Kant and K V Viswanathan**, stated that the contention that such promises could be seen as corrupt was too far fetched.
- The contention of the counsel that the commitments by a political party in its manifesto, which eventually lead to direct or indirect financial help to the public at large, will also amount to corrupt practice by a candidate of that party, is too far-fetched and cannot be accepted.
- The court emphasized that commitments leading to direct or indirect financial benefits for the public, as outlined in party manifestos, are legally permissible under election laws.
- This ruling sets a significant precedent in how election promises are interpreted legally in India.

What is the election manifesto?

- A **manifesto** is generally defined as a published declaration of the **intentions, motives or views of an individual, group, political party or government whosoever issues it**.
- A manifesto usually comprises a previously published opinion or public consensus and/or promotes a new idea with prescriptive notions for carrying out changes for future.
- An **election manifesto is a published document containing declaration of the ideology, intentions, views, policies and programmes of a political party**.
- The Election Manifestos are generally drafted by the Political Parties keeping an eye on forthcoming elections and are generally published and well publicized.

What are freebies?

- **Freebies that are usually distributed include goods like bicycles, smart phones, TVs, Laptops and waivers on bills (water, electricity, etc.).**
- Freebies and poll promises are different from subsidies which are required for the proper functioning of a government to fulfill peoples' needs and may not be a part of government poll promises.

Supreme Court views on FreeBies:

- The **Supreme Court in S Subramaniam Balaji vs Government of Tamil Nadu 2013** case held that unrealistic poll promises and freebies are a serious issue that disturbs the level-playing field in elections.
- In the **Balaji case judgment**, a **Division Bench of the Supreme Court** had held that making promises in election manifestos do not amount to a 'corrupt practice' under **Section 123 of the Representation of People Act (RP)**.

Why can accused persons in prison contest polls but not vote?

Sub: Polity

Sec: Elections

Tags: Why can accused persons in prison contest polls but not vote, Right to contest , Right to votes

Context:

- The Ongoing Lok Sabha polls highlight the **voting rights** and **Right to contest elections** in India.
- A candidate in jail (whether convicted or not) has the '**Right to be elected to Parliament**' but has **no 'Right to vote'**.

Statutory rights:

- In **Indira Gandhi v Raj Narain (1975)**, the Supreme Court stated that **free and fair elections** are **integral** to the **basic structure** of the Constitution.
 - However, the Court also held that **neither the right to elect nor the right to be elected** holds the same status.
- In **Kuldip Nayar v Union of India (2006)**, a five-judge Constitution Bench affirmed that the **right to vote** is purely a **statutory right**, meaning it is **not a fundamental right** and can be **denied**.
 - The same applies to the **right to be elected**.
 - The Court ruled that Parliament could **regulate** both these **statutory rights** through laws.

Disqualification rule under the RPA 1951:

- **Section 8** of the **Representation of the People Act, 1951 (RPA)** mandates **disqualification** from contesting elections to Parliament or state Assemblies upon **conviction for certain offences**.
 - This **disqualification** starts from the **date of conviction** and **lasts for six years** after the end of the sentence.
 - However, this **bar applies only after a person is convicted, not if they are merely charged with criminal offences**.
- **Section 8** of the **RPA** has faced challenges in the **Supreme Court**:
 - In **2011**, the **Public Interest Foundation** petitioned to disqualify persons with framed criminal charges or false affidavits about their criminal history, but the SC ruled that **only the legislature could amend the RPA**.
 - In **2016**, advocate Ashwini Kumar Upadhyay sought **permanent disqualification for convicted persons**. This case is ongoing, and in **November 2023**, the SC, noting **delays in criminal cases against MPs and MLAs**, directed the Chief Justices of all High Courts to expedite these cases.

Exceptions to provision:

- The **Election Commission of India (ECI)** is **authorized** under **Section 11** of the **RPA** to **"remove"** or **"reduce"** disqualification periods.
 - In **2019**, the **ECI reduced** the **disqualification** period for **Sikkim Chief Minister Prem Singh Tamang**, who had served a **one-year prison sentence** for **misappropriating funds**. **Tamang** subsequently **won** a by-election.
 - Additionally, **disqualified MPs or MLAs can contest elections if their conviction is stayed on appeal to a higher court**.
- In **2019**, the **Supreme Court** ruled that **disqualification ceases to be effective once a conviction is stayed**.
 - Former **BSP MP Dhananjay Singh**, convicted of kidnapping, sought a stay on his **seven-year sentence** from the **Allahabad High Court** to contest the **Lok Sabha election**.
 - Although **granted bail**, the court **refused** to stay his conviction, emphasizing the need for purity in politics.

No voting right for jailed:

- **Sub-clause (5)** of **Section 62** of the **RPA** stipulates that **individuals confined in prison or in lawful police custody cannot vote in elections**, with an **exception** for those in **preventive detention**.
- This **effectively bars individuals with criminal charges** from **voting** unless they are **released on bail or acquitted**.
 - In **1997**, the **Supreme Court** upheld this provision in **Anukul Chandra Pradhan v. Union of India**, affirming that **voting is a statutory right** subject to **limitations**.
 - The Court reasoned that **prisoners, due to their conduct, cannot claim equal freedom** and that **restricting their voting rights is reasonable** to keep individuals with criminal backgrounds away from elections.
 - This ruling has been used by the **Supreme Court in 2023** and the **Delhi High Court in 2020** to dismiss pleas for prisoner voting rights.

T.N. will protect its rights in inter-State water disputes

Sub: Polity

Sec: Federalism

Context:

- **DMK general secretary and Water Resources Minister Duraimurugan** on Monday maintained that the State government would protect the rights of Tamil Nadu in the inter-State water disputes.

More on news:

- The State government would protect the rights of **Tamil Nadu in the inter-State water disputes with Karnataka and Kerala** if the neighboring States attempted to violate the verdict of the Cauvery Water Disputes Tribunal.

Major issue:

- The issue is that **Kerala is building a check dam across the Silanthi river**.
- Building a check-dam across Silandhi river will block the flow of water to the Amaravathi dam, and farmers in Tamil Nadu will be adversely affected.
- If the check dam is constructed, Amaravathi cannot receive water from the Silanthi river.

About Cauvery Water Disputes Tribunal (CWDT):

- The Government of India constituted the Cauvery Water Disputes Tribunal (CWDT) on June 2, 1990, to adjudicate the water dispute between the states of **Tamil Nadu, Karnataka, Kerala and Puducherry with respect to the inter-state Cauvery water and river basin**.

Constitutional Provisions:

- **Entry 17 of the State List deals with water i.e., water supply, irrigation, canal, drainage, embankments, water storage and hydropower.**
- **Entry 56 of the Union List empowers the Union Government** for the regulation and development of inter-state rivers and river valleys to the extent declared by Parliament to be expedient in the public interest.
- **According to Article 262, in case of disputes relating to waters:**
 - **Parliament may by law provide for the adjudication of any dispute or complaint with respect to the use, distribution or control of the waters of, or in, any inter-State River or river valley.**
 - **Parliament** may, by law, provide that neither the Supreme Court nor any other court shall exercise jurisdiction in respect of any such dispute or complaint as mentioned above.

Other rivers in news:

Amaravathi river:

- The river receives water from **Pambar, Silanthi and Chinnar rivers.**
- The **Amaravathi River is the longest tributary of the Kaveri River** in the fertile districts of Udumalpet, Dharapuram and Karur Tamil Nadu state, South India.
- It runs north, past the **Amaravathi Reservoir and Amaravathi Dam in Amaravathinagar.**
- Some main tributaries of the Amaravathi river are Kudavanur, Nangaji, Shanmuga Nadi, Kudumiar, Upper, and Thenar.

Sounding the gavel on curative jurisdiction

Subject: Polity

Sec: Judiciary

Context:

- SC's recent ruling in the **DMRC-DAMEPL** case may undermine India's image regarding dispute resolution.

The Delhi Metro Rail judgment:

- This was a decision of a three-judge Bench of the Court in a curative petition in **Delhi Metro Rail Corporation Ltd. ("DMRC") vs Delhi Airport Metro Express Pvt Ltd ("DAMEPL")**
- DAMEPL succeeded before an **Arbitral Tribunal in a high value claim.**
- The challenge to the award moved to the **Supreme Court which upheld the award after setting out the limited scope to challenge an award under Indian law.**

What is Curative Jurisdiction:

- '**Curative Petition**' is a term coined by the **Supreme Court in 2002 by its judgment in the case of Rupa Ashok Hurra v. Ashok Hurra.**
- **Curative Jurisdiction allows the Court to correct its judgments even after they have become final.**
- This is distinct from the power of review under Indian law, which **enables all courts to rectify errors which are apparent from their records.**
- The Supreme Court held that to prevent abuse of its process and to cure gross miscarriage of justice, it may reconsider **its judgements in exercise of its inherent powers.**
- It is guaranteed under **Article 137 of Constitution of India**, which gives the power to the Supreme Court to review its own judgements and orders.
- It says that, subject to the provisions of any law made by **Parliament or any rules made under article 145**, the Supreme Court shall have the power to review any judgment pronounced or order made by it.

Process of Curative Jurisdiction:

- The court has devised what has been termed as a curative petition in which the petitioner is required to aver specifically that the grounds mentioned therein had been taken in the review petition filed earlier and that it was dismissed by circulation, which must be certified by a senior advocate.
- The curative petition is then circulated to the three most senior judges and to the judges who delivered the impugned judgment if available.
- No time limit is given for filing curative petition

Requirements for Curative Petition:

- To entertain a curative petition, the Supreme Court has laid down specific conditions:
 - The petitioner must establish that there was a genuine violation of principles of natural justice and fear of the bias of the judge and judgment that adversely affected him.
 - The petition must state specifically that the grounds mentioned had been taken in the review petition and that it was dismissed by circulation.

- The curative petition must accompany certification by a senior lawyer relating to the fulfillment of the above requirements.
- The petition is to be sent to the three senior most judges and judges of the bench who passed the judgment affecting the petition, if available.
- If the majority of the judges on the above bench agree that the matter needs hearing, it is sent to the same bench if possible.
- The court may impose "exemplary costs" to the petitioner if his plea lacks merit.

How is Curative Jurisdiction different from power of review?

- **Curative Jurisdiction** is distinct from the power of review under Indian law, which enables all courts to rectify errors which are apparent from their records.
- Examples of changes in the Court's views include the right of privacy, decriminalization of homosexuality and so on.
- Curative Jurisdiction is different as it is not merely the Court changing its view on a position of law but is a reversal of the Court's own view in a specific case, above and beyond even the power of review.

Charges framed against Brij Bhushan: what does this mean in legal process?

Subject: Polity

Section: Judiciary

Context:

- A trial court judge in Delhi framed charges against BJP MP and former Wrestling Federation of India chief Brij Bhushan Sharan Singh under **Sections 354** (assault or criminal force to woman with intent to outrage her modesty) and **354A** (sexual harassment) of the Indian Penal Code, 1860.

Framing of charges:

- The **framing of charges means the trial judge has found a prima facie** case against the accused, based on the material in the chargesheet.
- This is not a **determination of whether the accused has committed the alleged offenses** as it is only an acknowledgment that sufficient grounds exist to proceed with the trial.
- After the trial judge frames the charges, the accused can plead innocent or guilty. If the accused pleads innocent, the next step is the summoning of witnesses for cross-examination by the defense lawyer(s).

Various sections of IPC in news:

- Sections of IPC Sections 354 and 354A, along with Sections 354 B-D are often classified as offenses against women.

Section 354:

- Section 354 states that whoever assaults or uses criminal force against a woman intending to outrage or knowing it to be likely that he will thereby outrage her modesty shall be punished with a term of imprisonment between 1 and 5 years and/or a fine.

Phrase "outrage her modesty":

- The phrase "outrage her modesty" is not defined in the IPC.
- It is a sense of **shame or bashfulness that a woman feels when faced with any act that is intended to outrage her modesty.**

Section 354A:

- Section 354A deals with sexual harassment, which is defined by any of four acts as follows:
 - **physical contact and advances involving unwelcome and explicit sexual overtures;**
 - **a demand or request for sexual favors;**
 - **showing pornography against the will of a woman**
 - **making sexually coloured remarks.**
- The first, second, and third acts are treated more severely, and carry a punishment of up to 3 years in prison and a fine.
- The fourth act can be punished with a term of up to 1 year and a fine.

Section 506. Punishment for criminal intimidation:

- Whoever commits, the offense of criminal intimidation shall be punished with imprisonment of either description for a term which may extend to two years, or with fine, or with both; If threat be to cause death or grievous hurt, etc.

About Indian Penal Code (IPC):

- The draft of the Indian Penal Code was prepared by the First Law Commission, chaired by Lord Thomas Babington Macaulay in 1834 and was submitted to the Governor-General of India Council in 1835.
- It came into force on the subcontinent during British rule in 1862.

- On 11 August 2023, the Government introduced a Bill in the Lok Sabha to replace the Indian Penal Code with a draft Code called the **Bharatiya Nyay Sanhita (BNS)**.

Do marriages need to be registered? What happens if they are not?

Subject: Polity

Sec: Legislation in news

Tag: Special Marriage Act 1954 (SMA).

Context:

- The Supreme Court last week ruled that despite an **official marriage certificate, a Hindu couple before the Court had never acquired the status of husband and wife.**

More on news:

- Marriage is registered under the **Hindu Marriage Act, 1955 (HMA)** even before they perform the wedding rituals.
- The SC ruled that the couple who had **filed divorce cases need not get a divorce because they were never married in the first place.**
- The apex court’s observations in the ruling bring to focus various issues on **registration and solemnization of a marriage, and its necessity.**

What is a solemnized marriage?

- Solemnizing a marriage** simply refers to the performance of an official marriage ceremony, with appropriate rituals.
- Marriage in India is largely governed through a gamut of personal laws, and the Special Marriage Act, 1954 (SMA).**
- Though codified through statute, **these personal laws are essentially practices ordained by religion**, with each religion having its own set of ‘requirements’ for a marriage — a marriage is ‘valid’ when these requirements are met.
- Rituals such as kanyadaan, panigrahana and saptapadi, or other local customs solemnize a Hindu marriage.
- Section 7 of the HMA codifies these requirements, and names saptapadi as an essential ritual.

What are registered marriages?

- Registration of a marriage after it is solemnized as per rituals is different from a registered marriage.
- Commonly used terms like ‘court marriage’ or ‘registered marriage’ refer to a non-religious or civil marriage under the SMA, a secular law.
- A **marriage ‘performed’ under this law** is essentially a solemnization in ‘court’ (a registrar’s office) without any rituals.
- Marriages under personal laws (such as HMA)** become ‘valid’ only after the performance of rituals prescribed by religion.
- A marriage without any rituals is only valid under the SMA.
- Section 8 of the HMA** gives powers to the state to register marriages solemnized as per the requirements of Section 7.

Registered Marriage	Unregistered Marriage
✓ Prevents Child Marriage	✗ Increases fraudulent/ forceful/ unlawful marriage practices
✓ Prevents Polygamy	✗ Existence of Polygamy
✓ Ensures women to claim shelter and maintenance	✗ Women safety is not Guaranteed
✓ Marriage is legally authorised under the court of law	✗ Marriage is not documented and recorded legally

What if a marriage is not registered?

- Entry 5 of the Concurrent List in the Constitution’s Seventh Schedule** deals with marriage and divorce, and **Entry 30 deals with vital statistics including registration of births and deaths.**
- Both these subjects jointly or separately deal with the registration of marriages.

- There is a central legislation on the subject — **the Births, Deaths and Marriages Registration Act, 1886** — that does not have a robust application to marriage, unlike the effort to record births and deaths.
- States have their own laws, and in some states like Karnataka and Delhi, registration of a marriage is mandatory.



Validity of Marriage:

- Not registering a marriage cannot be the sole ground to declare it invalid — since registering a marriage itself does not make it valid, so not registering also cannot in itself make it invalid.
- When the validity of a marriage is contested, then a marriage certificate alone is not enough to prove the marriage.
- A ‘valid’ marriage as per rituals might be key in determining who is a rightful spouse when there are claims by multiple cohabiting partners.
- In an inheritance case, the validity of a marriage is questioned to disinherit a spouse.
- Proof of performing a valid marriage as per rituals (through photos, witnesses etc.); proof of long cohabitation as spouses through acceptance by family, friends or even children is evidence of a valid marriage.
- A marriage certificate has corroborative value in these cases but cannot be counted as evidence in itself.

About Hindu Marriage Act:

- The **Hindu Marriage Act (HMA)** is an **Act of the Parliament of India enacted in 1955** which was passed on 18 May.
- Three other important acts were also enacted as part of the Hindu Code Bills during this time: the **Hindu Succession Act (1956)**, the **Hindu Minority and Guardianship Act (1956)**, the **Hindu Adoptions and Maintenance Act (1956)**.
- The main purpose of the act was to amend and codify the law relating to marriage among Hindus and others.
- **This Act applies to:**
 - to any person who is a **Hindu by religion in any of its forms or developments, including a Virashaiva, a Lingayat or a follower of the Brahmo, Prarthana or Arya Samaj;**
 - to any person who is a **Buddhist, Jain or Sikh by religion; and**
 - to any other person domiciled in the territories to which this Act extends who is not a **Muslim, Christian, Parsi or Jew** by religion, unless it is proved that any such person would not have been governed by the **Hindu law** or by any custom or usage as part of that law in respect of any of the matters dealt with herein if this Act had not been passed.

Why Supreme Court ruled that a lawyer cannot be sued for providing faulty 'service'

Sub: Polity

Sec: Legislation in news

Tag: Consumer Protection Act 2019

Context:

- A lawyer's services must be treated differently from any other business or trade, the Supreme Court ruled on Tuesday.

About the recent case:

- Justices Bela M Trivedi and Pankaj Mithal held that the success of "professionals" often depends on factors outside their control and clients cannot take legal action against their lawyers by claiming they did not provide proper "service" as per the Consumer Protection Act.
- The judgment stems from an appeal against the 2007 National Consumer Disputes Redressal Commission's (NCDRC) decision.
- It was held that lawyers' services fall under the definition provided for the term under Section 2(o) of the Consumer Protection Act, 1986 (CPA).
- If there is any deficiency in service, the NCDRC held that a complaint could be filed under the CPA.

What arguments were made by lawyer groups against being liable under CPA?

- The majority of their arguments hinged on the idea that the legal profession must be differentiated from other businesses or trades and that even among other professions, lawyers occupy a unique space.
- **The petitioners argued that, unlike other professionals, lawyers cannot act as a "mouthpiece" for their client even after payment of fees as lawyers have duties to the court and their opponent as per the Bar Council of India Rules, 1961.**
- The petitioners also argued that there are existing remedies for professional misconduct in the **Advocates Act, 1961, and the Bar Councils** (both at the state and national level) are given disciplinary powers by the Advocates Act in such cases.
- Regarding the conduct of advocates, the petitioners argued that the **Advocates Act would be applied as opposed to the CPA.**

Supreme Court views:

- The court drew the distinction between the terms '**business**' or '**trade**' and **profession**.
- '**Business**' or '**trade**' have a **commercial aspect and cannot be used interchangeably with the term 'profession' which normally would involve some branch of learning or science.**
- Success in the latter field would depend on "factors beyond a man's control" and cannot be treated equally with a businessman or a service provider who falls under the CPA.
- The court also stated that the SC's decision in *Indian Medical Association v V.P. Shantha* (1995) — where the court held that services by medical practitioners would fall under the CPA — should be revisited by a larger SC bench.
- The Bench considered whether advocates enter a "contract of personal service" with their clients, exempting them from falling under the CPA.
- **The term 'service' is defined very broadly under the CPA but excludes free services and contracts of personal service.**

How can lawyers be sued in India?

- Lawyers cannot be dragged to consumer courts over **alleged deficiencies in service.**
- They can still be sued in ordinary courts for **negligence and other malpractice.**

About Consumer Protection Act 2019:

- The Consumer Protection Act 2019 seeks to revamp the process of administration and settlement of consumer disputes, with strict penalties, including jail term for adulteration and misleading ads by firms.
- **It defined 6 rights of the consumers which include:**
 - Right to be protected against the marketing of goods, products or services which can be hazardous to life and property
 - Right to be informed about the quality, quantity, potency, purity, standard and price of goods, products and services
 - Right to be assured of access to goods, products and services at competitive prices.
 - Right to be heard at appropriate forums
 - Right to seek redressal against unfair trade practices that are involved in exploitation of customers
 - Right to consumer awareness

- It proposes to set up the **Central Consumer Protection Authority (CCPA)** to promote, protect and enforce the rights of consumers.

About Bar Council of India:

- Bar Council of India is a **statutory body established under section 4 of the Advocates Act 1961.**
- It regulates the legal practice and legal education in India.
- Its members are elected from amongst the lawyers in India and represent the Indian bar.

About Advocates Act 1961:

- The act was enacted to amend and consolidate the law relating to **legal practitioners and consolidate the law relating to legal practitioners and to provide for the constitution of Bar Council and All India Bar.**

Karnataka govt seeks cancellation of MP Prajwal Revanna's diplomatic passport

Sub: Polity

Sec: legislation in news

Tags: diplomatic passport

Context:

- Karnataka home minister urges Centre to cancel Hassan MP Prajwal Revanna's diplomatic passport in a high-profile scandal.

More on news:

- The Special Investigation Team (SIT) wrote to the Ministry of External Affairs (MEA), seeking the cancellation of his diplomatic passport.
- This happened after the Special Court for Elected Representatives, Bengaluru, issued an arrest warrant against Prajwal in a rape case registered by a former domestic help in their house on April 28.

What is a diplomatic passport? Who can get one?

- Unlike normal passports, which have dark blue covers and are valid for 10 years (for adults), diplomatic passports have maroon covers, and are valid for five years or less.
- Holders of such passports are entitled to certain privileges and immunities as per the international law.
- Various immunities available to diplomatic passport holders are immunity from arrest, detention, and certain legal proceedings in the host country.
- The MEA's Consular, Passport & Visa Division issues diplomatic passports ('Type D' passports) to people falling in broadly five categories:
 - **those with diplomatic status;**
 - **government-appointed individuals traveling abroad for official business;**
 - **officers working under the branches A and B of the Indian Foreign Service (IFS), normally at the rank of Joint Secretary and above; and**
 - **relatives and immediate family of officers employed in IFS and MEA.**
 - **Diplomatic passports are also issued to select individuals who are authorized to undertake official travel on behalf of the government.**
 - **This includes union ministers and MPs who often travel abroad representing the government. The validity of these passports is concurrent with the term of the MP.**

What is Passport Act:

- The **Passports Act is an act of the Parliament of India**, for the issue of passports and travel documents, to regulate the departure from India of citizens of India and for other persons and for matters incidental or ancillary thereto.
- The **Act applies to the whole of India extending to citizens of India living outside the country.**
- The Act replaced the Indian Passport Ordinance 1967 and was enacted by Act 15 of 1967 with retrospective effect from 5 May 1967.
- The act describes the procedures in getting an Indian passport, which replaced the British Indian passport and The Passport Act of 1920.

Various types of passports in the country:

Physical/offline passports

Blue personal passport or type P Passport

- The **Type P passport is a personal passport** issued to Indian citizens for personal travel purposes. It is the most common passport type in India.

- Its dark blue cover characterizes it, and is available to individuals who have completed their education beyond the 10th grade.
- This passport lets holders travel internationally for leisure, business, education, or other personal reasons.

White service passport

- The white service passport is designated for individuals employed in various government services or public sector organizations, excluding diplomatic or consular officials.
- This passport, distinguished by its white cover, is issued to government officials and employees traveling abroad for official duties, conferences, or training programs.
- **IAS (Indian Administrative Service) officers**, along with other government officials and employees traveling abroad for official duties, are typically issued the white service passport.

Orange emigration passport

- The orange emigration passport is specifically designed for Indian citizens who are emigrating to other countries for employment opportunities.
- It is issued to individuals who have not completed their formal education and seek overseas employment.

Maroon diplomat passport

- India's diplomatic passport is exclusively issued to diplomats, consular officers, and other high-ranking government officials representing India abroad.
- It is characterized by its maroon cover and grants holders diplomatic immunity and privileges per international conventions.

Yellow passports:

- **Tibetans seeking refugee status in India are commonly issued the yellow Indian passport as their identity card.**
- For individuals without a formal education, particularly those who have only completed up to the 10th grade, the appropriate passport to apply for would be the orange passport, also known as the **Emigration Check Required (ECR) passport.**

Online or e-passports

- **India has introduced e-passports as part of its efforts** to enhance the security of its travel documents.
- **E-Passports, also known as biometric passports**, contain an electronic chip. This chip holds the biometric information of the passport holder, which can include fingerprint and iris data alongside the traditional personal details found in a passport.
- The introduction of e-passports aims to streamline the immigration process through automated identity verification, reduce passport forgery, and enhance overall security.

UAPA tribunal upholds MHA ban against seven Meitei extremist organizations

Sub: Polity

Sec: Legislation

Context:

- A tribunal under the **Unlawful Activities (Prevention) Act (UAPA)** has upheld the Centre's decision to declare seven valley based Meitei extremist organizations as "unlawful associations" for the next five years.

More on news:

- In the past five years, **the seven outfits were responsible for 335 of 689** violent incidents reported in Manipur, in which nine security personnel and 21 civilians were killed.
- The **Union Ministry of Home Affairs (MHA)** informed the tribunal that the outfits through their front organizations and civil society groups are also engaged in targeting non-local population, protesting against peace talks of authorities with other ethnic groups of the State, boycotting national days like Republic Day, and opposing merger of Manipur with Indian Union.
- The ministry said that the **insurgent groups** were initially declared as unlawful associations in 1979 and since then the declarations have been continuously extended, last on November 13, 2018.

Order of the tribunal:

- An order by **Justice Sanjay Kumar Medhi** said that the tribunal concurs with the opinion of the Central government that **if there is no immediate curb and control of the seven outfits, they will take the opportunity to mobilize their cadres for escalating their secessionist, subversive and violent activities.**

About UNLAWFUL ACTIVITIES PREVENTION ACT (UAPA):

- UAPA was passed in **1967.**

- It aims at effective prevention of **unlawful activities associations in India**.
- **Unlawful activity refers to any action taken by an individual or association intended to disrupt the territorial integrity and sovereignty of India.**
- The **2004 amendment added “terrorist act” to the list of offenses to ban organizations for terrorist activities, under which 34 outfits were banned.**
- Till 2004, “unlawful” activities referred to actions related to secession and cession of territory.
- In August, Parliament cleared the Unlawful Activities (Prevention) Amendment Bill, 2019 to designate individuals as terrorists on certain grounds provided in the Act.
- The Act empowers the Director General of National Investigation Agency (NIA) to grant approval of seizure or attachment of property when the case is investigated by the said agency.

About Meities:

- The **Meitei people, Meetei, Meithei, Manipuri people** are an ethnic group native to Manipur, they are also known as Kathe in Myanmar, Mogli in Tripura.
- They belong to the **Mongoloid race and Tibeto-Burman language family in Northeast India.**
- They form the largest and dominant **ethnic group of Manipur in Northeast India.**
- They speak the **Meitei language (officially called Manipuri)**, one of the 22 official languages of the Indian Republic and the sole official language of Government of Manipur and it is also a associated official language of four districts (Hojai, Cachar, Hailakandi, Karimganj) of Assam.

The Karnataka HC ruling on EPF benefits

Sub: Polity

Sec: National body

Context:

- The **Karnataka High Court** recently **invalidated the provisions (paragraph 83 of the Employees’ Provident Funds Scheme, 1952 and paragraph 43A of the Employees’ Pension Scheme, 1995)** allowing for the **inclusion of foreign workers in India’s Employees’ Provident Fund (EPF)**, citing these provisions as **unconstitutional**.

Details:

- This ruling targets the **amendments made in 2008 to the Employees’ Provident Funds and Miscellaneous Provisions Act, 1952**, which had previously **broadened the scope to include international workers, obligating them to contribute to the EPF based on their entire salary without the usual wage ceiling applicable to domestic workers.**
- The court’s decision highlighted the **act’s original intention to provide retirement benefits specifically for industrial workers within lower salary brackets**, pointing out the **inapplicability of these provisions to highly paid employees.**
- The judge noted a **disparity in the treatment of Indian workers overseas and foreign workers in India**, deeming it **discriminatory and in violation of Article 14** of the Indian Constitution, which **guarantees equality before the law.**

How has the EPFO responded?

- The **EPFO** argued that these provisions were designed to **protect the interests of Indian workers internationally.**
- However, the court found the classification between **international workers from SSA and non-SSA countries** to lack a rational basis and reciprocity.
- The ruling, though specific to **Karnataka**, raises questions about the **uniform application of EPF provisions to international workers across India.**

Significance of the judgement:

- Overall, this judgment emphasizes the **need for careful scrutiny of international labour laws and equity in social security provisions**, which should align closely with the objectives of both national policy and international obligations.

About Employees’ Provident Funds and Miscellaneous Provisions Act, 1952:

- The Employees’ Provident Funds and Miscellaneous Provisions Act, 1952 is India’s pivotal **social security legislation and regulates three main schemes** — the **Employees’ Provident Funds Scheme (EPF) Scheme 1952**, the **Employees’ Pension Scheme (EP) Scheme 1995** and the **Employees’ Deposit-Linked Insurance Scheme, 1976.**
- It is administered through a **statutory body** — the **Employees’ Provident Fund Organisation (EPFO).**
- An **establishment with a minimum of 20 employees** is required to **register with the EPFO and make Provident Fund (PF) contributions** for eligible employees.
- The **EPFO** is under the **administrative control** of the **Ministry of Labour and Employment**, Government of India.
- The benefit amount is **20 times the wages**, a **maximum benefit of 6 Lakh.**
- **2008 Amendment to the Act:**

- Amended to bring **international workers or expatriates** within the fold of the statute.
- As per the amendment, **international workers** employed in India for a **minimum period of six months** are **mandated** to make **PF contributions** which include **12% of the employee's total salary**.
- A matching contribution is made by the employer for each of these workers.
- However, **contrary to their domestic counterparts**, the **wage ceiling of ₹15,000 per month** for availing **PF benefits does not apply to international workers**.
- Withdrawal of PF accumulations by international workers based in India is **permitted only upon retirement from service** in the establishment at any time after the attainment of **58 years** of age; upon retirement on account of permanent incapacity for work due to bodily or mental incapacity and pursuant to any stipulations under existing **Social Security Agreements (SSAs)**.

Provident Fund (PF):

- A **provident fund** is a **financial scheme** that aims to provide **retirement benefits** to employees.
- It is a **savings scheme** established by **employers and/or employees** to **accumulate a fund over a period of time**, which can be withdrawn by the employee upon retirement or under certain specified conditions.

Social Security Agreements (SSAs):

- **Bilateral instruments** executed to protect the **social security interests** of workers posted in a foreign country.
- **SSAs** have been set up between **India** and **21 countries** to **ensure protection** and **continuity** in **social security contributions** for **Indian workers abroad**.
- They may also be required to make similar contributions under the host country's laws.
- However, **due to restrictions on withdrawals** and stipulations relating to their duration of stay, such **employees rarely reap benefits from PF contributions made outside India**.
- As a result, **SSAs** are **executed** to avoid such **double coverage** — coverage under the social security laws of both the domestic as well as the host countries.

How is India streamlining the pharma sector?

Sub: Polity

Sec: National body

Context:

- **India's Central Drugs Standard Control Organisation (CDSCO)** has recently **taken back the authority** previously granted to **State licensing bodies** for issuing **No Objection Certificates (NOCs)** for the **production of unapproved, banned, or new drugs** for export purposes.

Details:

- This **centralization of licensing authority** reflects **India's efforts to maintain strict control over drug quality** following **international scrutiny** over **allegations of substandard drug exports linked to health concerns in several countries**.
- The **CDSCO** will now be the **sole authority** to **issue manufacturing licenses** for **drugs** intended for **export**, consolidating the process at the **national level**.

India's pharma industry:

- **India's pharmaceutical industry** plays a significant role **globally** as the **third-largest producer** of **pharmaceuticals** by **volume** and **14th largest by value**, catering to about **200 countries**.
 - **100% FDI** in the Pharmaceutical sector is **allowed under the automatic route** for **greenfield pharmaceuticals**.
 - **100% FDI** in the pharmaceutical sector is allowed in **brownfield pharmaceuticals**; wherein **74%** is allowed under the **automatic route** and thereafter through the **government approval route**.
- Notably, **India** supplies **62%** of the **global demand for vaccines**, including major vaccines like **DPT, BCG, and measles**, with at least **70%** of the **WHO's essential immunization schedule vaccines** sourced from **India**.
- The **Indian pharmaceutical industry** has an estimated **10,500 companies**, with **drug exports** having **more than doubled** in the past decade.
- This vast production capacity and global reach make any policy change within India's pharma sector, such as the recent **centralization of NOC issuance**, **highly impactful**.

Significance of this step:

- A study by the **Department of Pharmaceuticals** anticipates **substantial growth opportunities** for **India's generic drug market** between **2022** and **2030**, as **drugs worth \$251 billion globally** are **expected to go off-patent**, opening up **new markets for Indian generics**.
- The **centralization of NOC issuance** is expected to **streamline procedures**, **improve efficiency**, and **standardize protocols** across **India's pharma industry**, potentially enhancing the country's pharmaceutical exports.

- This move aligns with the broader goal of reaching a **\$450 billion target by 2047** and reinforces the **central government's role in controlling and overseeing drug exports**—a function deemed necessary given the critical nature of pharmaceuticals in global health.

About CDSCO:

- It is the **Central Drug Authority** for **discharging functions** assigned to the **Central Government** under the **Drugs and Cosmetics Act of 1940**.
- It works under the **Ministry of Health & Family Welfare** the **National Regulatory Authority (NRA)** of India.
- **Under the Drugs and Cosmetics Act, CDSCO is responsible for -**
 - Approval of Drugs.
 - Conduct Clinical Trials.
 - Laying down the standards for Drugs.
 - Control over the quality of imported Drugs in the country.
 - Coordination of the activities of State Drug Control Organizations.
 - Further CDSCO along with state regulators, is jointly responsible for the grant of licences to certain specialised categories of critical Drugs such as vaccines and sera, etc.
- The Indian government has announced plans to subject all medical devices, including implants and contraception, to CDSCO scrutiny.

Drugs Controller General of India (DCGI):

- **DCGI is the head of the department of the CDSCO** of the Government of India responsible for the approval of licences of specified categories of drugs such as blood and blood products, IV fluids, vaccines and sera in India.
- DCGI also sets standards for the manufacturing, sales, import, and distribution of drugs in India.

Kerala Governor declines Ordinance on ward delimitation citing Model Code of Conduct

Sub: Polity

Sec: Parliament and legislature

Context:

- Kerala Governor Arif Mohammed Khan has declined the Left Democratic Front (LDF) government's request to promulgate an Ordinance aimed at establishing a Delimitation Commission to redraw the boundaries and increase the number of local self-government wards based on the 2011 census.

Key reasons to decline the request:

- The Governor cited Model Code of Conduct principles and returned the executive order to the State government.
- The governor reportedly rested his case on the premise that he could only enact the Ordinance, only with the prior consent of the Election Commission of India.
- The meeting proposed amendments to the Kerala Panchayat Raj Act, 1994, and the Kerala Municipality Act, 1994.

About the ordinance:

- The State Election Commissioner will chair the proposed Delimitation Commission and will have five members at the rank of Secretary to the government.
- **The Commission will issue a draft notification. This notification will include fixing the ward boundaries and shaping the future electoral landscape.**
- The Commission will create new wards based on the 2011 census findings.

About Ordinance power of Governor:

- **Article 213 states that the Governor of the state may issue ordinances when the state legislative assembly** (or either of the two Houses in states with bicameral legislatures) is not in session.
- These ordinances have the same legal force and effect as an Act of legislature, but they are only temporary in nature.

Key features of this ordinance:

- An ordinance can be retrospective, which means that it can be enacted prior to its approval.
- An ordinance passed while the legislature is in session is deemed null and void.
- To stay a law, the Ordinance must be approved by the legislature within six weeks of its reassembly. Its existence is terminated if the legislature does not act within six weeks of its reassembly.
- Acts, laws, and events that occurred as a result of the ordinance remain in effect until it expires.
- Ordinance promulgation cannot be regarded as a substitute for the Governor's legislative authority.
- Ordinances can only be passed on subjects where the State legislature has the authority to pass laws.

- Ordinances cannot be used to revoke the fundamental rights of the citizens guaranteed by the Indian Constitution.
- The ordinance would also be declared null and void if the legislature passes a resolution opposing it.

About Delimitation Commission:

- **Delimitation entails fixing the number of seats and boundaries of territorial constituencies, including the reservation of seats for Scheduled Castes (SC) and Scheduled Tribes (ST), based on census data.**
- **Article 82 (Lok Sabha) and Article 170 (State Legislative Assemblies)** mandate readjustment of seats after each Census, performed by the Delimitation Commission.
- Delimitation exercises were conducted post the **1951, 1961, and 1971 Censuses, highlighting its periodic nature.**
- The Delimitation Commission is a high-powered committee entrusted with the task of drawing and redrawing boundaries of different constituencies for state assembly and Lok Sabha election.
- It is appointed by the **President and works in collaboration with the Election Commission.**
- **The Commission consists of –**
 - A retired or working Supreme Court Judge (chairperson)
 - Election Commissioner
 - Concerned State Election Commissioners or
- Commission's orders have the force of law and cannot be called in question before any court.
- The orders are laid before the Lok Sabha and the legislative assemblies concerned, but they cannot affect any modifications in the orders.

Schemes

2024 Lok Sabha polls: Housing schemes and promises to voters

Sub: Schemes

Sec: Infra

Context:

- As the 2024 elections drew near, various political parties attempted to woo voters with schemes, freebies and promises.

India's housing crisis:

- According to a **Government of India report in 2012, an estimated 18.78 million more houses** were required to cater to the housing demand in the country.
- The share of **affordable housing in overall sales during the first half of 2023 saw a sharp decline as compared to the first half of 2022.**

Right to Housing:

- A right to housing has been held to be a part of the fundamental right to life under **Article 21 of the Constitution by the Supreme Court.**

Timeline of Policy measures:

- There was no explicit housing policy in place till well after India attained Independence.
- **1985:**
 - The first policy intervention from the Government came in 1985, with the Indira Awaas Yojana, which was focused on rural housing.
- **2004:**
 - After 2004, urban housing came into focus with programmes such as reform-led infrastructure investment schemes for cities and the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), launched in 2005.
- **2008:**
 - In 2008, the Parekh Committee report on housing led to urban housing interventions such as the Rajiv Awas Yojana and Rajiv Rinn Yojna.

Pradhan Mantri Awas Yojna:

- **Pradhan Mantri Awas Yojana** is a **credit-linked subsidy scheme** by the Government of India to facilitate access to affordable housing for the low and moderate-income residents of the country.
- It envisaged a target of building 2 crore affordable houses by 31 March 2022.

PM Awas Yojna Urban:

- **Pradhan Mantri Awas Yojana – Urban (PMAY-U), a flagship Mission of Government of India being implemented by Ministry of Housing and Urban Affairs (MoHUA), was launched on 25th June 2015.**



- The duration of the PMAY-U was initially seven years, from FY 2015-16 to FY 2021-22.
- It has now been extended up to **December 31, 2024-** with all verticals except Credit Linked Subsidy Scheme (CLSS) – to complete houses sanctioned up to March 31, 2022.

Components of PM Awas Yojna Urban:

Components	About
In-situ slum redevelopment	This is done with the participation of private developers. Beneficiary households are granted Rs 1 lakh by the Centre. Besides this, State governments often match this amount, and additional funds may be provided by urban local bodies.
Credit Linked Subsidy Scheme (CLSS)	A subsidy is offered on home loan interest rates.
Affordable housing in partnership with public or private sector	Under this, the government provides incentives for building affordable housing. In a project where 35% of homes are built for economically weaker sections (EWS), the central government provides funds of Rs 1.5 lakh per EWS house.
Beneficiary-led individual house construction or enhancement (BLC)	This applies to eligible families in the EWS section who have land or homes in need of upgradation. The Centre makes available funds of Rs 1.5 lakh for individual families, and States and urban local bodies may add another Rs. 1 lakh to this amount.

- A temporary fifth vertical was recently introduced in the wake of the COVID pandemic.
- Affordable Rental Housing Complexes (ARHCs) were added in 2020 to provide sustainable and inclusive affordable rental housing avenues for urban migrants/poor.



What is Pradhan Mantri Awas Yojana-Gramin?

- The Pradhan Mantri Awas Yojana-Gramin was launched by the Modi government in 2016 with the aim of constructing 2.95 crore houses, to further the “Housing for All” scheme.
- Pradhan Mantri Gramin Awas Yojana, previously Indira Awas Yojana, is a social welfare programme, created by the Indian Government, to provide housing for the rural poor in India.

Other State Housing Schemes:

- Navaratnalu-Pedalandariki Illu scheme of Andhra Pradesh aimed at construction of 21.76 lakh houses, with an outlay of ₹56,700 crore.

An overview of the AMRUT scheme

Sub: Schemes

Sec: Infra

Tags: AMRUT scheme

What is the AMRUT scheme?

- The AMRUT (Atal Mission for Rejuvenation and Urban Transformation) scheme was a flagship programme launched by the NDA-1 government in June 2015, with its 2.0 version launched on October 1, 2021.
- AMRUT 2.0 was launched in October 2021 for a period of 5 years, i.e., Financial Year 2021-22 to 2025-26.
- AMRUT 2.0 was aimed at making cities ‘water secure’ and providing functional water tap connections to all households in all statutory towns.
- Ambitious targets were set up such as providing 100% sewage management in 500 AMRUT cities.
- It is an extension of the AMRUT mission, which was launched in June 2015 and aims to provide every household with access to a tap with a guaranteed supply of water and a sewer connection.
- The Ministry of Housing and Urban Affairs (MoHUA) is the nodal ministry for the scheme.
- The purpose of the AMRUT mission was to
 - (i) ensure that every household has access to a tap with assured supply of water and a sewerage connection
 - (ii) increase the value of cities by developing greenery and well-maintained open spaces such as parks and
 - (iii) reduce pollution by switching to public transport or constructing facilities for non-motorised transport.
- The total outlay for AMRUT was ₹50,000 crore for five years from FY 2015-16 to FY 2019-20.

Data on housing patterns:

- Around 36% of India’s population is living in cities and by 2047 it will be more than 50%.

- The World Bank estimates that around \$840 billion is required to fund the bare minimum urban infrastructure over the next 15 years.

What is the reality of AMRUT schemes?

- It is estimated that about **2,00,000 people die every year due to inadequate water, sanitation and hygiene.**
- In 2016, the disease burden due to unsafe **water and sanitation per person was 40 times higher in India than in China.**
- Around 21 major cities are going to run out of ground water. In a NITI Aayog report it was stated that 40% of India's population will have no access to drinking water by 2030.
- A National Clean Air Programme was launched by the central government in 2019, as AMRUT 2.0 focused only on water and sewerage and because the air quality concerns of AMRUT 1.0 were far from addressed.

Challenges in the scheme:

- The basic fundamental of the scheme was **erroneously constructed.**
- Instead of a holistic approach, **it took on a project-oriented attitude.**
- **AMRUT was made for cities with no participation from the cities.**
- In the governance architecture, the apex committee is headed by the secretary of the Ministry of Housing and Urban Affairs (MOHUA) and all the members are non-elected.
- The State level high powered committee is headed by the chief secretary with a private nexus of consultants and professionals.
- Peoples' representatives are completely missing, in violation of the 74th constitutional amendment.

About National Clean Air Programme(NCAP):

- It was launched by the **MoEFCC in January 2019** as a long-term, time-bound, national-level strategy that features:
 - Making determined efforts to deal with the air pollution problem across the country in a comprehensive manner.
 - Achieving 20% to 30% reduction target in Particulate Matter concentrations by 2024 where 2017 is kept as the base year for the comparison of concentration.
- Identification of **122 non-attainment cities (presently 131 non-attainment cities) across the country based on the 2014-2018 Air Quality data.**
- Non- Attainment Cities are the cities which do not meet the National Ambient Air Quality Standards.

Prejudiced past and forsaken future: the DNTs' battle for dignity

Sub: Schemes

Sec: Vulnerable sector

Tags: Denotified Tribes

Context:

- **Denotified and Nomadic Tribes**, a group of marginalized communities across Andhra Pradesh, have been silently suffering neglect and caste-based discrimination for centuries.

About the recent plight?

- Getting access to quality education, jobs or even basic amenities such as water and electricity is a constant struggle, with the primary focus often being on securing enough food for survival.
- This is the reality for the Yanadis and 58 other Denotified and Nomadic Tribes (DNTs) of the State.
- **Until 1952, when these communities were denotified, they were branded criminals under the Criminal Tribes Act, 1871.**
- They were later designated as **Scheduled Castes, Scheduled Tribes, Backward Classes (BCs), and Minorities groups, with reservations and other measures to ensure equity.**
- It is estimated that 20 crore people across the country belong to **DNT communities, with around 60 lakh people in this category in the state of Andhra Pradesh.**
- Of **DNT communities, Lambadas (STs)** are the most vocal and visible, followed by Vadderas (BCs) in government sector and political spheres.
- The other communities, including Yanadis, Yerukulas, Nakkalas, Pamulollu and those falling in the SC group, rarely get their voices heard.

Who are Denotified Tribes?

- The term '**De-notified Tribes**' stands for all those communities which were once notified under the Criminal Tribes Acts, enforced by the British Raj between 1871 and 1947.

- These **Acts were repealed by the Independent Indian Government in 1952, and these communities were "De-Notified"**.
- A few of these communities which were listed as de-notified were also nomadic.
- Terms such as nomads and semi-nomads are applied to social groups who undertook a fairly frequent, usually seasonal physical movement as part of their livelihood strategy in the recent past.
- The term **semi-nomad** is mostly used to describe those sections of nomads whose duration, distance and frequency of movement is comparatively less than others.
- The distinction between nomadic and semi-nomads does not involve distinguishable ethnic categories or social groups, it rather describes the degree of mobility practiced by them.
- It has been **estimated that South Asia has the world's largest nomadic population.**
- In India, roughly 10 percent of the population is Denotified and Nomadic.
- While the number of Denotified Tribes is about 150, the population of Nomadic Tribes consists of about 500 different communities.
- While the **Denotified Tribes** have almost settled in various States of the country, the Nomadic Communities continue to be largely nomadic in pursuit of their traditional professions.
- **The Renke Commission (2008)** was earlier commissioned to identify and list the DNT communities.
- **Idate commission** was established in 2014 under the leadership of **Bhiku Ramji Idate**, to compile a statewide catalog of Denotified, Nomadic, and Semi-Nomadic Tribes (DNTs).
- According to a report published by the **National Commission for Denotified, Nomadic and Semi-Nomadic Tribes in 2008**, there are 59 Denotified communities and 60 nomadic tribes in Andhra Pradesh.

About Yanadis tribe:

- The Yenadis also spelled Yanadi are one of the Scheduled tribes of India.
- They live in **Andhra Pradesh in Nellore, Chittoor and Prakasam districts.**
- The Yenadis are a **tribe in Andhra Pradesh** living in extreme conditions of poverty and social exclusion.
- The tribe is divided among three subgroups: **the Manchi Yanadi, Adavi Yanadi, and Challa Yanadi. Yenadis are the largest tribal group in Andhra Pradesh.**

About Lambadas:

- Lambada are the **most colorful of all the tribal groups of Andhra Pradesh**, widely dispersed in almost all the districts.
- According to the **Scheduled Caste Scheduled Tribe Lists Modification Order of 1956**, Lambadas are declared as Scheduled Tribe in Andhra area and as a Denotified Tribe in Telangana area of Andhra Pradesh.

Science and tech

What is Artificial General Intelligence (AGI), and why are people worried about it?

Sub: Sci

Sec: Awareness of computer and AI

Context:

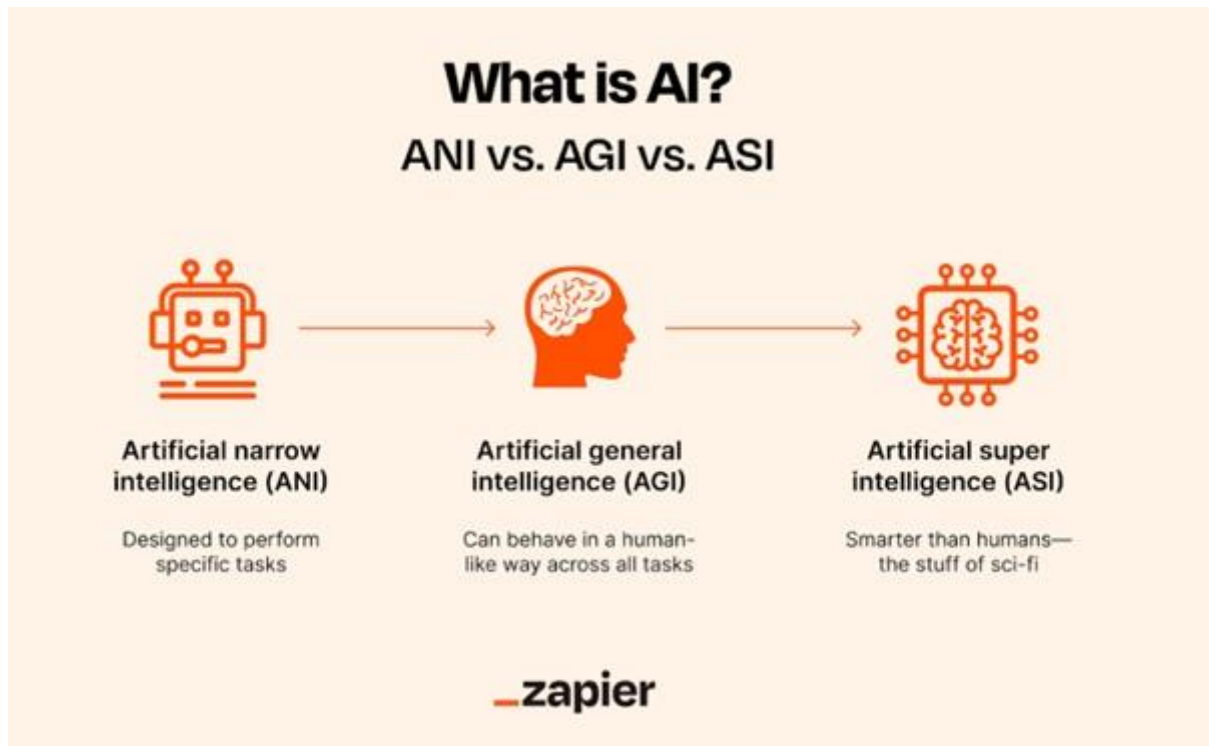
- In a recent interview, Sam Altman, CEO of OpenAI, expressed his commitment to invest billions of dollars **towards the development of Artificial General Intelligence (AGI).**

What is AGI?

- **AGI refers to a machine or a software that can perform any intellectual task that a human can do.**
- This includes **reasoning, common sense, abstract thinking, background knowledge, transfer learning, ability to differentiate between cause and effect, etc.**
- **AGI aims to emulate human cognitive abilities such that it allows it to do unfamiliar tasks, learn from new experiences, and apply its knowledge in new ways.**

How is AGI different from AI we already use?

- The main difference between **AGI and the more common form of AI, also known as narrow AI, lies in their scope and capabilities.**
- Narrow AI is designed to perform specific tasks such as image recognition, translation, or even playing games like chess— at which it can outdo humans, but it remains limited to its set parameters.
- On the other hand, AGI envisions a broader, more generalized form of intelligence, not confined to any particular task (like humans).



Idea of AGI?

- The idea of AGI first emerged in the 20th century with a paper written by Alan Turing, widely considered to be the father of theoretical computer science and artificial intelligence.
- In 'Computing Machinery and Intelligence' (1950), he introduced what is now known as the Turing test, a benchmark for machine intelligence.



How can AGI help humanity?

- AGI has innumerable positive implications.
- For instance, in healthcare, it can redefine diagnostics, treatment planning, and personalized medicine by integrating and analyzing vast datasets, far beyond the capabilities of humans.
- AGI could automate various processes and enhance the overall decision-making, offering real-time analytics and market predictions with accuracy.

What is DigiLocker and does it keep your data safe?

Sub: Science and tech

Sec: Awareness in IT, COMPUTER

Context:

- 10th and 12th standard students from the CISCE board as well as 10th standard students from the State Board of Tamil Nadu can get their 2024 results from DigiLocker.

What is DigiLocker?

- DigiLocker is a flagship initiative of the Ministry of Electronics & IT (MeitY) under the Digital India programme.
- The DigiLocker platform, launched in 2015, operates as an app to store users' digital records.

- The app can be used when applying for a passport, reviewing marksheets, or proving one's identity during travel.
- **DigiLocker is a digitization service** provided by the **Indian Ministry of Electronics and Information Technology** under its **Digital India initiative**.
- **DigiLocker allows access to digital versions** of various documents including driver's licenses, vehicle registration certificates and academic mark sheets.
- DigiLocker was not mandatory in order to get a new passport



Rule 9A:

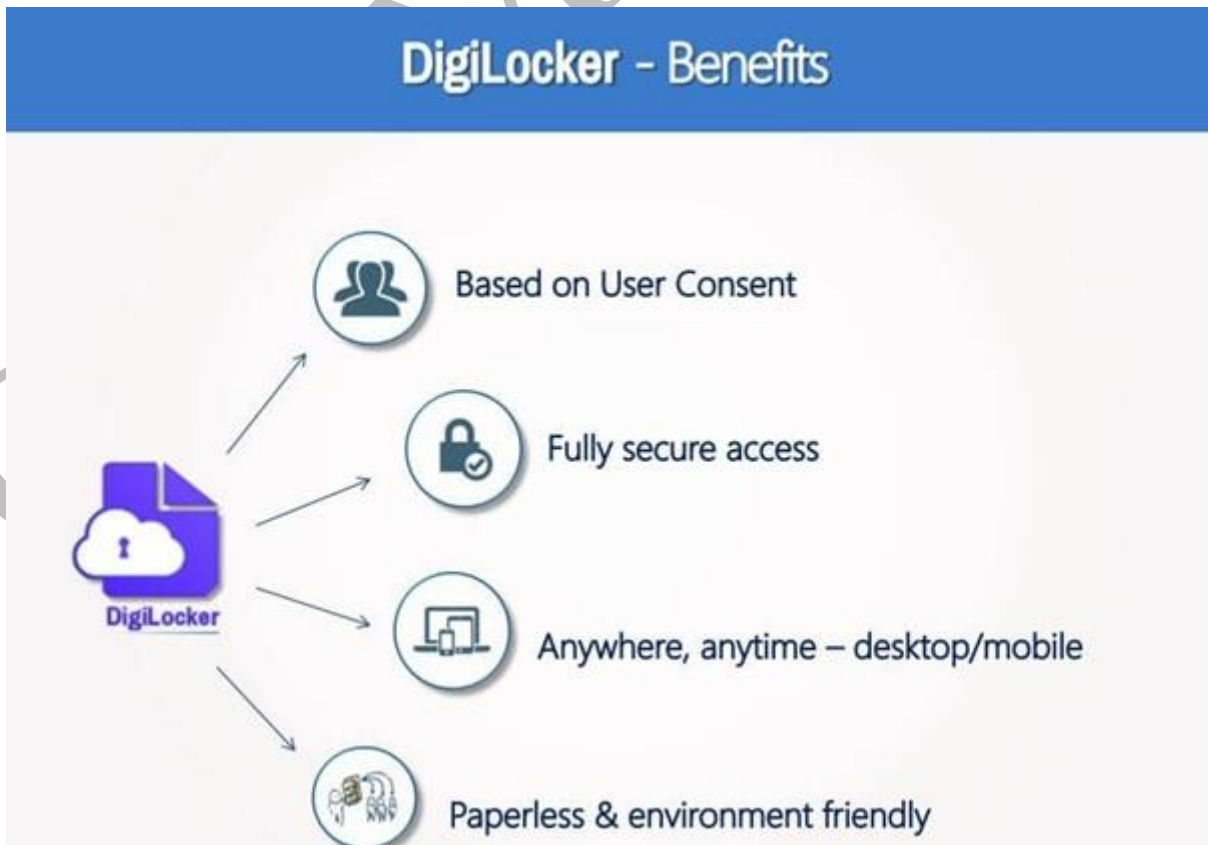
- The issued documents in DigiLocker system are deemed to be at par with original physical documents as per **Rule 9A of the Information Technology (Preservation and Retention of Information by Intermediaries providing Digital Locker facilities) Rules, 2016**.

Why is there an increased adoption rate of DigiLocker?

- **DigiLocker is a paperless solution** meant to ensure that a user can access the latest and updated versions of their documents online in order to prove their identity and their credentials at any given moment.
- This app helps eliminate the need to carry separate sets of documents while they are on the move.

How secure is DigiLocker?

- It is a government approved application and is ideally maintained with strict security protocols framed by officials.
- It has standard security measures in place including 2048 Bit RSA SSL encryption, multi-factor authentication (OTP verification), consent systems, timed log outs, and security audits.
- No DigiLocker data is shared with third parties and data is encrypted in transit.



On the importance of regulatory sandboxes in artificial intelligence

Sub: Science and tech

Sec: Awareness in IT and Computer

Tags: artificial intelligence

Context:

- Many governments and regulatory bodies have turned to innovative approaches such as “AI regulatory sandboxes” to strike a balance between fostering AI innovation and ensuring responsible development.

More on news:

- The first formal regulatory sandbox is attributed to the Financial Conduct Authority in the U.K.
- According to data from the World Bank(November 2023), there were approximately 73 regulatory sandboxes, both announced and operational, within the financial sector across 57 jurisdictions.

What are Regulatory Sandboxes?

- A regulatory sandbox is a tool allowing businesses to explore and experiment with new and innovative products, services or businesses under a regulator's supervision.
- A regulatory sandbox (RS) usually refers to live testing of new products or services in a controlled/test regulatory environment for which regulators may (or may not) permit certain regulatory relaxations for the limited purpose of the testing.
- The RS allows the regulator, the innovators, the financial service providers (as potential deployers of the technology) and the customers (as final users) to conduct field tests to collect evidence on the benefits and risks of new financial innovations, while carefully monitoring and containing their risks.
- It can provide a structured avenue for the regulator to engage with the ecosystem and to develop innovation-enabling or innovation-responsive regulations that facilitate delivery of relevant, low-cost financial products.
- The RS is potentially an important tool which enables more dynamic, evidence-based regulatory environments which learn from, and evolve with, emerging technologies.
- In India, all financial sector regulators, including the Reserve Bank of India, Securities and Exchange Board of India, Insurance Regulatory and Development Authority of India, Pension Fund Regulatory and Development Authority, and International Financial Services Centre Authority, have launched their respective regulatory sandboxes

What are Regulatory Sandboxes for AI?

- A regulatory sandbox for Artificial Intelligence is a controlled and supervised environment where developers and innovators, under the guardianship of the governmental authorities, can test and deploy AI systems in real-world scenarios, with some regulatory flexibility.

What are the objectives of Regulatory Sandboxes(RS)?

- The RS provides an environment to innovative technology-led entities for limited-scale testing of a new product or service that may or may not involve some relaxation in a regulatory requirement before a wider-scale launch.
- The RS is, at its core, a formal regulatory programme for market participants to test new products, services or business models with customers in a live environment, subject to certain safeguards and oversight.
- The proposed financial service to be launched under the RS should include new or emerging technology, or use of existing technology in an innovative way and should address a problem, or bring benefits to consumers.

What are Benefits of Regulatory Sandboxes?

- Regulatory sandbox provides a controlled environment for experimentation, offering invaluable insights into AI technologies capabilities and limitations while fostering collaboration between innovators and regulators.
- It promotes transparency and accountability by requiring participants to disclose information about their AI models, addressing concerns about opacity and enabling tailored regulations.
- It encourages responsible innovation, mitigating potential societal impacts of AI applications and nurturing a culture of ethical development within the industry.

What are some laws regarding Regulatory Sandboxes?

- Karnataka has enacted the Karnataka Innovation Authority Act, 2020, establishing an Innovation Authority dedicated to promoting and regulating innovative technologies through a regulatory sandbox model.
- Telecommunications Act 2023 proposed a regulatory sandbox where the central Government has the authority to establish one or more regulatory sandboxes, as prescribed, to promote and facilitate innovation and technological development in the field of telecommunications, specifying the manner and duration for their implementation.
 - About Telecommunication Act 2023:
- Article 53 of the European Union's AI Act, has the provision of a regulatory sandbox to test technology before making it mainstream.

- Spain became the first European country to have established the statute of the Spanish Agency for the Supervision of Artificial Intelligence (AESIA).
- **The EU has come up with an AI Act**, the U.S. has released a white paper on the AI Bill of Rights, and the U.K. has a national AI Strategy.

What is India's approach to AI?

- The Ministry of Electronics and Information Technology (MeitY), released a report on AI Innovation 2023 highlighting India's AI vision through seven working groups.
- Digital India Act, 2023 also talks about regulating AI by creating a separate set of laws and regulations.

About GPAI:

- The **Global Partnership on Artificial Intelligence is an international initiative** established to guide the responsible development and use of artificial intelligence in a manner that respects human rights and the shared democratic values of its members.
- The GPAI is a global alliance of **29 countries, including the US, UK, Germany, Israel, Singapore, Australia, Belgium and France, as well the EU.**
- It is aimed at responsible development and use of artificial intelligence, grounded in human rights, inclusion, diversity, innovation and economic growth.
- **29 countries of the GPAI have unanimously adopted the New Delhi Declaration**, which promises to position GPAI at the front and center of shaping the future of AI in terms of both innovation and creating collaborative AI between the partner nations.

GPT-4o, OpenAI's newest AI model that makes ChatGPT smarter and free for all

Sub: Science and tech

Sec: Awareness in IT and computer

Tag: OpenAI, ChatGPT

Context:

- OpenAI introduced its latest large language model (LLM) called GPT-4o on Monday (May 13), billing it as **their fastest and most powerful AI model so far.**

What is OpenAI?

- **OpenAI is an American artificial intelligence (AI)** research organization founded in December 2015, researching artificial intelligence with the goal of developing safe and beneficial artificial general intelligence, which it defines as highly autonomous systems that outperform humans at most economically valuable work.
- Its release of ChatGPT has been credited with starting the AI boom.

What is GPT 4O and what are its features?

- **GPT-4o is being seen as a revolutionary AI model, which has been developed to enhance human-computer interactions.**
- It lets users input any combination of text, audio, and image and receive responses in the same formats.
- This makes GPT-4o a multimodal AI model – a significant leap from previous models.
- GPT-4o seems like ChatGPT transformed into a digital personal assistant that can assist users with a variety of tasks
- **It can respond to audio inputs** in as little as 232 milliseconds, with an average of 320 milliseconds, which is similar to human response time (opens in a new window) in a conversation.
- It matches GPT-4 Turbo performance on text in English and code, with significant improvement on text in non-English languages, while also being much faster and 50% cheaper in the API.
- **GPT-4o is especially better at vision** and audio understanding compared to existing models.
- GPT-4o comes with an integration that allows it to process and understand inputs more holistically.
- GPT-4o can understand tone, background noises, and emotional context in audio inputs at once. These abilities were a big challenge for earlier models.



What is the technology behind GPT-4o?

- **LLMs are the backbone of AI chatbots.**
- Large amounts of data are fed into these models to make them capable of learning things themselves.
- **A large language model (LLM) is a computational model** notable for its ability to achieve general-purpose language generation and other natural language processing tasks such as classification.
- Based on language models, LLMs acquire these abilities by learning statistical relationships from text documents during a computationally intensive self-supervised and semi-supervised training process.
- LLMs are artificial neural networks.
- The largest and most capable, as of March 2024, are built with a decoder-only transformer-based architecture.

Importance of GPT 4o:

- **GPT-4o could be beneficial for Microsoft**, which has invested billions into OpenAI, as it can now embed the model in its existing services.
- Similar to GPT-4o, Google's Gemini is also expected to be multimodal.
- Thus, GPT-4o will be made available to the public in stages.

What are GPT-4o's limitations and safety concerns?

- **GPT-4o** is still in the early stages of exploring the potential of unified multimodal interaction, meaning certain features like audio outputs are initially accessible in a limited form only, with preset voices.

Terms in news:

Gemini:

- **Gemini is a family of multimodal large language models** developed by Google DeepMind, serving as the successor to LaMDA and PaLM 2.
- Comprising **Gemini Ultra, Gemini Pro, and Gemini Nano**, it was announced on **December 6, 2023**, positioned as a competitor to OpenAI's GPT-4.

The use of AI in drug development

Sub: Science and tech

Sec: Awareness in IT and computers

Context:

- The advent of Artificial Intelligence (AI) has opened up a world of possibilities with respect to fast-tracking drug development.

How does the process start?

- The process of developing a **drug starts with identifying and validating a target.**
- A target is a **biological molecule (usually a gene or a protein)** to which a drug directly binds in order to work.
- Only those proteins with ideal sites where drugs can go and dock to do their business are druggable proteins.
- **Target proteins are identified in the discovery phase, wherein a target protein sequence is fed into a computer which looks for the best-fitting drug out of millions in the library of small molecules for which the structures are stored in the computer.**
- The process assumes that the structures of the target protein and drug are known.
- Computers use models to understand the sites where a drug can bind.
- This discovery process avoids time-consuming laboratory experiments that require expensive chemicals and reagents and have a high failure rate.

- Once the **suitable protein target and its drug are identified**, the research moves to the pre-clinical phase, where the potential drug candidates are tested outside a biological system, using cells and animals for the drug's safety and toxicity.
- After this **the drug is tested on a small number of human patients before being used on more patients for efficacy and safety**.
- Finally, **the drug undergoes regulatory approval and marketing and post-market survey phases**.
- Due to a high failure rate, the discovery phase limits the number of drugs that pass and carry on to the pre-clinical and clinical phases.

How can AI help this process?

- AI has the potential to revolutionize target discovery and understand drug-target interaction by drastically cutting down time, increasing the accuracy of prediction of interaction between a drug and its target, and saving money.
- The development of two AI-based prediction tools, **AlphaFold and RoseTTAFold has provided a major scientific breakthrough in the last four years in the area of computational drug development**.
- Both tools are based on **deep neural networks**.
- The tools' neural networks use massive amounts of input data to produce the desired output — the three-dimensional structures of proteins.
- The new avatars of **AlphaFold and RoseTTAFold, called AlphaFold 3 (developed jointly by Isomorphic Labs, a DeepMind spinoff) and RoseTTAFold All-Atom respectively, take the capability of these tools to an entirely new level**.
- **Upgraded Versions:**
 - The significant difference between the upgraded versions and their previous forms is their capability to predict not just static structures of proteins and protein-protein interactions but also their ability to predict structures and interactions for any combination of protein, DNA, and RNA, including modifications, small molecules and ions.
- Additionally, the new versions use generative diffusion-based architectures (one kind of AI model) to predict structural complexes.

What are the drawbacks?

- The tools can provide up to 80% accuracy in predicting interactions (the accuracy comes down drastically for protein-RNA interaction predictions).
- The tools can only aid a single phase of drug development, target discovery and drug-target interaction.
- Insufficient training data causes the tool to produce incorrect or non-existent predictions.
- Unlike the previous versions of AlphaFold, DeepMind has not released the code for AlphaFold 3, restricting its independent verification, broad utilization and use for protein-small molecule interaction studies.

Aspects for India?

- Developing new AI tools for drug development requires large-scale computing infrastructure, especially ones with fast **Graphics Processing Units (GPUs)** to run multiple tasks with longer sequences.
- GPU chips are expensive, and with newer and faster ones being produced by hardware makers every year, they have a quick expiration date.
- India needs such large-scale computing infrastructure.

What are Deep neural networks (DNN)?

- **Deep neural networks (DNN)** is a class of machine learning algorithms similar to the artificial neural network and aims to mimic the information processing of the brain.
- Deep neural networks can recognize voice commands, identify voices, recognize sounds and graphics and do much more than a neural network.

What is a Graphics Processing Unit (GPU)?

- The graphics processing unit (GPU) in your device helps handle graphics-related work like graphics, effects, and videos.
- Integrated GPUs are built into your PC's motherboard, allowing laptops to be thin, lightweight, and power-efficient.

About AlphaFold and RoseTTAFold:

- **AlphaFold is an artificial intelligence program** developed by **DeepMind, a subsidiary of Alphabet**, which performs predictions of protein structure. The program is designed as a deep learning system.
- **RoseTTAFold is a “three-track” neural network**, meaning it simultaneously considers patterns in protein sequences, how a protein's amino acids interact with one another, and a protein's possible three-dimensional structure.

Why is the European Union probing Facebook and Instagram?

Sub: Science and tech

Sec: Awareness in IT

Context:

- The European Union has opened a fresh investigation into Meta's Facebook and Instagram over suspicions that they are failing to protect children on their platform.

More on news:

- The 27-nation bloc has said it is concerned that Facebook and Instagram's recommendation engine could exploit the weaknesses and inexperience of children and stimulate addictive behavior.
- The commission will look into **Meta's use of age verification tools to prevent children under the age of 13 from accessing Facebook and Instagram.**
- It will find out whether the company is complying with the bloc's Digital Service Act (DSA) and enforcing a high level of privacy, safety and security for minors.

What is the investigation's trajectory?

- The EU regulator will now carry out an in-depth investigation as a matter of priority and gather evidence by sending additional requests for information, conducting interviews and inspections.
- The commission can also accept commitments made by Meta to remedy the issues raised during the investigation.

What has Meta done to protect children on its platforms?

- **Meta announced it was testing an AI-driven "nudity protection"** tool that would find and blur images containing nudity that were sent to minors on the app's messaging system.
- The company said it would roll out measures to protect users under 18 years of age by tightening content restrictions and boosting parental supervision tools.

Other investigations against Meta in the EU?

- The **regulator opened an investigation**, accusing Meta of having failed to tackle deceptive advertising and disinformation in the run-up to the European Parliament elections.
- The **antitrust regulator's** move against Meta stemmed from the platform being used as a potential source of disinformation by Russia, China and Iran to influence voters in the EU.

What is the EU Digital Service Act (DSA)?

- The DSA is a set of common rules on intermediaries' obligations and accountability across the single market, and ensures higher protection to all EU users, irrespective of their country.
- The DSA regulates online intermediaries and platforms such as marketplaces, social networks, content-sharing platforms, app stores, and online travel and accommodation platforms.
- Its main goal is to prevent illegal and harmful activities online and the spread of disinformation.
- It ensures user safety, protects fundamental rights, and creates a fair and open online platform environment.
- The DSA requires online platforms to take measures to prevent and remove illegal or harmful content, such as hate speech, terrorism, child abuse – or those that promote illegal goods.
- DSA also requires that platforms give users the means to report this type of content

Leading AI firms pledge 'responsible' tech development

Sub: Science and tech

Sec: Awareness in IT and computer

Context:

- More than a dozen of the world's leading artificial intelligence firms pledged at a global summit to develop and use their technology safely.

Key highlights:

- **Sixteen companies involved in AI including Alphabet's Google, Meta, Microsoft and OpenAI, as well as companies from China, South Korea and the United Arab Emirates have committed to safe development of the technology.**
- Both South Korea and Britain hosted a global AI summit in Seoul.
- The agreement is a step up from the number of commitments at the first global AI summit held six months ago.
- Countries such as the UK and U.S. establishing state-backed AI Safety Institutes for evaluating AI models.

Global AI summit, Seoul:

- **The artificial intelligence (AI) summit in Seoul aims to build on a broad agreement at the first summit held in the United Kingdom to better address a wider array of risks.**

- The **AI Summit Seoul** is a **leading technology** and business-focused global conference that shares knowledge on the intersection between AI technology and business models for key players in the industry.
- **Representatives of the Group of Seven (G7)** major democracies are expected to take part in the virtual summit.
- China will not participate in the virtual summit but is expected to attend Wednesday's in-person ministerial session.

About Bletchley Declaration:

- The **Declaration signifies a collective commitment to proactively manage potential risks associated with so-called “frontier AI”** (i.e., highly capable general-purpose AI models) to ensure such models are developed and deployed in a safe and responsible way.
- The **Bletchley Declaration, signed in November 2023 by 28 countries — including the United States, India, and China — and the European Union**, aimed to boost global cooperation to promote inclusive economic growth, sustainable development and innovation, to protect human rights and fundamental freedoms.

About Seoul AI business Pledge:

- The **Seoul AI Business Pledge enhances globally coordinated efforts to address artificial intelligence (AI) safety**, with leading AI developers including BSA members as signatories.
- The pledge builds upon the Hiroshima AI Process and work by the United Nations, and is rooted in shared values, including the need to ensure widespread and inclusive access to the benefits of responsible AI.

How Europe’s AI convention balances innovation and human rights

Sub: Science and tech

Sec: Awareness in AI and computer

Context:

- The **Council of Europe (COE)** took a big step by adopting the Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law i.e. the ‘AI convention’ on May 17.

Definition of AI:

- The definition of **AI is similar to the one in the EU AI Act**, which is based on the OECD’s definition of AI i.e. An **AI system is a machine-based system** that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments.

What is Europe’s AI convention?

- The **agreement is a comprehensive convention** covering AI governance and links to human rights, democracy, and the responsible use of AI.
- **The framework convention will be opened for signature in Vilnius, in Lithuania.**
- The Convention **aims to create a balanced framework that encourages technological advancement while safeguarding fundamental freedoms and democratic values.**
- By establishing clear guidelines, it seeks to prevent AI from undermining democratic institutions.
- The **COE is an intergovernmental organization formed in 1949**, with 46 members today, including the Holy See, Japan, and the U.S., plus countries of the EU bloc and others.

What is a framework convention?

- A **‘framework convention’ is a legally binding treaty** that specifies the broader commitments and objectives under the Convention, and sets mechanisms to achieve them.
- Those agreements that are negotiated under the **framework convention** will be called protocols.
- The **framework convention approach** is useful because it allows flexibility even as it encodes the core principles and processes by which the objectives are to be realized.
- The **AI convention** can catalyze the negotiation of similar conventions at the regional level in other places.
- As the U.S. is also a member of the COE, the convention can indirectly affect AI governance in the U.S. as well, which matters because the country is currently a hotbed of AI innovation.

Scope of the convention:

- **Article 1 of the convention** states that the provisions of this Convention aim to ensure that activities within the lifecycle of artificial intelligence systems are fully consistent with human rights, democracy and the rule of law.
- **Article 3 states that the scope of this Convention** covers the activities within the lifecycle of artificial intelligence systems that have the potential to interfere with human rights, democracy, and the rule of law as follows:
 - Each Party shall apply this Convention to the activities within the lifecycle of artificial intelligence systems undertaken by public authorities or private actors acting on their behalf.

- Each Party shall address risks and impacts arising from activities within the lifecycle of artificial intelligence systems by private actors to the extent not covered in subparagraph a, in a manner conforming with the object and purpose of this Convention.

AI convention and National Security:

- **Article 3(b) allows Parties the flexibility** in this matter but without allowing them to completely exempt the private sector.
- The exemptions in **Articles 3.2, 3.3, and 3.4** are broad and pertain to the protection of national security interests, research, development and testing, and national defense, respectively.
- The **‘General Obligations’ in the convention pertain to the protection of human rights (Article 4)**, the integrity of democratic processes, and respect for the **rule of law (Article 5)**.
- While disinformation and deep fakes haven’t been addressed specifically, Parties to the convention are expected to take steps against them under Article 5.
- **The convention also indicates (in Article 22) that Parties can go beyond the commitments and obligations specified.**

Need the AI convention:

- The convention takes a comprehensive approach to mitigating risks from the application and use of AI systems for human rights, democracy, and the rule of law.

About Council of Europe(COE):

- **The Council of Europe is an international organization** with the goal of upholding human rights, democracy and the rule of law in Europe.
- **Founded in 1949, it brings together 46 member states** with a population of approximately 675 million as of 2023.
- It operates with an **annual budget of approximately 500 million euros**.
- The organization is distinct from the European Union (EU), although people sometimes confuse the two organizations – partly because the EU has adopted the original European flag, designed for the Council of Europe in 1955, as well as the European anthem.
- **No country has ever joined the EU without first belonging to the Council of Europe.**
- **The Council of Europe is an official United Nations Observer.**

Russia accuses U.S. of seeking to weaponise outer space

Sub: Science and tech

Sec: Defence

Tag: weaponise outer space

Context:

- **Russia accused the US of seeking to place weapons in space for military confrontation.**

Details:

- This accusation followed the **US veto of a Russian non-proliferation motion** at the UN.
- In February, the US expressed concern over **Russia's anti-satellite capability**, fearing **nuclear weapons in orbit**.
- **Both countries** have proposed rival **non-proliferation motions** at the UN.
- **Russia vetoed the US initiative** last month, and the **US, Britain, and France blocked Russia's proposal** on 20 May.
- Russia criticized the US initiative for focusing only on nuclear weapons.
- Despite tensions, the **US and Russia** still cooperate in space, sharing **crew transport to the ISS**.

Weaponization of Space vs. Militarization of Space

Weaponization of Space	Militarization of Space
<ul style="list-style-type: none"> ● Space itself becomes the battlefield ● Includes placing orbital or suborbital satellites to attack enemy satellites ● Uses ground-based direct ascent missiles to shoot down space jets ● Involves jamming signals from enemy satellites 	<ul style="list-style-type: none"> ● Usage of space-based assets for command, control, communication, surveillance, and reconnaissance ● Assists armies on the conventional battlefield ● Space is the ‘fourth frontier of war’



Why Space Weaponization?

- Establish **military supremacy** on all fronts of warfare
- Lack of faith in current missile defense systems against Intercontinental Ballistic Missiles (ICBMs)
- Preserve space assets from **anti-satellite (ASAT) weapons**
 - **Anti-satellites (ASATs) are weapons designed to destroy or disable satellites in orbit.**
 - They can be ground-based, air-based, or space-based. ASATs can use various methods to attack satellites, including kinetic impact, lasers, and directed energy weapons.
- Space supremacy complements sea, air, and land warfare

Implications of Space Weaponization:

- **Mutual Suspicion:** Fear of war leads to competition and aggressive deployment between nations
- **Threat to Commercial and Scientific Missions:** Military satellites' secrecy affects coordination systems due to undisclosed orbital and radio frequency information
- **Space Debris:** Increases space debris, potentially leading to **Kessler's syndrome**
 - The **Kessler Syndrome** is a theoretical concept where the growth of space debris can lead to an escalating chain reaction of collisions, rendering Earth's orbit overpopulated with objects and debris. This would make Earth's orbit unusable for future space activities.
- **Monopoly of Orbital Slots:** Developed countries monopolize limited orbital slots, restricting scientific and commercial explorations

Global Frameworks to Prevent Space Weaponization:

- **Outer Space Treaty 1967-** It was conceptualized by the **United Nations** in **1967**. It emphasizes that the **use of outer space should be peaceful and beneficial to all mankind**. It claims that **one nation cannot claim national sovereignty in outer space**.
- **Prevention of an outer space arms race-** It stresses the use of space for peaceful purposes. Further, it calls for the importance of avoiding an arms race.

Outer Space Treaty, 1967:

- The treaty provides the **basic framework for international space law**.
- The **exploration and use of outer space shall be carried out for the benefit and in the interests of all countries** and shall be the **province of all mankind**.
- Outer space shall be free for exploration and use by all States.
- Outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.
- States shall not place nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies or station them in outer space in any other manner.
- The Moon and other celestial bodies shall be used exclusively for peaceful purposes.
- Astronauts shall be regarded as the envoys of mankind.
- States shall be responsible for national space activities whether carried out by governmental or non-governmental activities.
- States shall be liable for damage caused by their space objects.

- States shall avoid harmful contamination of space and celestial bodies.

The value of attributing extreme events to climate change

Sub: Science and tech

Sec: Defence

Evolution of Extreme Event Attribution:

- Previously, the IPCC argued against attributing individual weather events to climate change.
- Now, researchers attribute some extreme events to climate change despite uncertainties.

Value of Extreme Event Attribution:

- Attribution is seen as **critical** for the **loss and damage (L&D) process** in climate talks.
- Developing countries demand **L&D funding** to cope with **climate impacts**, but **criteria for eligibility are crucial**.
- Attribution reports could inform legal accountability for extreme events, but challenges remain.

Attribution of Asian Heatwaves:

- **World Weather Attribution (WWA)** reported that **Asian heatwaves** were **45 times** more likely due to climate change.
- **Attribution** involves comparing current conditions with a hypothetical world without climate change.
- Data limitations and challenges in modelling rainfall affect attribution reliability.

Challenges in Event Selection:

- **Selecting extreme events for attribution** is challenging due to various factors.
- In evaluating **Asian heatwaves**, **WWA** scientists used **regional scales** and various definitions, considering **daily, three-day, or monthly average temperatures**.
- **Heatwaves** can be **influenced** by **natural factors** (e.g., El Niño) and **human factors** (e.g., urbanization, deforestation).
- There is **debate** over whether **irrigation affects heatwaves**.
- Extreme events are unique and often have **no exact precedent**, making **subcontinent-scale attributions easier than local ones**.

Dependency of Extreme Events on Human Action:

- The impacts of extreme events depend on hazard, vulnerability, exposure, and financial factors.
- Questions arise whether attribution exercises should focus solely on hazards or also consider impacts.

International Finance and Adaptation:

- Consideration of international finance aspects is necessary for adaptation, mitigation, and L&D.
- Historical responsibilities should be addressed to fund developing countries and support global mitigation efforts.

Resource Constraints and Cost-Benefit Analysis:

- In a resource-constrained world, a cost-benefit analysis is needed for the role of attribution in climate action.
- While attribution is a scientific challenge, its practical application requires careful consideration of costs and benefits.

World Weather Attribution (WWA):

- WWA is an international collaboration of climate scientists conducting rapid assessments to determine the role of climate change in extreme weather events.
- **Collaborative Effort:** Involves scientists from Imperial College **London (UK)**, **KNMI (Netherlands)**, **IPSL/LSCE (France)**, **Princeton University and NCAR (US)**, **ETH Zurich (Switzerland)**, **IIT Delhi (India)**, and climate impact specialists from the **Red Cross/Red Crescent Climate Centre (RCCC)**.
- **Objective:** Provide timely, scientifically rigorous information on links between extreme weather and climate change.
 - Inform policymakers, media, and the public about climate change impacts and the need for mitigation.
- **Methodology:**
 - Uses a standardized, transparent approach comparing the likelihood and severity of weather events in current climate conditions versus a world without climate change.
 - Collaborates globally, with all results peer-reviewed for scientific accuracy.
- **Three-Part Response to Extreme Events:**
 - **Define the Event:** Identify the geographic region and relevant weather parameters.
 - **Gather Historical Data:** Collect weather data from 1950 to the present to compute statistics on normal and extreme weather patterns.

- **Simulate the Event:** Use computer models to simulate the event multiple times, comparing current greenhouse gas conditions to past conditions.

Pentagon says Russia launched space weapon in path of U.S. satellite

Sub: Science and tech

Sec: Defence

Context:

- The Pentagon accused Russia of launching a likely **space weapon** and deploying it in the **same orbit as a U.S. government satellite**.

Details of the 'Counter space weapon':

- This '**counter-space weapon**' is presumably capable of attacking other satellites in low Earth orbit.
- **Russia's response:** We act absolutely in accordance with international law, do not violate anything, and have repeatedly advocated banning any weapons in space.
- **Both countries** have proposed rival **non-proliferation motions** at the UN.
- **Russia vetoed** the **US initiative** last month, and the **US, Britain, and France blocked Russia's proposal** on 20 May.

Anti-satellite weapon (ASAT):

- **Anti-satellites (ASATs)** are **weapons** designed to **destroy or disable satellites in orbit**. They can be ground-based, air-based, or space-based. ASATs can use various methods to attack satellites, including kinetic impact, lasers, and directed energy weapons.
- **Anti-satellite (ASAT) technology** refers to the **capability** to intercept, disable, or destroy satellites in orbit. This technology is primarily developed for defence and strategic purposes.
- **Types of Anti-Satellite Weapons**
 - **Kinetic energy methods:** This involves launching a missile that intercepts and physically collides with the target satellite to destroy it.
 - The kinetic energy ASATs physically collide with satellites and can reach altitudes. These ASATs can be ballistic missiles, drones, and other satellites.
 - **Non-kinetic methods:** They use non-physical attacks such as cyber-attacks, jamming, and even lasers to blind satellites without physically destroying them.
 - All of these attacks can be launched from the air, low orbit, or even ground installations.

Countries with ASAT Technology:

- ASATs were first developed during the Cold War era. They have never been used in warfare, but have been used to remove decommissioned satellites.

Country	ASAT Missile/Weapon
India	Mission Shakti
USA	Bold Orion air-launched ballistic missile (ALBM)
Russia (Former Soviet Union)	Nudol Missile
China	SC-19 ASAT missile

Outer Space Treaty, 1967:

- The treaty provides the **basic framework for international space law**.
- The **exploration and use of outer space shall be carried out for the benefit and in the interests of all countries** and shall be the **province of all mankind**.
- Outer space shall be free for exploration and use by all States.
- Outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.
- States shall **not place nuclear weapons or other weapons of mass destruction** in orbit or on celestial bodies or station them in **outer space** in any other manner.
- The Moon and other celestial bodies shall be used exclusively for peaceful purposes.
- Astronauts shall be regarded as the envoys of mankind.
- States shall be responsible for national space activities whether carried out by governmental or non-governmental activities.
- States shall be liable for damage caused by their space objects.
- States shall avoid harmful contamination of space and celestial bodies.

Azad Engineering bags contract for advanced turbo gas generator engine from DRDO lab GTRE

Sub: Science and tech

Sec: Defence

Context:

- **Azad Engineering** secured a contract with **DRDO laboratory Gas Turbine Research Establishment (GTRE)** for the **manufacturing, assembly, and integration** of advanced turbo gas generator engines.

Details of the advanced turbo gas generator engines:

- The **engine** features a **single-spool turbojet** design with a **4-stage axial flow compressor, annular combustor, single-stage axial flow uncooled turbine, and fixed exit area nozzle.**
- **Azad Engineering** will serve as the **sole industry partner** for this project.

About Gas Turbine Research Establishment (GTRE):

- A laboratory of DRDO in **Banglore, Karnataka.**
- It is one of the pioneering Research and Development Organizations under the **Ministry of Defence, Government of India.**
- **Goal:** To design and develop gas-turbine engines for military applications, besides carrying out advanced research work in the area of gas-turbine sub-systems.

Indigenisation of Defence:

- The '**Aatmanirbharta in Defence**' initiative **aims to reduce import dependency and foster domestic defence manufacturing capabilities**, issuing approximately 350 new industrial licenses over the last seven years.
- Encouraged by government initiatives, **private players** are **developing defence equipment manufacturing capacity** to meet the **armed forces' requirements** and address programme delays, cost overruns, and quality issues.

Why are Indian spices facing the heat?

Subject: Science and tech

Sec: Health

Context:

- Several countries, namely **Singapore, Hong Kong, and the U.S.,** are **investigating Indian spice brands MDH and Everest** for **possible contamination with ethylene oxide (used as food stabiliser), a harmful chemical exceeding safe levels.**
- In response, the **Spices Board of India** has mandated product testing for exports and is collaborating with exporters to pinpoint the contamination source.
 - **Ethylene Oxide** is **prohibited** from being used even as a **fumigant** in India.

Product is tested for:

- Up to **139 pesticide residues**
- Nearly **seven metal contaminants** including **lead, arsenic, copper, cadmium and mercury.**
- In terms of **biological parameters**, tested for **yeast, mould, salmonella and staphylococcus** among others.
- **25 physical parameters** and **22 chemical parameters** such as **total ash, crude fibre and argemone oil** among others.
 - **Argemone oil-** native to **Maxico**, now widespread globally. **Non-edible oil plant** (toxic and poisonous). It's seed resemble those of **mustard (Brassica nigra)**, thus used as an **adulterant in mustard oil. 1% adulteration** can cause clinical disease.
- In terms of **food additives**, tested for **Sorbates, Neotame and Sulfites** among others.
 - **Salmonella** are agents known to cause **salmonellosis** — a common **bacterial food-borne illness.**

- **Sorbates:** It is a food preservative added to increase shelf life. Mold and yeast inhibitor. Used as a fungistatic agent for foods, especially cheeses.
- **Neotame:** Neotame was developed as an alternative to aspartame with the aim of being a more stable and sweeter version of the traditional sweetener. It is very stable at high temperatures, which means it is a good additive to use in baked goods.
- **Sulfites:** Sulfites are a food preservative widely used in winemaking, thanks to their ability to maintain the flavor and freshness of wine.

Health concerns:

- The spice mixes from **MDH and Everest** are reportedly **contaminated** with high levels of **ethylene oxide (EtO), a banned pesticide.**

- Initially used to **sterilize medical devices**, EtO is employed across various industries, including in the **spice industry to reduce microbial contamination and extend shelf life**.
- However, **improper usage** can lead to **residues that form toxic and potentially carcinogenic compounds**, such as **ethylene glycol** — recently linked to **fatal contaminations in cough syrups**.
- **Long-term exposure to EtO** is also associated with an **increased risk of cancers** like **lymphoma and leukaemia**.

Impact on India's spice exports:

- With nearly **\$700 million** in **exports** to key markets at risk and potential cascading losses that could **halve India's total spice exports**, urgent action is needed to preserve the industry's reputation.
- If regulatory actions similar to those in **Hong Kong** and **Singapore** are adopted by **China** and **ASEAN countries**, and possibly followed by **the EU**, which has a history of rejecting Indian spices over quality issues, **Indian spice exports** could dramatically downturn. The **total potential loss** could amount to **58.8%** of **India's global exports**, **impacting \$2.17 billion in value**.

India's response:

- In response to reports of **ethylene oxide** contamination in **spices**, the **Spice Board of India** has implemented several **corrective actions**.
- These include **mandatory testing of spice consignments** shipped to **Singapore** and **Hong Kong**, and **demanding technical and analytical reports** from **food and drug agencies**.
- They have also updated **guidelines for exporters on how to prevent EtO contamination**, covering **testing protocols, storage, and alternative treatments to reduce chemical use**.
- Following a **similar advisory in 2021** due to concerns from the **EU**, the **FSSAI** has instructed **state regulators to test major spice brands** like **MDH** and **Everest** for **EtO**.
- Activists are pushing for **more rigorous safety checks on spices**, and a recent report suggests updating food safety standards to meet global norms and enhancing industry compliance through better information dissemination.

Spice Board of India:

- Indian government agency under the **Ministry of Commerce and Industry**.
- Responsible for **regulating and promoting the export of Indian spices**, headed by **Chairman Shri A G Thankappan**.
- **Established in 1987** under the **Spices Board Act 1986**, it **oversees the production and development of cardamom and promotes the export of 52 listed spices**.
- **Headquartered in Kochi**, the board operates **state-of-the-art testing laboratories** in **several cities** including **Mumbai, Chennai, Delhi, Tuticorin, Kandla, and Guntur**, ensuring mandatory quality checks for exported spices.

Indian spices and herbs rejected by the U.S. FDA in 2023

A scrutiny of FDA's import refusal report, for the calendar year 2023, cites at least 30 instances wherein entry was refused because the products appeared to contain salmonella

Company	Products rejected	Reasons for rejection
Ramdev Food Products Pvt Ltd	Cumin	Appears to contain salmonella, a poisonous and deleterious substance which may render it injurious to health
	Mixed spices and seasoning	Salmonella
	Coriander	Salmonella
	Nutmeg	Salmonella
	Cumin	Salmonella
	Ginger	Salmonella
Mahashian Di Hatti (MDH)	Fennel	Artificial colouring, misbranding
	Paprika	Filthy, putrid, or decomposed substances otherwise unfit for food; and salmonella
	Mixed spices and seasoning	Salmonella
	Mixed spices and seasoning	Misbranding + salmonella
	Capsicums (cayenne chili, hot peppers) spice	Salmonella
Everest	Spices and seasoning, ground, cracked with salt	Salmonella
	Spices and seasoning, ground, cracked with salt	Labelling violation of FPLA because of its placement, form and/or contents statement
	Black pepper	Salmonella
MTR Foods Private Limited	Capsicums (cayenne chili, hot peppers) spice	Salmonella
	Curry powder, ground, cracked without salt	Salmonella
	Spices and seasoning, ground, cracked with salt	Salmonella
Dharampal Satyapal Ltd. (DS Group Catch)	Spices and seasoning, ground, cracked with salt	Labelling violation
	Mixed spices and seasoning	Appears to be misbranded in that the label or labeling fails to bear the required nutrition information; appears to contain a poisonous or deleterious substance which would ordinarily render the article injurious to health
Patanjali Ayurved Ltd.	Natural extract or flavour	Appears to be a new drug within the meaning of Section 201(p) without an approved New Drug Application (NDA)
Nestle India	Spices and seasoning, ground, cracked with salt	Salmonella
Badshah Masala Pvt. Ltd.	Spices and Seasoning, ground, cracked with salt	Labelling violation
Tulsi Foods	Black pepper	Filthy and salmonella
Speciality Indian Food Parks & Exports	Black pepper	Filthy and salmonella

A computer science conundrum that could transform healthcare

Subject: Science and tech

Sec: health

Introduction to P vs NP:

- The **P vs NP problem** is an **unsolved question** in **computer science** that explores **whether every problem whose solution can be quickly verified (NP) can also be solved quickly (P)**.
 - In simpler terms, consider multiplying two prime numbers (a P problem, solvable in polynomial time) versus factoring a product back into primes (an NP problem, verifiable but potentially time-consuming to solve).
- **Healthcare Applications:**
 - **Healthcare management** involves complex scheduling challenges, such as allocating shifts for medical staff, reserving operating rooms, and arranging patient appointments.
 - If the **P vs NP problem** were resolved with **P equalling NP**, it would mean that **complex healthcare scheduling** could potentially be **optimized quickly, improving operational efficiency and patient care**.

- Overall, **resolving the P vs NP problem** could **significantly reduce resource constraints** and **improve health outcomes** by **enabling more efficient handling of complex healthcare-related decision-making processes**.

Other applications of P vs NP problem:

- **Antibiotic Resistance:** If **P equals NP**, **rapid analysis of bacterial genomes** could become **feasible**, allowing for **quick predictions of antibiotic resistance patterns**. This would enable doctors to prescribe the **most effective antibiotics**, **enhancing treatment outcomes** and aiding in the battle against antibiotic resistance.
- **Cancer Treatment:** Cancer involves numerous possible mutations, making **treatment decisions complex (NP problems)**. A solution to **P vs NP** could allow for the **fast determination of optimal combinations of drugs and therapies tailored to individual patients**, potentially saving more lives.
- **Insurance Sector:** Insurance companies face NP problems when setting premiums and designing packages that consider a wide range of variables (e.g., age, health status, lifestyle). A breakthrough in solving P vs NP would enable **more efficient and fair decision-making**, leading to more precisely tailored insurance offerings.
- **Government Healthcare Spending:** Efficient solutions to NP problems could also enhance government healthcare programs like **Ayushman Bharat**, **optimizing resource allocation**, **minimizing wastage**, and **better achieving universal health coverage goals**.
- **Broad Sector Benefits:** Beyond healthcare, solving the P vs NP problem would benefit multiple sectors including **logistics**, **finance**, and **climate modelling**. Each could see significant shifts in **operations and efficiencies** due to **improved problem-solving capabilities**.

Implications and Challenges of Solving the P vs NP Problem

- A major concern of **P equalling NP** would be the **vulnerability it creates in cryptography**. Many current encryption methods rely on **NP problems**, which are difficult to solve but easy to verify. If these become easy to solve (P problems), it would **compromise the security of digital data**.

Covid virus is still here. Why aren't more people falling ill?

Subject: Science and tech

Sec: Health

Context:

- There were 850 active cases as of Friday, according to the Health Ministry.

More on news:

- In the first three weeks of that month, more than 3 lakh positive cases were detected every day on average.
- Daily detections peaked exactly three years ago on May 6, 2021 when more than 4.14 lakh positive cases were reported.

Is the pandemic finally over?

- On May 5, 2023, the World Health Organisation (WHO) announced that Covid-19 was no longer a global public health emergency.
- India had withdrawn all Covid-19-related restrictions after March 31, 2022, shortly after the Omicron wave had dissipated and ceased the application of the provisions of the Disaster Management Act.

Why aren't more people getting infected?

- The Omicron variant, which emerged at the end of 2021, had enhanced capability to spread and infect people, but it did not cause severe disease.
- A large proportion of the world's population gained natural immunity after being infected with Omicron.
- The decline in the number of people without immunity, either through natural infection or vaccination, meant that the virus had fewer opportunities to evolve rapidly into newer variants.
- However, neither natural infection nor vaccines provide permanent immunity.
- The effect of vaccines taken in 2021 and 2022 is most likely over.
- Natural immunity also dissipates after some time.
- The only reason there is no uncontrolled surge is that people are continuing to get infected with relatively harmless variants, and getting their immunity renewed.

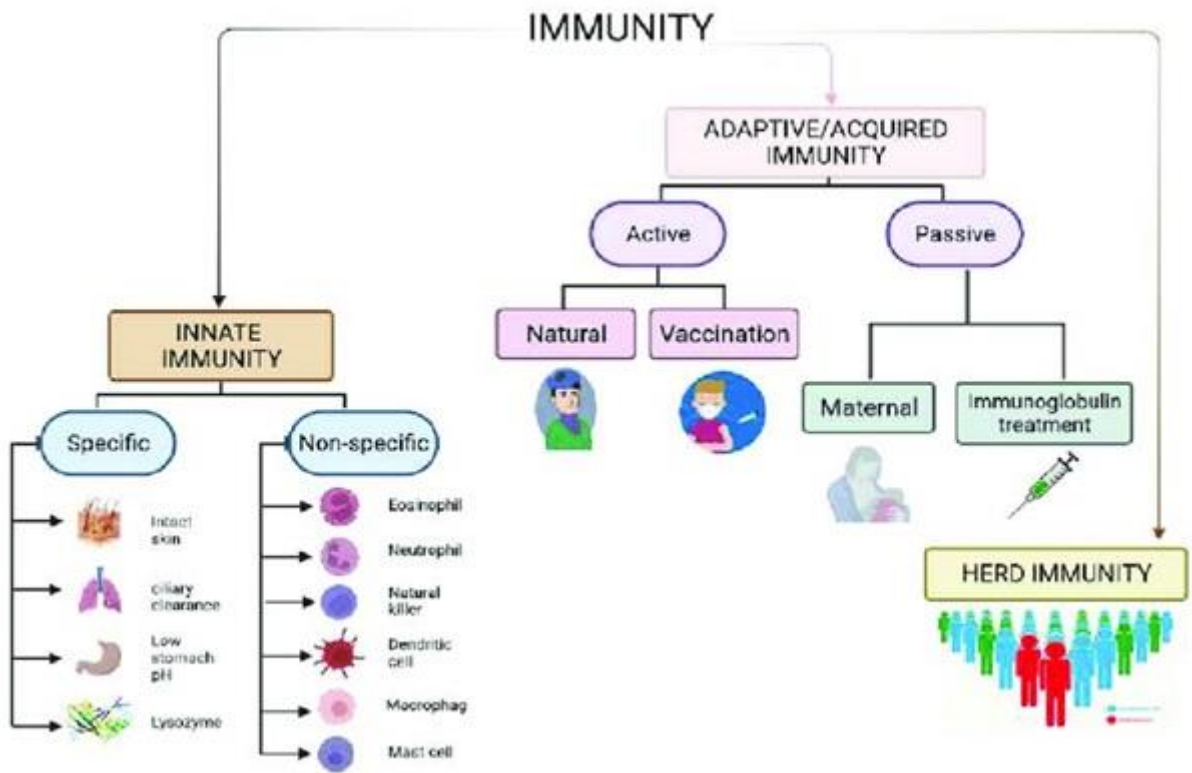
About Covid 19 and its strains:

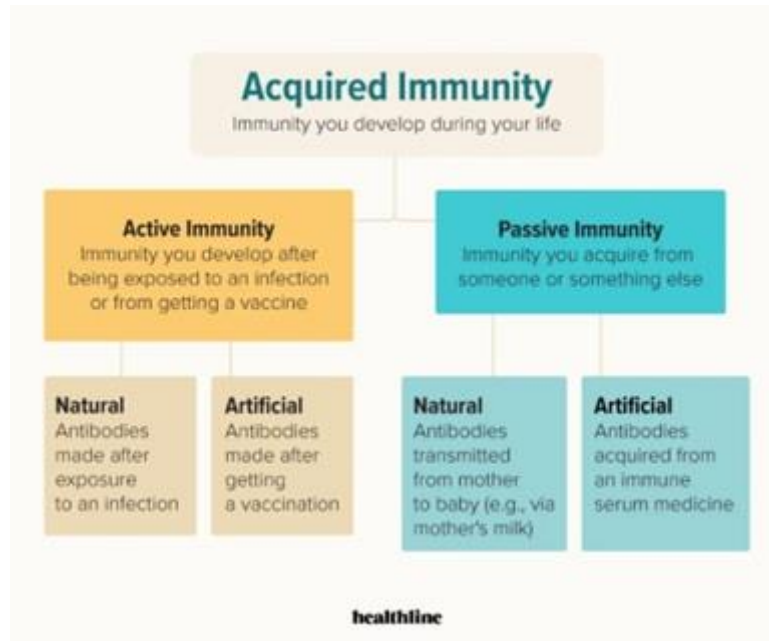
- **Coronaviruses are a specific family of viruses**, with some of them causing less-severe damage, such as the common cold and others causing respiratory and intestinal diseases.
- **These are enveloped RNA viruses that cause respiratory illnesses of varying severity from the common cold to fatal pneumonia.**

- The dominant variant causing the most infections right now is JN.1, a distant descendant of Omicron. JN.1 is a little more efficient at infecting people than its sister variants but like all descendants of Omicron, does not cause severe disease.
- The presence of Beta variant was first reported from India during December 2020.
- Various SARS- CoV-2 variants i.e., Alpha, B. 1.1. 28.2, Eta, Kappa, Delta, Delta AY have been detected from India.
- The Delta variant first detected in India remains the most worrisome.
 - It has proven capable of infecting a higher proportion of vaccinated people than its predecessors.
 - The WHO classifies **Delta** as a variant of concern, meaning it has been shown capable of increasing transmissibility, causing more severe disease or reducing the benefit of vaccines and treatments.
- The Lambda variant has attracted attention as a potential new threat.

Types of Immunities:

- **Active Immunity** results when exposure to a disease organism triggers the immune system to produce antibodies to that disease.
 - **Natural immunity** happens after you get infected by a germ and your immune system responds by making antibodies to it.
- **Passive immunity** is provided when a person is given antibodies to a disease rather than producing them through his or her own immune system.
 - A newborn baby acquired passive immunity from its mother through the placenta.





A mouth bacteria has starring role in colorectal cancer: study

Subject: Science and tech

Sec: Health

Context:

- Recent research by the **Fred Hutchinson Cancer Center in the U.S.** has discovered a **specific subtype** of the bacterium '**Fusobacterium nucleatum**' that is **more prevalent in colorectal cancer (CRC) tumours.**

Details:

- This **subtype's genetic characteristics** may **enhance its association with gut cancers.**
- In experiments, mice infected with this subtype developed **precancerous intestinal growths** known as **adenomas.**
- These findings, pointing to a **potential role of Fusobacterium in CRC progression,** could lead to **new diagnostic and treatment strategies for CRC,** which is increasingly prevalent globally and notably among younger populations.
 - CRC is the seventh most common type of cancer in India,** where the **number of cases rose by 20% from 2004 to 2014.** Worldwide, the **overall CRC incidence has declined** but the **incidence of age-adjusted early-onset CRC** "has **risen at an alarming rate of 2-4%** in many countries, with even **sharper increases in individuals younger than 30 years.**"

About Fusobacterium nucleatum:

- Fusobacterium nucleatum,** typically found in the **human mouth,** has been linked to **colorectal cancer (CRC)** by **promoting cancer cell evasion** from the **immune system.**
- Researchers cultured **Fusobacterium bacteria** from **130 human colorectal cancer (CRC) tumours** and conducted a **full genetic analysis.**
- They discovered that among the **four known subspecies of Fusobacterium nucleatum,** only **Fusobacterium nucleatum animalis (Fna)** was **significantly linked to CRC tumours.**
- Pangenomic analysis,** which maps **all genes of a species** including its **accessory genome** (genes not shared by all members), showed that **Fna** has a **notably small core genome,** suggesting diverse subtypes within **Fna.**
- Further **genetic tracing** revealed that **Fna** consists of **two distinct evolutionary lineages,** referred to as **clades.**
- These clades, named **Fna C1** and **Fna C2,** were examined, with **Fna C2** found to be **significantly associated with CRC tumours** and possessing additional genetic features that may enhance this association.
- This differentiation into **clades** highlights the **complex relationship** between **Fusobacterium nucleatum subtypes** and their **role in colorectal cancer.**

Colonising the gut:

- The study identified **physical and genetic distinctions** between **two clades of Fusobacterium nucleatum animalis (Fna)** which contribute to their association with **colorectal cancer (CRC) tumors.**
- The **Fna C2 bacteria,** physically **longer and thinner** than **Fna C1,** possess unique genes enabling them to utilize **ethanolamine and 1,2-propanediol for energy in the gut,** traits not found in **Fna C1.** This **enhanced metabolic capability** likely **aids their survival and association with CRC tumours.**

- Further evidence of **Fna C2's adaptation** to the **gut environment** was found in an analysis of over 1,200 human stool samples, where genes necessary for metabolizing these compounds were more prevalent in samples from **CRC patients** compared to healthy individuals.
- The study also proposed a **new pathway for these bacteria to travel from the mouth to the gut**, suggesting **they can survive the journey through the highly acidic stomach environment, unlike other bacteria**.
- **Fna C2** has evolved **acid-resistant genes** that **activate in acidic conditions**, enabling their **survival and colonisation** in the **gut**, contrasting with the previously assumed route of bloodstream infection during oral injuries or procedures.

Impact of the *Fusobacterium nucleatum* (Fna) C2 bacteria:

- The research investigated the **impact of *Fusobacterium nucleatum* (Fna) C2 bacteria** on **tumour development** by introducing them into the **inflamed guts of mice**, which led to a **higher incidence of adenomas** compared to mice treated with **Fna C1**.
- The metabolic profiles of **Fna C2-treated mice** also indicated changes that support **tumour progression**, affirming **Fna C2's** unique ability to alter the intestinal environment in ways conducive to **colorectal cancer (CRC)**.
- Further validation in human patients showed that **Fna C2** was predominantly found in **CRC tissues** and stool samples of **CRC patients**, but not in **non-cancerous samples** or those from healthy individuals. This specificity suggests potential for **Fna C2** as a marker for CRC detection.
- Experts see the study as a promising step towards **microbial cellular therapies for cancer** and **targeted microbial interventions for CRC**.
- The findings encourage future research into **tracking microbial changes in high-risk individuals** to **better understand the interactions between specific bacterial strains and cancer development**.
- Challenges remain, including the development of treatments that can **selectively target harmful bacteria like Fna C2** without disrupting other beneficial gut bacteria.

Understanding the science behind magnetic resonance imaging

Subject: Science and tech

Sec: Health

Context:

- **Magnetic resonance imaging (MRI)** is a **critical non-invasive tool** for examining the **internal structures** of the **human body**.
- The **foundational techniques** of MRI were developed in the **early 1970s**, with significant advancements made later that decade by **Paul Lauterbur** and **Peter Mansfield**, who refined the technology for commercial application.
- Their contributions were recognized with the **Nobel Prize in Medicine in 2003**, underscoring the **importance of MRI in contemporary medical diagnostics**.

What is Magnetic resonance imaging (MRI)?

- MRI is a **non-invasive diagnostic tool** that uses **strong magnetic fields** to create **detailed images of soft tissues within the body**, such as the **brain, cardiovascular system, spinal cord, joints, muscles, liver, and arteries**.
- It is particularly useful for **observing and treating certain cancers** like **prostate and rectal cancer**, as well as **monitoring neurological conditions** such as **Alzheimer's, dementia, epilepsy, and stroke**.
- **Functional MRI (fMRI)** is a variation used to **study brain activity** by **measuring changes in blood flow**.
- However, the **use of strong magnetic fields** means that **individuals with metallic implants or embedded metallic objects**, like **shrapnel or pacemakers**, **may not be able to undergo MRI scans** due to **safety concerns**. Additionally, these **magnetic fields** can **demagnetize credit cards** if carried close to the scanner.

Working of MRI:

- MRI works by using the **natural abundance of hydrogen atoms found in fat and water throughout the body** to generate detailed images.
- The procedure involves **four key components** within an MRI machine.
 1. **Superconducting Magnet:** This is the **primary component that creates a powerful and stable magnetic field** around the body part being examined. It aligns the **spinning hydrogen atoms** in the body, such that their **spin axes point along the direction of the magnetic field**.
 2. **Radiofrequency Pulse Emitter:** This device **emits pulses that specifically target a small population of 'excess' hydrogen atoms** (those whose alignment is slightly off due to natural variances among approximately a million atoms). These excess atoms absorb the **radiofrequency energy** and become excited.
 3. **Detector:** When the **radiofrequency pulse** is turned off, the **excited hydrogen atoms** release the absorbed energy as they return to their lower energy state. This released energy is detected as emissions.
 4. **Computer System:** The emissions collected by the **detector** are **converted into signals** that a **computer processes** to construct **two- or three-dimensional images** of the scanned body part.

- The **entire process is non-invasive** and **particularly useful for imaging soft tissues** in the **human body**.
- The **strength of the magnetic field** and the **nature of the tissue** influence the specific **radiofrequency** (known as the **Larmor frequency**) needed to excite the hydrogen atoms.

Pros of MRI	Cons of MRI
<p>Precision and Flexibility:</p> <ul style="list-style-type: none"> • MRIs can focus on very specific areas of the body, down to just a few millimeters in width. • MRI can scan different body parts in fine detail without requiring the patient to move. <p>Comprehensive Imaging:</p> <ul style="list-style-type: none"> • MRI can image the body from virtually all useful directions and in small increments, which is crucial for detailed diagnostics. <p>Tissue Differentiation:</p> <ul style="list-style-type: none"> • MRI utilizes the T1 relaxation time, the period it takes for 'excess' hydrogen atoms to return to their lower energy states after excitation. • This time varies among tissues, allowing MRIs to differentiate between types of tissue by displaying them in different shades of grey. • Contrast agents, often gadolinium-based, can be used to further enhance tissue visibility by altering the T1 relaxation time. <p>Safety:</p> <ul style="list-style-type: none"> • They pose no long-term health risks to patients. • The body's atoms return to the normal state post-scan without any residual effects. • However, the effects on pregnant women are less understood, leading some facilities to avoid scanning during pregnancy. 	<p>High Cost:</p> <ul style="list-style-type: none"> • MRI machines are expensive to purchase and maintain. • In turn, it becomes expensive for patients as well. <p>Patient Discomfort:</p> <ul style="list-style-type: none"> • During an MRI scan, patients are required to lie still inside the machine. Any movement can distort the images, potentially requiring a rescan. • This can be challenging for claustrophobic patients, although some open-bore MRI designs may alleviate this issue. <p>Energy Intensity:</p> <ul style="list-style-type: none"> • Operating an MRI machine involves generating a strong magnetic field, typically around 1 tesla or more, using superconducting coils cooled by liquid helium. • Although superconducting materials do not lose energy as heat, maintaining such a setup is still energy-intensive and costly. <p>Noise:</p> <ul style="list-style-type: none"> • The operation of MRI machines involves switching heavy currents through gradient coils, which produces loud noises.

MDH-Everest row: FSSAI raises default limit for pesticides in spices but will that impact your health?

Subject: Science and tech

Sec: Health





Context:

- The country's apex food safety regulator, the **Food Safety and Standards Authority of India (FSSAI)**, has increased the default limit for pesticide residues in spices to **0.1 mg/kg** last month, a ten-fold increase over the previous **0.01 mg/kg**.

More on news:

- This will be applicable only in cases where the Indian regulation does not specifically mention the **maximum residue limits (MRL)** for a pesticide for the crop.
- The default MRL for other food products remains the same at **0.01 mg/kg**.
- The total number of pesticides registered in India are more than 295, out of which 139 pesticides are registered for use in spices.

Examples of limits set by FSSAI and international agency Codex:

S. No.	Name of the Pesticides /Insecticides	Spices	FSSAI MRL (mg/Kg)	Codex MRLs (mg/kg)
1.	Metalaxyl and Metalaxyl-M	Black pepper 	0.5	2
2.	Myclobutanil	Chilli, dried 	2	20
3.	Spiromesifen	Chilli, dried 	1	5
4.	Thiamethoxam	Chilli, dried 	5	7

Why were the limits increased for spices?

- It is difficult to keep the limits below the **0.01 mg/kg limit** because of the confounding effect of the large number of phenols present in spices.
- Imports from other countries may contain pesticides that are approved for use in those countries but not in India.
- The **default MRL** is used in cases where the limit for a pesticide for a particular crop is not present in India.
- There could be seepage of a pesticide not approved in spices from other crops where it might be allowed.

About Maximum Residue Level(MRL):

- A **maximum residue level (MRL)** is the **highest level of a pesticide residue** that is legally tolerated in or on food or feed when pesticides are applied correctly (**Good Agricultural Practice**).
- The **maximum residue limit (also maximum residue level, MRL)** is the **maximum amount of pesticide residue** that is expected to remain on food products when a **pesticide is used according to label directions, that will not be a concern to human health.**

About Food Safety and Standards Authority of India (FSSAI):

- The **Food Safety and Standards Authority of India (FSSAI)** is an **autonomous statutory body** established under the **Food Safety and Standards Act of 2006**.
- **Establishment:** FSSAI was established to consolidate various laws related to food safety and standards in India.
- The Act of 2006 brought together laws such as the **Prevention of Food Adulteration Act, 1954, the Fruit Products Order, 1955, the Meat Food Products Order, 1973, and others.**
- **Responsibilities:** FSSAI is responsible for protecting and promoting public health by regulating and supervising food safety and quality in India.
- **It operates under the Ministry of Health & Family Welfare.**
- **Headquarters:** FSSAI has its headquarters in **New Delhi**.

How the Widal test clouds India's sense of its typhoid problem

Subject: Science and tech

Sec: Health

Tag: Widal Test, Typhoid

Typhoid Fever:

- **Typhoid fever** is an **infectious disease** caused by **Salmonella typhi bacteria**, transmitted through **contaminated food and water**.
- It manifests symptoms like **high fever, stomach pain, weakness, nausea, and potentially severe complications** if untreated.
- Approximately **9 million cases** are diagnosed annually worldwide, with significant morbidity and mortality rates.

Typhoid test:

- The **gold standard** for **diagnosing typhoid** — in addition to a detailed medical history and a thorough examination — is to isolate the bacteria from a patient's blood or bone marrow and grow them in the lab.
- Stool and urine samples can also yield the same but with lower sensitivity.

- Cultures are **time-consuming** and **skill- and resource-intensive**.

Widal Test and associated challenges:

- In **India**, the **Widal test (rapid blood test)** is prevalently used for **diagnosing typhoid** due to its **simplicity and cost-effectiveness**.
 - Our immune system produces antibodies in the blood against the bacteria, causing enteric fever. The **Widal test** rapidly detects and quantifies these antibodies.
- However, this test, developed in the late 1800s, is plagued with **inaccuracies** such as **false positive and negative outcomes**.
- It requires **two serum samples** taken **7-14 days apart** to **confirm a diagnosis**, which is often **impractical**.
- Additionally, the **test's results** can be **skewed by prior antibiotic use, existing immunity levels, or cross-reactions with other infections**.

Impact of Misdiagnosis:

- **Misdiagnosis** leads to **inappropriate treatment**, contributing to the **misuse of antibiotics** and **increasing antimicrobial resistance (AMR)**.
- This not only **escalates the disease burden** by making it harder to treat but also imposes **financial strains** on **affected individuals**, often forcing them to sell assets for treatment costs.

Alternatives and Improvements Needed:

- Given the flaws of the **Widal test**, there is a pressing need for **better diagnostic methods**. **Recommendations include:**
 - Developing and adopting **more accurate and reliable point-of-care tests**.
 - Implementing a **"hub and spoke" model** for sample collection and processing, leveraging existing healthcare infrastructure for better diagnosis and surveillance.
 - Improving **sanitation, access to clean water, and food safety** to address the root causes of typhoid.
 - Enhancing **surveillance systems** to monitor and respond to **typhoid resistance patterns effectively**, with reports such as those from the **Indian Council for Medical Research** guiding antibiotic usage and policy adjustments.

Way forward:

- The mismanagement of typhoid fever diagnosis and treatment underscores the need for **systemic improvements in public health strategies, diagnostic technologies, and antibiotic use policies** to **effectively control this preventable disease in India**.

With 56.4% of India's total disease burden linked to unhealthy diets, what new nutrition guidelines prescribe

Subject: Science and tech

Sec: Health

Context:

- India's premier nutrition research institute has published comprehensive guidelines on the diet of **vulnerable groups, including pregnant and lactating women, and children and the elderly**.

More on news:

- The guidelines issued by the **National Institute of Nutrition (NIN), Hyderabad, which works under the Indian Council of Medical Research (ICMR)**, also prescribe general principles such as reducing consumption of salt and highly processed foods (such as packaged chips, cookies, bread, ketchup, candy, etc.).
- Around **5% of children of ages 5-9, and 6% of adolescents, were overweight or obese, almost 2% of children and adolescents were found to have diabetes, and another 10% had pre-diabetes**.

Some Basic Guidelines:

- The guidelines say an estimated 56.4% of India's total disease burden can be attributed to unhealthy diets.
- A healthy diet and physical activity can prevent 80% of Type 2 diabetes cases, and significantly reduce the burden of heart disease and high blood pressure.

Focus on children, mothers:

- Optimal nutrition for mother and child from conception till the age of 2 years is linked to proper growth and development.
- It can prevent all forms of undernutrition, including micronutrient deficiencies, and obesity.
- The Comprehensive National Nutrition Survey 2019, which showed high prevalence of lifestyle conditions even in children.

YOUNG & UNHEALTHY			
	1-4 yrs	5-9 yrs	10-19 yrs
DISEASES OF OVERNUTRITION (%)			
Overweight		3.7	4.9
Obesity		1.3	1.1
Pre-diabetes		10.3	10.4
Diabetes		1.2	0.6
Hypertension			4.9
High total cholesterol		3.2	3.7
DISEASES OF UNDERNUTRITION (%)			
Anaemia	40.6	23.5	28.4
MICRONUTRIENT DEFICIENCIES (%)			
Iron	32.1	17.0	21.5
Vitamin D	13.7	18.2	23.9
Vitamin A	17.5	21.5	15.6
Vitamin B12	13.8	17.2	30.9
Zinc	19.0	16.8	31.7

Dual nutrition challenge

- Incidence of micronutrient (zinc, iron, vitamins) deficiencies ranged from 13% to 30% of children between ages 1 and 19.
- The recommended ideal diet charts for various groups of people takes into account both micronutrient deficiencies and diseases of overnutrition.
- While severe forms of undernutrition such as marasmus (a deficiency of macronutrients such as carbohydrates and proteins) and kwashiorkor (deficiency of proteins) have disappeared from the country, manifestations such as anemia continue to grow.
- All oils are 100 percent fat and, therefore, should be consumed in moderate quantities
- It puts the prevalence of anemia at 40.6%, 23.5%, and 28.4% in children under age 5, ages 5-9, and 10-19 respectively.
- Undernutrition continues to be high in India, but obesity has increased significantly over the last 30 years.

General dietary principles:

- The guidelines recommend getting required nutrients from at least eight food groups, **including vegetables, leafy vegetables, roots and tubers, dairy, nuts,** and oils.
- Consumption of cereals, i.e. **the staple of Indian meals**, should be restricted.
- More proteins (**pulses, meat, poultry, fish**) should be consumed, **making up 14% of the total daily energy (instead of only 6-9% now).**
- Achieving adequate levels of **essential polyunsaturated fatty acids (PUFA) and B12 is a challenge for vegetarians.**
- The guidelines recommend consumption of flax seeds, chia seeds, walnuts, vegetables, and greens.
- Salt consumption should be restricted to 5g a day, and strongly recommends against consuming highly processed foods that are typically high in fats, salt and sugar.

What does organic food represent?

- When a **food label states 'organic'**, it may simply mean that it is free of all artificial preservatives, flavors and colors, and that the food ingredients are free from pesticides and chemical fertilizers.
- If both the above are met, then the label can **state 100 percent organic and have the 'Jaivik Bharat' logo approved by Food Safety and Standards Authority of India (FSSAI).**

Group-specific guidelines:

Pregnant women:

- Small frequent meals for those experiencing nausea and vomiting.
- The guidelines recommend consumption of lots of fruit and vegetables, especially those high in iron and folate content.

Infants and children:

- For the first six months, infants should only be breastfed, and must not be given honey, glucose, or diluted milk. There is no need to give water, even during hot months.
- After age 6 months, complementary foods must be included.

Elderly:

- The elderly should consume foods rich in proteins, calcium, micronutrients, and fiber.
- Apart from pulses and cereals — with at least one-third as whole grains , at least 200-400 ml of low-fat milk or milk products, a fist full of nuts and oilseeds, and 400-500g of vegetables and fruit should be consumed.
- Exercise is important in order to maintain bone density and muscle mass.

Misleading Advertisements:

- Any food item, **including fruit juices containing only 10 or less per cent of fruit**, is allowed to display that the product is made with real fruit pulp or juice.
- Fortification of **ultra-processed food cannot make them wholesome or healthy**, which is a technique used to add certain nutrients to unhealthy food.

About ICMR - National Institute of Nutrition:

- **The National Institute of Nutrition is an** Indian public health, nutrition and translational research center located in Hyderabad, India.
- The institute is **one of the oldest research centers in India, and the largest center, under the Indian Council of Medical Research, located in the vicinity of Osmania University.**

About Hidden Hunger:

- Hidden hunger is a form of undernutrition that occurs when intake and absorption of vitamins and minerals (such as zinc, iodine, and iron) are too low to sustain good health and development.

About Food Fortification:

- **Food fortification also known as food enrichment** is when nutrients are added to food at higher levels than what the original food provides.
- This is **done** to address **micronutrient deficiencies across populations, countries and regions.**

What is rice fortification

Fortification is the process of deliberately increasing the content of an essential micronutrient e.g. vitamins and minerals (including trace elements), in food to increase its nutritional quality and provide public health benefit with minimal risk to public health

The process of rice fortification



All about FLiRT, the new COVID-19 variants

Subject: Science and tech

Sec: Health

FLiRT variant of COVID-19 virus:

- The **COVID-19 pandemic** witnesses **new developments** with the **emergence of the FLiRT variants**, specifically **KP.2** and **KP1.1**, which are **descendants** of the **Omicron JN.1 variant**.
- These **new variants** have been detected in significant numbers across various countries, including **the U.S., U.K., South Korea, New Zealand, and India**.
- The **Indian SARS-CoV-2 Genomics Consortium (INSACOG)** reported **238 cases of KP.2** and **30 cases of KP1.1** in **India** as of early May.
- **Naming:** They are nicknamed the **FLiRT group of variants** (labelled so because of their technical names, F being replaced by L at position 456, and R supplanted by T at position 346).

Increased Immune Evasion:

- The **KP.2 variant**, which is more prevalent among the two, shows a **heightened ability to evade immunity** provided by **vaccines** and previous infections.
- This variant has **mutations** that **enhance its transmissibility** and **immune escape capabilities**, making it a **public health concern**.
- **KP.2** can **overcome immunity** from both the latest vaccines and prior infections, including those from its ancestor **JN.1**.

Current COVID-19 Wave and Management:

- There is a noted **increase** in **COVID-19** cases in regions like **Maharashtra, Odisha, Goa, and West Bengal**, largely attributed to the **spread of these new variants**.
- The **symptoms** remain **similar** to **previous Omicron subvariants**, including **sore throat, cough, and fatigue**.
- Despite the rise in cases, the **overall severity of the disease has not shown a significant increase**, suggesting that while the variants are **more transmissible**, they may **not necessarily lead to more severe illness**.
- Health authorities, including the **Infectious Diseases Society of America (IDSA)** and the **European Medicine Agency**, emphasize the need to update **COVID-19 vaccines** to include **coverage against these new variants**.
- Health experts suggest that **COVID-19 might shift from being a pandemic to a cyclical disease**, presenting recurring waves rather than a constant presence.

Indian SARS-CoV-2 Genomics Consortium (INSACOG):

- Jointly initiated by the **Union Health Ministry of Health**, and the **Department of Biotechnology (DBT)** with the **Council for Scientific & Industrial Research (CSIR)** and **Indian Council of Medical Research (ICMR)**.
- A consortium of **54 laboratories** to monitor the **genomic variations in the SARS-CoV-2**.
- INSACOG is a **multi-laboratory, multi-agency, Pan-India network** to monitor **genomic variations in the SARS-CoV-2** by a **sentinel sequencing effort** which is facilitated by the **National Centre for Disease Control (NCDC)**, Delhi involving the **Central Surveillance Unit (CSU)** under **Integrated Disease Surveillance Programme (IDSP)**.

Could bird flu turn into the next pandemic?

Subject: Science and tech

Sec: Health

Avian Influenza or Bird flu:

- It is a **highly contagious viral disease** affecting **several species of food-producing birds** (chickens, turkeys, quails, guinea fowl, etc.), as well as **pet birds and wild birds**.
- Occasionally **mammals**, including **humans**, may **contract avian influenza**.
- **Influenza A viruses** are classified into **subtypes** based on **two surface proteins, Hemagglutinin (HA) and Neuraminidase (NA)**. For example, a virus that has an **HA 7 protein** and **NA 9 protein** is designated as **subtype H7N9**.
- **Avian influenza virus subtypes** include **A(H5N1), A(H7N9), and A(H9N2)**.
- **H5N1 virus** occurs **mainly in birds** and is **highly contagious** among them.
- **H5N1 Asian H5N1** is especially **deadly for poultry**.
- **Prevention:** Strict biosecurity measures and good hygiene are essential in protecting against disease outbreaks.
- **Eradication:** If the infection is **detected in animals**, a **policy of culling** infected and contact animals is normally used to **rapidly contain, control and eradicate the disease**.

Spread of H5N1 Bird Flu virus:

- The **World Health Organization (WHO)** has raised alarms about the **ongoing spread of the H5N1 bird flu virus**, which has **evolved to affect not only birds but also mammals**, including **cows and goats**, marking a significant **zoonotic development**.
- This outbreak, which started in **2020**, has seen **cases in humans** as well, with a **high mortality rate of 52% among the infected**.
- To date, **889 human cases** have been recorded across **23 countries**, leading to **463 deaths**.

Global Developments:

- In the **US**, the **H5N1 virus** has been **detected in cattle**, a **new host species** for the virus, across several states.
- This presents a unique challenge as **unlike poultry, culling cattle is not seen as a viable containment strategy** due to their **economic value** and the fact that the **virus does not cause high mortality in these animals**.
- There is **no evidence of the virus in pasteurized milk**.

Economic Impact on India:

- **India** ranks as the **third-largest egg producer** and the **fifth-largest poultry meat producer globally**.
- In the **fiscal year 2022-23**, **India exported 664,753.46 metric tons of poultry products** valued at approximately **134.04 million USD** to over **57 countries**.
- The **Indian poultry market** was valued at **USD 30.46 billion** in **2023** and is expected to **grow** at a **CAGR of 8.1%** from **2024 to 2032**.
- This underlines the **significant economic stake** India holds in managing bird flu effectively.

Implications and Future Concerns:

- The **adaptation of the H5N1 virus to infect mammals** including **cattle** has **heightened concerns** about its **potential to evolve further**, possibly **gaining the ability for human-to-human transmission**.
- This scenario underscores the importance of **vigilant monitoring, rapid response strategies, and international cooperation** to manage the spread of this potentially devastating virus.

India's strategy to prevent and control Avian Influenza:

- **India first detected the Highly Pathogenic Avian Influenza (HPAI) in Maharashtra in February 2006** and has since faced yearly outbreaks affecting various states.
- **Over 9 million birds** have been **culled to control the disease**.
- The **Indian government's strategy**, as per the **revised National Action Plan for Prevention, Control, and Containment of Avian Influenza (2021)**, includes **strict measures** such as the **culling of infected animals, restriction on poultry movement, and intensive surveillance post-outbreak**.
- It's important to note that **vaccination against HPAI is not permitted in India**.
 - The **Central Government** has maintained that with the **long-term use of vaccination** either the disease has become **endemic** and therefore **widespread**, or the **infection in affected animals is too difficult to detect**.

Early clinical trial sheds light on regulatory T cell therapies

Sub: Science and tech

Sec: Health

Context:

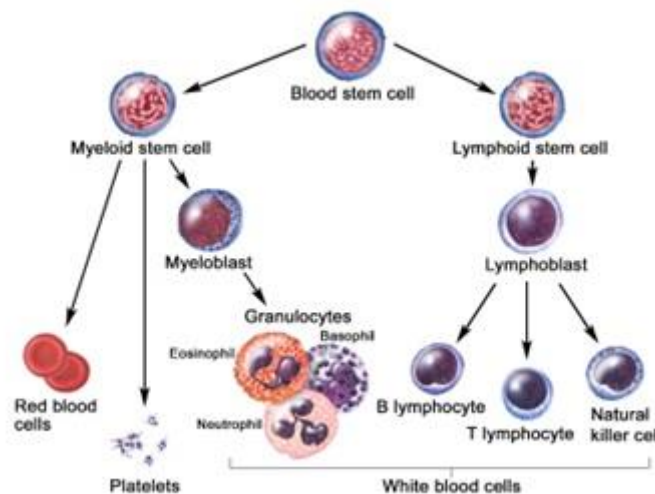
Results from a new clinical trial shed light on the performance of infusions of immune-calming regulatory T cells for children with type 1 diabetes.

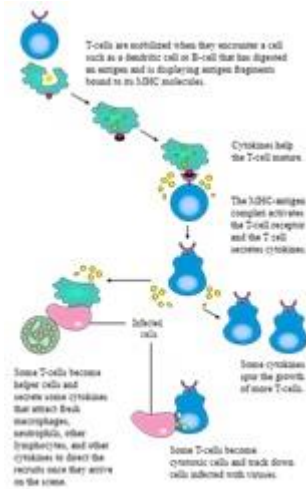
Results of the trials:

The trial shows that a single dose of the cells can transfer over efficiently in children but does not show signs of preserving insulin-releasing cells in the pancreas.

What is T cells:

- T cells are so called because they are predominantly produced in the **thymus**.
- They recognise foreign particles (antigen) by a surface expressed, **highly variable, T cell receptor (TCR)**.
- There are two major types of T cells: **the helper T cell and the cytotoxic T cell**.
- As the names suggest, helper T cells 'help' other cells of the immune system, whilst cytotoxic T cells kill virally infected cells and tumors.
- The severity of disease can depend on the strength of these T cell responses.





What are the different types of T-cells?

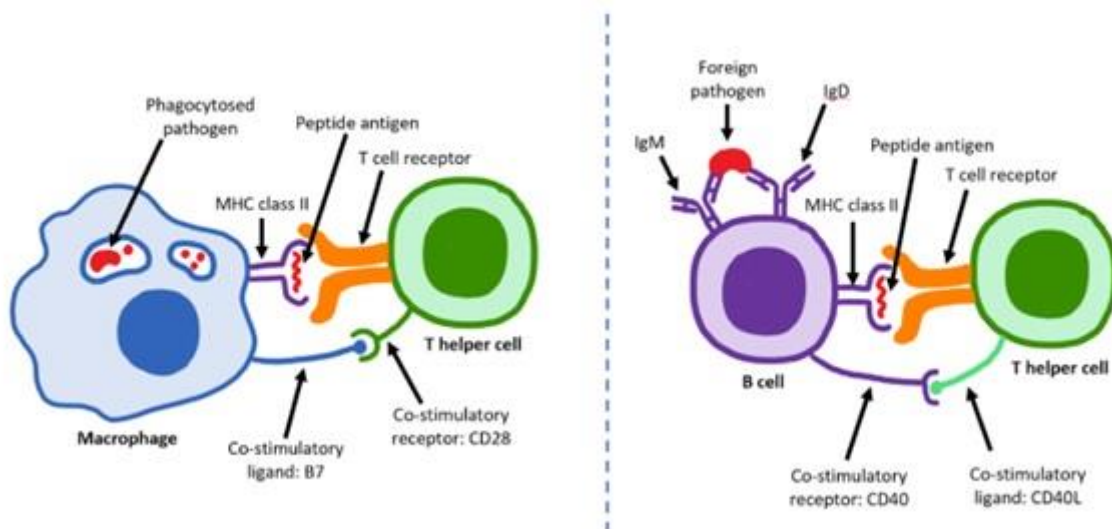
There are two main types of T-cells:

Cytotoxic T-cells:

- **Cytotoxic T-cells** are also called CD8+ cells because they have a CD8 receptor on their membranes.
- These cells get their name from “cyto,” which means cell, and “toxic,” which means poisonous or harmful.
- Cytotoxic T-cells kill cells infected with viruses and bacteria, and they also destroy tumor cells.

Helper T-cells:

- **Helper T-cells** are also called CD4+ cells because they have a CD4 receptor on their membranes.
- Unlike cytotoxic T-cells, helper T-cells don't kill cells directly.
- Instead, they send signals that tell other cells in your immune system how to coordinate an attack against invaders.
- Helper T-cells signal cytotoxic T-cells, B-cells and another type of white blood cell called a macrophage.



T-cell therapy (TCRs) and CAR T-cell therapy (CARs):

- Unlike CARs, which use portions of synthetic antibodies that can recognize specific antigens only on the surface of cells, TCRs use naturally occurring receptors that can also recognize antigens that are inside tumor cells

Will cattle be the next evolutionary lab for flu host-switching?

Sub: Science and tech

Sec: Health

Context:

H5N1 virus, which was first detected in dairy cattle in Texas in late March, has rapidly spread to 37 herds in nine States in the U.S. as of May 7.

About the recent study:

- The U.S. FDA study of pasteurized milk reveals that about one in five of the retail samples tested positive for bird flu viral fragments.

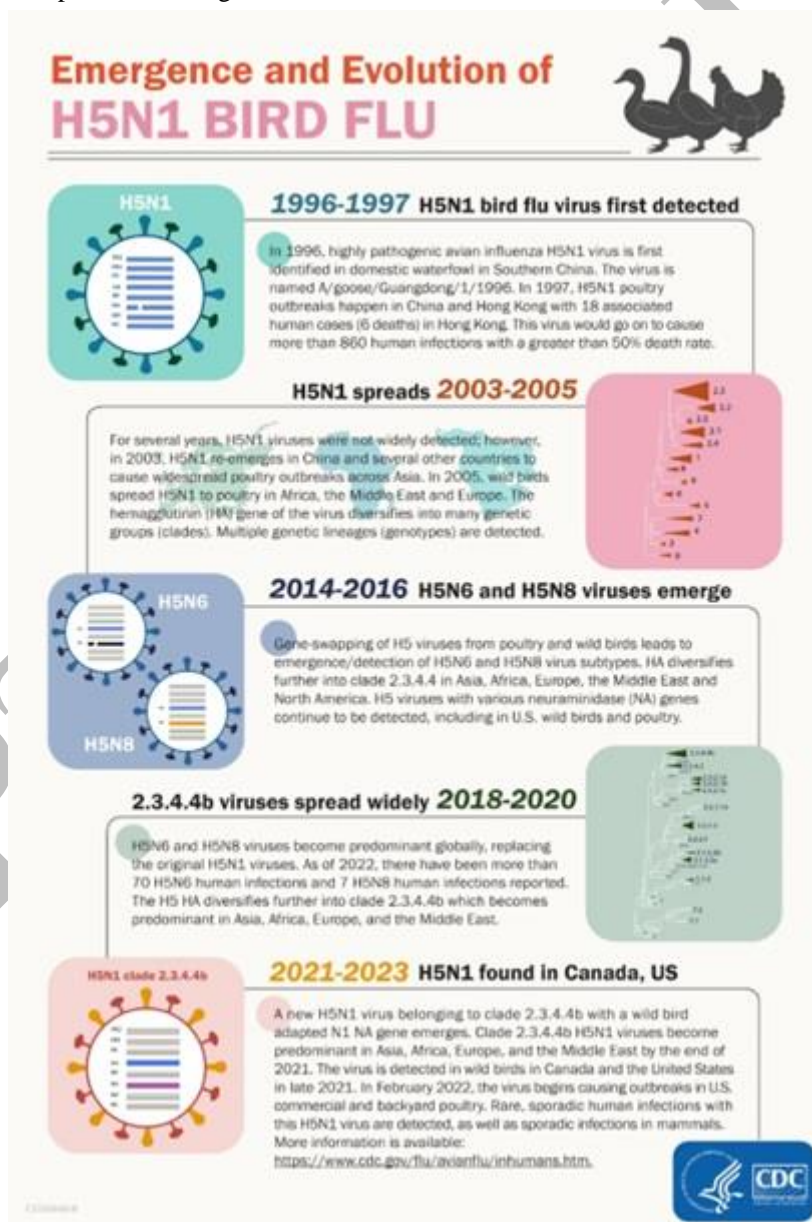
- FAO noted that H5N1 virus was detected in high concentrations in milk from infected dairy cattle and at levels greater than that seen in respiratory samples.

Why does dairy milk contain high concentrations of H5N1 virus?

- The expression of H5N1 receptors in the mammary gland, respiratory tract and cerebrum of cattle, both the human and the duck receptors to be highly expressed in the mammary glands.
- In the mammary gland, the human receptors and the duck receptors were found to be widely distributed in the alveoli but not in the ducts.
- **Chicken-type influenza receptors were common in the cow respiratory tract.**
- The high concentration of H5N1 virus fragments in milk from H5N1-infected cows could be due to local viral replication in the mammary glands of cows.
- The chicken receptor was expressed on the surface of the respiratory epithelium in the upper respiratory tract and upper part of the lower respiratory tract.
- Human and duck receptors were either lacking or very limited in expression.

Evolution of H5N1 virus:

- A favorable environment for the **development of H5N1 viruses**, which can readily transfer from animals to people, was created by the abundance of human and duck receptors in the mammary glands and the significant presence of human, chicken, and duck receptors in the lung alveolar cells of cows.

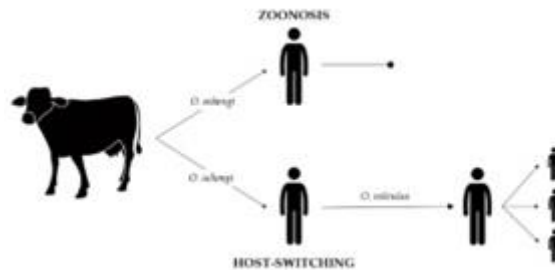


Pigs as “evolutionary lab for flu host switching”:

- Pigs are called the “evolutionary lab for flu host switching” precisely due to the presence of both the human-flu and avian-flu host cell receptors in their upper-respiratory tract.

What is Host Switching?

- In parasitology and epidemiology, a host switch (or host shift) is an evolutionary change of the host specificity of a parasite or pathogen.
- For example, the human immunodeficiency virus used to infect and circulate in non-human primates in West-central Africa, but switched to humans in the early 20th century.



About H5N1:

- Influenza A virus subtype H5N1 (A/H5N1) is a subtype of the influenza A virus, which causes influenza (flu), predominantly in birds.
- It is an enzootic (maintained in the population) in many bird populations, and also panzootic (affecting animals of many species over a wide area).
- H5N1 virus can also infect mammals (including humans) which have been exposed to infected birds.
- The H1N1 pandemic of 2009 was due to reassortment of the virus in pig populations.

About hemagglutinin (H) and neuraminidase (N):

- Influenza A viruses are divided into subtypes based on two proteins on the surface of the virus: hemagglutinin (H) and neuraminidase (N).
- There are 18 different hemagglutinin subtypes and 11 different neuraminidase subtypes (H1 through H18 and N1 through N11, respectively).

About Hemagglutinin (H):

- The hemagglutinin(HA) of influenza virus is a major glycoprotein and plays a crucial role in the early stage of virus infection.
- HA is responsible for binding of the virus to cell surface receptors, and it mediates liberation of the viral genome into the cytoplasm through membrane fusion.

About Neuraminidase (N):

- Viral neuraminidase is a type of neuraminidase found on the surface of influenza viruses that enables the virus to be released from the host cell.
- Neuraminidases are enzymes that cleave sialic acid (also called neuraminic acid) groups from glycoproteins.

30-year study links ultra-processed food to higher risk of early death

Sub: Science and tech

Sec: Health

Context:

- According to U.S. observational study, Higher consumption of most ultra-processed foods is linked to a slightly higher risk of death.

About the study:

- Compared with participants in the lowest quarter of ultra-processed food intake (average three servings per day), those in the highest quarter (average seven servings per day) had a 4% higher risk of total deaths.

What are Processed Foods?

A processed food is any food that has been altered in some way during preparation.

Food processing can be as basic as:





- freezing
- canning
- cooking
- drying

Not all processed foods are unhealthy but some processed foods may contain high levels of salt, sugar and fat.

What Are the Types of Processed Foods?

- The United Nations has a food grouping scale called the NOVA food classification. It puts food into four groups:

NOVA Food classification

Unprocessed or minimally processed foods	Processed culinary ingredients	Processed foods	Ultra-processed foods
Foods which did not undergo processing or underwent minimal processing techniques, such as fractioning, grinding, pasteurization and others.	These are obtained from minimally processed foods and used to season, cook and create culinary dishes.	These are unprocessed or minimally processed foods or culinary dishes which have been added processed culinary ingredients. They are necessarily industrialized.	These are food products derived from foods or parts of foods, being added cosmetic food additives not used in culinary.
			
Legumes, vegetables, fruits, starchy roots and tubers, grains, nuts, beef, eggs, chicken, milk	Salt, sugar, vegetable oils, butter and other fats.	Bottled vegetables or meat in salt solution, fruits in syrup or candied, bread, cheeses, purees or pastes.	Breast milk substitutes, infant formulas, cookies, ice cream, shakes, ready-to-eat meals, soft drinks and other sugary drinks, hamburgers, nuggets.

Group one: Unprocessed or minimally processed foods.

- This group includes foods like fresh blueberries, roasted nuts, chopped vegetables, or other foods that have slight changes.
- These foods are prepared like this to make them easier to access.
- This group might also include things that have been dried, frozen, refrigerated, filtered, fermented, or put in vacuum-sealed packages.
- This is meant to preserve the natural foods and allow you to safely eat them later.

Group two: Processed culinary ingredients.

- This group contains options like butter, oils, sugar, or salts.
- They're ingredients that come from nature but are slightly changed.
- They may have been pressed, refined, milled, or dried.
- They've gone through this process to make it easier for you to use them in your kitchen.
- These options aren't supposed to be eaten alone.
- They're meant to be added to foods during meal preparation.

Group three: Processed foods.

- These include canned fish, fruits in syrup, bottled vegetables, cheese, fresh bread, or other options that were made with added salt, oil, sugar, or other things from groups one or two.
- Most of these foods have two or three ingredients. They're edible by themselves but can also be added to other dishes. The food in this group was processed to make it more stable or add to its qualities.

Group four: Ultra-processed food and drink products.

- This group contains foods that are typically the result of intensive manufacturing processes.
- They're created from foods and additives and don't relate much to group one foods.
- Like other options, these foods include sugars, oils, fats, and salt.
- They also have ingredients taken from other foods, like casein, lactose, gluten, whey, hydrogenated oils, protein isolate, maltodextrin, invert sugar, and high-fructose corn syrup.
- Ultra-processed options have a lot of preservatives, dyes, colors, added flavors, non-sugar sweeteners, or other ingredients that change the texture or appearance of the food.

What are Ultra Processed Foods?

- Ultra-processed food is an industrially formulated edible substance derived from natural food or synthesized from other organic compounds.**
- The resulting products are designed to be highly profitable, convenient, and hyperpalatable, often through food additives such as preservatives, colourings, and flavorings.
- Ultra-processed foods include items such as cake, sugary cereal, baked goods, soft drinks, bacon, chicken nuggets, hot dogs, frozen pizza, and ready-to-eat or ready-to-heat meals.



What FLiRT, a new set of Covid-19 variant detected in the US, could mean for spring and summer

Sub: Science and tech

Sec: Health

Context:

- The **KP.2** variant, emerging as an **offshoot** of the **JN.1** strain (Omicron variant) of the coronavirus, has shown a **notable increase** in prevalence in the **United States**.
- From accounting for **only 1% of cases** in mid-March, **KP.2** now represents **over a quarter of all COVID-19 cases**.
- This variant belongs to a **subset of COVID variants** collectively nicknamed "**FLiRT**".

Characteristics and Evolution of KP.2:

- **KP.2** is closely related to its predecessor, **JN.1**, with **minor but significant alterations** in its **spike protein** that potentially **enhance its ability to evade immune defences and increase its transmissibility**.
- **Spike protein:**
 - **Spike (S) glycoprotein** (also called spike protein) is the **largest** of the **four major structural proteins** found in **coronaviruses**.
 - The **spike protein** assembles into **trimers** that form **large structures**, called **spikes or peplomers**, that project from the surface of the virion.
 - It mediates viral entry into the host cell.

Vaccine Efficacy Against KP.2:

- Vaccination and prior infections provide substantial protection against severe disease.
- However, **KP.2** poses challenges due to its **distinct characteristics** from the variants targeted by the most recent vaccines, such as **XBB.1.5**.
- **KP.2** may be **more capable of infecting individuals vaccinated against different variants**.
- Nevertheless, vaccination remains crucial, especially for high-risk groups, including the **elderly, pregnant, and immunocompromised individuals**.

SARS-CoV-2 Variants
Currently on the lists of concern and interest

Variants of concern		
WHO label	Lineage	First documented samples
α Alpha	B.1.1.7	UK Sep. 2020
β Beta	B.1.351	South Africa May 2020
γ Gamma	P.1	Brazil Nov. 2020
δ Delta	B.1.617.2	India Oct. 2020
ο Omicron	B.1.1.529	Multiple countries, Nov. 2021
Variants of interest		
λ Lambda	C.37	Peru Dec. 2020
μ Mu	B.1.621	Colombia Jan. 2021

Symptoms and Long COVID Risks:

- The symptom profile for **KP.2** is expected to align with those observed in other variants: **respiratory symptoms, fever, and in some cases, gastrointestinal disturbances**.
- While **anosmia** and **ageusia** are **less common** now, the **risk of long COVID persists**, especially with repeated infections, complicating the long-term management of the pandemic.

- **Long Covid:**

- **Long COVID** is a term to describe the **effects of COVID-19** that continue for **weeks or months beyond the initial illness**, usually **three months** from the onset of the symptoms.
- **Older people** and those who had **five or more symptoms** in the first week of becoming ill with **COVID-19** are more prone to develop '**long COVID**'.

First human recipient of pig kidney transplant dies

Sub: Science and tech

Sec: health

Context:

- The first recipient of a modified pig kidney transplant passed away on May 11, around two months after the surgery was carried out.

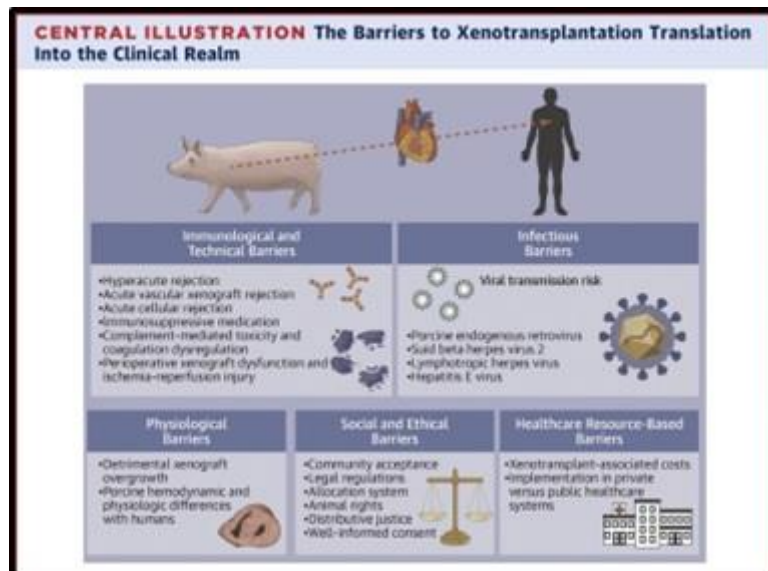
What is Xenotransplantation?

- **Xenotransplantation, or heterologous transplant**, is the transplantation of living cells, tissues or organs from one species to another.
- Such cells, tissues or organs are called **xenografts or xenotransplants**.
- Xenotransplantation is any procedure that involves the transplantation, implantation or infusion into a human recipient of either
 - (a) **live cells, tissues, or organs from a nonhuman animal source, or**
 - (b) **human body fluids, cells, tissues or organs that have had ex vivo contact with live nonhuman animal cells, tissues or organs**
- **Xenotransplantation involving the heart was first tried in humans in the 1980s.**
- At present, various large animals have been used in xenotransplantation, including **pigs, monkeys, chimpanzees and baboons**.
- Pigs are considered the most **ideal organ xenograft donor** because their organ size, physiological metabolism and immune system are similar to those of human beings.
- The need for such a procedure was felt because of the significant gap between the number of transplantations needed by patients and the availability of donor organs.
- HMS surgeons at **Brigham and Women's Hospital** performed the first successful human organ transplant of a **kidney in 1954**.



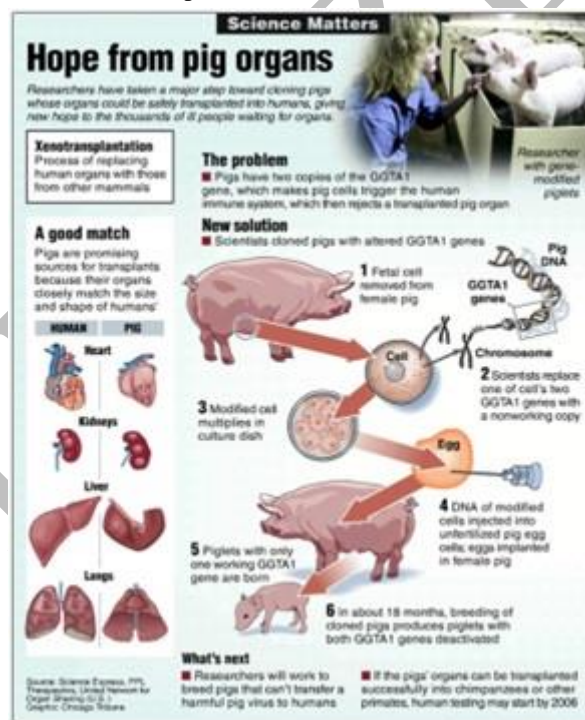
Why are pigs often used for xenotransplantation?

- The pig's anatomical and physiological parameters are similar to that of humans, and the breeding of pigs in farms is widespread and cost-effective.
- Many varieties of pig breeds are farmed, which provides an opportunity for the size of the harvested organs to be matched with the specific needs of the human recipient.
- In January 2022, the first xenotransplantation of a genetically-modified pig heart was done.



What Methodology is employed in Xenotransplantation?

- The first step involved genetically **modifying the pig organs to be more compatible with humans.**
- The kidney used in the **new surgery was modified using the gene-editing technology CRISPR-Cas9 to:**
 - Remove certain pig genes that produce sugars with antibodies our immune systems react to.
 - Add certain human genes to improve the kidney's compatibility with humans.
 - Inactivate viruses present in all pig genomes, known as porcine endogenous retroviruses, in the donor pig to eliminate risk of infection in the recipient.



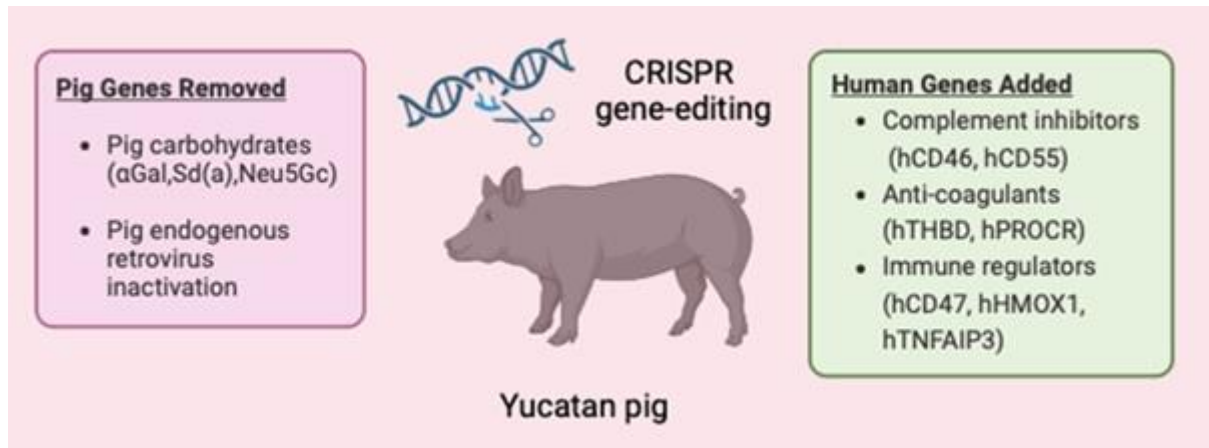
What are the complications in xenotransplantation?

- It has to be ensured that the **body does not reject the organ.**
- One method of doing this is **embedding the pig's thymus gland, responsible for educating the immune system, underneath the outer layer of the kidney.**
- This helps keep away any new or **delayed immune responses.**

What is Crispr-CAS9?

- **CRISPR-Cas9 is a genome editing tool** that is creating a buzz in the science world.
- It is **faster, cheaper and more accurate** than previous techniques of editing DNA and has a wide range of potential applications.

- **CRISPR-Cas9 is a unique technology** that enables geneticists and medical researchers to edit parts of the genome by removing, adding or altering sections of the DNA sequence.
- It is currently the simplest, **most versatile and precise method of genetic manipulation and is therefore causing a buzz in the science world.**



The challenge of extra-pulmonary TB

Sub: Science and tech

Sec: health

Tags: extra-pulmonary TB, Multidrug-Resistant TB (MDR-TB), Mycobacterium

Context:

- The World Health Organization (WHO) reports over 10 million new cases of TB every year and India alone accounts for **27% of the global TB burden.**

What is Tuberculosis?

- **Tuberculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis.**
- TB commonly affects the lungs (pulmonary TB) but can also affect other parts (extrapulmonary TB)
- Tuberculosis spreads from person to person through the air, when people who are infected with TB infection cough, sneeze or otherwise transmit respiratory fluids through the air.
- The most common risk factor associated with TB is **HIV & other conditions that impair the immune system.**
- Common symptoms of tuberculosis are **Chronic coughs with blood-tinged sputum, Loss of weight, Loss of appetite, Fever and night sweats, Fatigue , etc.**

What are Pulmonary and Extra Pulmonary Tuberculosis?

Pulmonary TB:

- Pulmonary TB is caused by the **bacterium Mycobacterium tuberculosis (M tuberculosis).**
- Pulmonary tuberculosis (TB) is a serious infection caused by the bacterium Mycobacterium tuberculosis (MTB) that involves the lungs but may spread to other organs.
- When it affects the lungs, it's called pulmonary TB.

Extra Pulmonary TB:

- **TB outside of the lung is called extrapulmonary TB.**
- It can also be categorized as being either active or latent
- Extrapulmonary tuberculosis (EPTB) is tuberculosis outside of the lungs.
- **EPTB includes tuberculosis meningitis, abdominal tuberculosis (usually with ascites), skeletal tuberculosis, Pott's disease (spine), scrofula (lymphadenitis), and genitourinary (renal) tuberculosis.**
- EPTB is often stain negative, which means it is not detectable on regular TB stain tests.
- The infection may surface in any part of the body and present itself like other non-TB conditions.
- In 2014, a group of experts from different health institutions across the country, the WHO, and the Cochrane Infectious Disease Group came together to formulate INDEX-TB, a set of guidelines for EPTB management in India.

What are other various types of Tuberculosis?

Multidrug-Resistant TB (MDR-TB):

- In MDR-TB, the bacteria that **cause TB develop resistance to antimicrobial drugs** used to cure the disease.

- MDR-TB does not respond to at least isoniazid and rifampicin, the 2 most powerful anti-TB drugs.
- Treatment options for MDR-TB are limited and expensive.
- CBNAAT (Cartridges Based Nucleic Acid Amplification Test) is used for early diagnosis of MDR-TB.

Extensively Drug-Resistant TB (XDR-TB):

- **XDR-TB is a form of multidrug-resistant TB** with additional resistance to more anti-TB drugs.
- People who are **resistant to isoniazid and rifampicin**, plus any fluoroquinolone and at least one of three injectable second-line drugs (amikacin, kanamycin, capreomycin) are said to have XDR-TB.

What is Mycobacterium?

- The **mycobacterium that causes TB was first isolated** in the eye just a year after Robert Koch identified the organism.
- **Mycobacterium is a genus of over 190 species in the phylum Actinomycetota**, assigned its own family, Mycobacteriaceae.
- This genus includes pathogens known to cause serious diseases in mammals, including tuberculosis and leprosy in humans.

Efforts to Control TB in the country:

- **The National TB Control Programme was started in 1962** with the aim to detect cases earliest and treat them. In the district, the programme is implemented through the district Tuberculosis Centre (DTC) and the Primary Health Institutions.
- **Directly Observed Therapy (DOT)** is the practice of observing a patient swallow his or her tuberculosis (TB) medications. National guidelines recommend DOT as part of the standard of care for TB treatment, and DOT is used by TB programs throughout the U.S. and around the world.
- **NI-KSHAY-(Ni=End, Kshay=TB)** is the web enabled patient management system for TB control under the National Tuberculosis Elimination Programme (NTEP).

Spices Board discussing the setting of ETO Limits with CODEX

Sub: Science and tech

Sec: Health

Tag: ETO Limits with CODEX

Context:

- **India** has taken up with the **CODEX committee** the need for **setting up limits for ETO usage as different countries have different limits.**
- **CODEX** has **not prescribed a limit** so far.
- Also, there is **no standard for ETO testing.** India has also given a proposal for that.

About ETO (ethylene oxide):

- **ETO** is a chemical used as a **sterilising agent in spices.**
- **EtO** is **prohibited** from being used even as a **fumigant** in India.
- **EtO** is employed across **various industries**, including in the **spice industry to reduce microbial contamination and extend shelf life.**
- **EtO** is banned for use as a **pesticide** in India.
- However, improper usage can lead to residues that form toxic and potentially carcinogenic compounds, such as **ethylene glycol** — recently linked to fatal contaminations in cough syrups.
- **Long-term exposure to EtO** is also associated with an increased risk of cancers like lymphoma and leukaemia.

About CODEX:

- The **Codex Alimentarius Commission (CAC)** is an **inter-governmental food standards body** established jointly by the **Food and Agriculture Organization (FAO)** and the **World Health Organization (WHO)** in **May 1963.**
- **Objective:** Protecting consumer's health and ensuring fair practices in food trade.
- The **Agreement on Application of Sanitary and Phytosanitary Measures (SPS)** of the **World Trade Organization (WTO)** recognizes **Codex standards, guidelines, and recommendations** as reference standards.
- **Members:**
 - Currently, the CAC has 189 Codex Members made up of 188 Member Countries and the EU.
- **India** became a member in **1964.**

CODEX Committee on Spices and Culinary Herbs:

- **CODEX committee (CCSCH)** was formed in **2013** with the support of more than a hundred countries with **India** as the **host country** and the **Spices Board** as the **Secretariat** for organizing the committee sessions.

- **Objectives:**

- To consult with other International Organisations for the standards development process in the spice market.
- To develop and expand worldwide standards.
- Since its inception, the CODEX Committee has been on a positive path in developing harmonized global standards for worldly herbs and spices.

About Codex Standards:

- **Voluntary** in nature, **Codex standards** can be general or specific and are recognized by **WTO Agreements** as reference standards.
- **General Standards, Guidelines, and Codes of Practice:** These core Codex texts, typically deal with hygienic practice, labelling, contaminants, additives, inspection & certification, nutrition, and residues of veterinary drugs and pesticides and apply horizontally to products and product categories.
- **Commodity standards:** These refer to a specific product although increasingly Codex now develops standards for food groups.
- **Regional standards:** Standards developed by the respective Regional Coordinating Committees, applicable to the respective regions.

About Spices Board India:

- It is the **statutory organization** constituted on **26th February 1987**, under the **Spices Board Act 1986**.
- It was formed with the **merger** of the **erstwhile Cardamom Board** and **Spices Export Promotion Council**.
- The Board functions as an **international link** between the **Indian exporters** and the **importers abroad** and it has been involved in various activities which touch upon every segment of the spices sector.
- **Nodal Ministry:** Ministry of Commerce & Industry, Government of India.
- **HQ:** **Kochi, Kerala**, regional laboratories in **Mumbai, Chennai, Delhi, Tuticorin, Kandla** and **Guntur**.
- **Main functions:**
 - The **Spices Board** is responsible for the **overall development of cardamom (small and large)** in terms of improving production, productivity and quality.
 - The **Board** is also implementing **post-harvest improvement programmes** to improve the **quality** of the **52 scheduled spices for export**.
 - The various development programmes and post-harvest quality improvement programmes of the Board are included under the head **'Export Oriented Production'**.
 - Promotion of organic production, processing and certification of spices
 - Development of spices in the North East
 - Provision of quality evaluation services

General, central obesities linked to higher risk of colorectal cancer

Sub: Science and tech

Sec: Health

Tag: Obesity

Context:

- In India, a 2022 study in The Lancet estimated the percentage of obese women and men to be 9.8% and 5.4% respectively.

More on news:

- Along with higher risk of heart disease and diabetes, obesity has been linked to a higher susceptibility to colorectal cancer (CRC), among others.

What is colorectal cancer (CRC)?

- **CRC refers to cancers of the colon or the rectum.**
- Colon cancer is sometimes called colorectal cancer.
- This term combines colon cancer and rectal cancer, which begins in the rectum
- The CRC incidence is relatively low in India.
- Percentage of people who are alive five years after a CRC diagnosis is reportedly under 40% i.e. one of the lowest in the world.
- CRC patients in India are generally young and present more frequently with advanced stages of the disease.

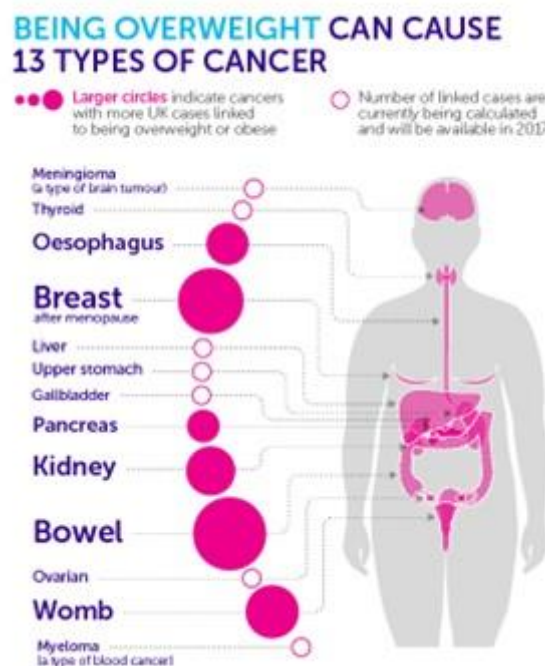
What is Obesity?

- Obesity is a complex, chronic disease with several causes that lead to excessive body fat and sometimes, poor health.

- Obesity is generally defined with the body mass index (BMI), a number that accounts for the height and the weight of the individual.
- The BMI measures average body weight against average body height.
- **Body mass index (BMI)** is a medical screening tool that measures the ratio of your height to your weight to estimate the amount of body fat you have.
- Healthcare providers calculate BMI by using **weight in kilograms (kg) divided by the square of height in meters (m²)**

What are the three types of obesity?

- Healthcare providers classify obesity into class types based on how severe it is.
- They use BMI to do it.
 - **They include:**
 - **Class I obesity: BMI 30 to <35 kg/m².**
 - **Class II obesity: BMI 35 to <40 kg/m².**
 - **Class III obesity: BMI 40+ kg/m².**



Which groups are at risk of colorectal cancer?

- Scientists began by analyzing the BMI, weight, height, waist circumference, hip circumference, and the waist-to-hip ratio of more than 3 lakh people to group them into four body shapes based on their observable characteristics: PC1, PC2, PC3, and PC4.
- **PC1 individuals were “generally obese”, while PC2 included tall individuals with a low waist-to-hip ratio.**
- **PC3 included tall individuals with central obesity, with excess fat deposited around the abdomen.**
- **PC4 had those who had an athletic body shape.**
- **PC1 and PC3 individuals were strongly correlated with higher CRC risk while PC2 and PC4 were not associated with CRC risk.**
- These associations were also linked to the site at which CRC occurred and the sex of the individual.

How genes are responsible for obesity?

- Using a technique called genome-wide association study (GWAS), the researchers looked for small variations in the DNA.
- GWAS is used to find correlations between gene variations and traits in large groups of people.
- Variation in a gene called AKT was implicated in the higher CRC risk for PC1 individuals.
- AKT regulates cell survival, insulin signaling, and the formation of blood vessels and tumors in humans.
- Variation of the RAF1 gene was found to be implicated in PC3 individuals’ CRC risk.
- RAF1 mediates, among other processes, the transformation of normal cells into cancerous cells.

- Genetic variations associated with risk for **PC1 individuals were most highly expressed in the brain and in the pituitary gland.**
 - **The pituitary gland** is located at the base of the brain and produces hormones important for regulating growth, blood pressure, and functions of the sex organs, the thyroid glands, and the kidneys.
- **Variations associated with risk in PC3 individuals were found enriched in adipose tissue, nerve, cervix uteri, uterus, blood vessel, breast, fallopian tube, and ovary.**
- **Genetic variations found in the GWAS analysis of PC1 and PC3 were “positively associated” with CRC risk.**

Terms in news:

Genome-wide association study (abbreviated GWAS):

- **A genome-wide association study** (abbreviated GWAS) is a research approach used to identify genomic variants that are statistically associated with a risk for a disease or a particular trait. The method involves surveying the genomes of many people, looking for genomic variants that occur more frequently in those with a specific disease or trait compared to those without the disease or trait.

Mendelian randomisation test:

- **Mendelian randomization** can be used to look at whether levels of a substance found naturally in a person's body is linked to disease. Measuring the levels themselves can be a problem because the levels can change in response to other factors that could be related to the disease, such as diet, smoking, or alcohol use.

Modern Genetics:

- **Modern genetics** is founded on the classical study of seven genes by Gregor Mendel, even though until relatively recently little was known about their function.
- **Modern genetics focuses on the chemical substance** that genes are made of, called deoxyribonucleic acid, or DNA, and the ways in which it affects the chemical reactions that constitute the living processes within the cell.

Can humans get H5N1 infection by consuming raw milk?

Sub: Science and tech

Sec: Health

Context:

- The Atlanta-based CDC has advised people to desist from consuming uncooked dairy food products such as raw, unpasteurised milk, or raw cheeses from animals with suspected or confirmed H5N1 bird flu virus infection.

More on news:

- **No case of H5N1 infection** in humans has been reported after consuming raw milk.
- Scientists believed that the virus can be transmitted via an infected cow's milk that has not been pasteurized.

Human Case:

- The lone reported human case in the current outbreak in cattle spread across **49 herds in nine States** in the U.S. has been a dairy farm worker who had direct exposure to cows and developed conjunctivitis.
- There are very few human cases reported so far and almost all of those were in farm workers who had come in close contact with infected animals.
- The likely route of transmission was airborne.

Do humans get H5N1 infection by consuming raw milk?

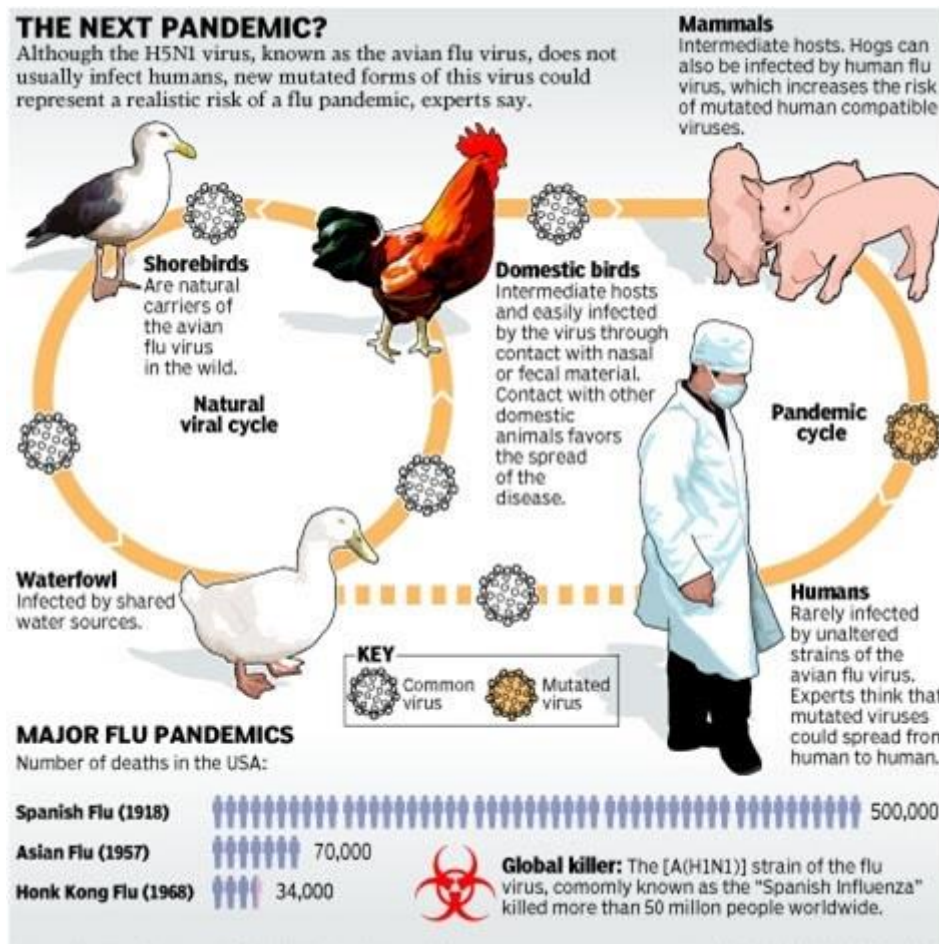
- **Raw milk from H5N1 infected cows may not cause illness in humans as the route of introduction of the virus is oral rather than nasopharyngeal.**
- Possibility of a human being catching **H5N1 infection from infected raw milk is very low.**
- There has been no documented evidence of H5N1 transmission from animals to humans via the oral route, till now.
- Almost all human influenza virus infections are primarily respiratory infections unlike in some other mammals where gut infections are reported.
- Based on that it can be stated that consumption of **heavily infected H5N1 containing raw milk is unlikely to cause illness in human beings.**

Transmission in cats and birds:

- There are **many reports of cats being infected with H5N1 in the current outbreak in the U.S.**
- Domestic cats fed with raw, unpasteurised colostrum and milk from affected cows developed fatal systemic influenza infection, thus demonstrating the oral route of transmission in cats.
- Some birds (poultry) as well as cats do show susceptibility to influenza virus infections via oral route. Humans have not been infected by faeco-oral route even if the virus is shed by humans in the excreta.

What is A(H5N1)?

- **H5N1 is one of several influenza** viruses that causes a highly infectious respiratory disease in birds called avian influenza (or bird flu).
- Infections in **mammals, including humans, have also been documented.**
- In 1996, **highly pathogenic avian influenza H5N1 virus was first identified in domestic waterfowl in Southern China.**
- India experienced the first Highly Pathogenic Avian Influenza (H5N1) outbreak in the State of Maharashtra and Gujarat on 18th February, 2015.



Don't use calcium carbide to ripen fruits, orders FSSAI

Sub: Science and tech

Sec: Health

Context:

- The **Food Safety and Standards Authority of India (FSSAI)** has reiterated the **ban** on using **calcium carbide** for **fruit ripening**.

Details:

- The ban is enforced under the **Food Safety and Standards (Prohibition and Restrictions on Sales) Regulations, 2011**, which **prohibits** selling or handling fruits ripened with acetylene gas.
- **FSSAI** has urged **state and UT Food Safety Departments** to remain vigilant and take stringent action against those violating the ban.

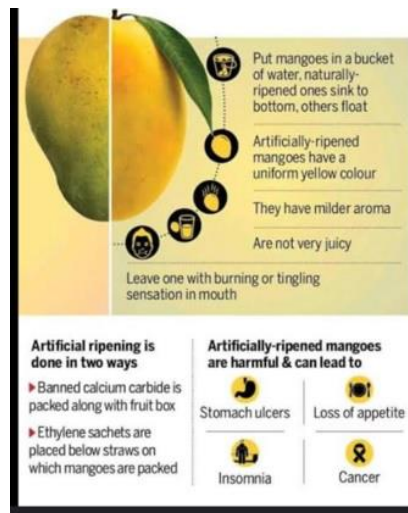
How does Calcium carbide ripen the fruit?

- In contact with **moisture**, **CaC₂** produces **acetylene gas**, an analog of **ethylene**, and **mimics** its functions as a **natural fruit-ripening plant hormone**.
- Although **CaC₂** **quickens** the fruit ripening process the **Skin/epicarp may change colour**, but **mesocarp and pericarp often remain green and raw**.
- It results in **tasteless, unhealthy, and highly toxic fruit**.
- Naturally-ripened fruits are beneficial for human health and nutrition.
- **Harmful effects:**

- **Calcium carbide** releases **acetylene gas** containing **harmful arsenic and phosphorus traces**, posing **health risks** such as dizziness, thirst, irritation, weakness, swallowing difficulty, vomiting, and skin ulcers. The gas is also **hazardous to handlers**.

Approved Alternatives:

- **Ethylene Gas:** FSSAI recommends using **ethylene gas** as a **safer alternative** for ripening fruits.
 - **Ethylene** is the **first identified plant hormone** regulating many processes in **plant growth, development, and response to biotic and abiotic stresses**.
 - It is **best known** for its **effect on fruit ripening** and **organ abscission**, holding great commercial importance in agriculture.
 - As a **gaseous hormone**, **ethylene** can **diffuse across membranes** and is synthesized at or near its site of action, differing from other plant hormones.
- **Ethylene** can be used at **concentrations up to 100 ppm**, depending on the **fruit's crop, variety, and maturity**.
- **Ethylene**, a **naturally occurring hormone** in fruits, regulates the **ripening process** by **initiating and controlling chemical and biochemical activities**.
- **Ethephon 39% SL:** Approved by the **Central Insecticides Board and Registration Committee (CIB & RC)** for **uniform ripening of mangoes** and other fruits.



About the Food Safety and Standards Authority of India (FSSAI):

- It is an **autonomous body** established under the **Ministry of Health and Family Welfare**, Government of India.
- The **FSSAI** was established under the **Food Safety and Standards Act, 2006**, which is a consolidating statute related to food safety and regulation in India.
- **Vision:** Build a new India by enabling citizens to have safe and nutritious food, prevent diseases, and lead a healthy and happy life.
- **Mission:** Set globally benchmarked standards for food, encourage and ensure that food businesses adhere to these standards, adopt good manufacturing and hygiene practices, and ultimately enable citizens to access safe and right food.

Functions of FSSAI:

- **FSSAI** is responsible for protecting and promoting public health through the regulation and supervision of food safety.
- It lays down **standards and guidelines** in relation to articles of food and provides for **licensing, registration, and accreditation** for **food business operators**.
- Anyone selling or importing food in India needs a food licence issued by FSSAI.
- **FSSAI** also directly monitors compliance of **food regulations**, especially in the area of food imports to India.
- **FSSAI** officers carry out food import controls and ensure that they contain **no harmful ingredients**. To do this, they send selected test products from the import to accredited laboratories for inspection.
- The **FSSAI** is also responsible for the accreditation of food testing laboratories throughout India.
- The **FSSAI** is responsible for the **Food Certification** in India.
- It is **mandated** to specify systems for enforcing its **standards**, for **accreditation of certification systems**, and for **certification of food safety management systems** for food businesses.

Women with no sexual autonomy twice likely to get STIs: study

Sub: Science and tech

Sec: Health

Context: women who had controlling husbands and had experienced intimate partner violence in their married life are more at risk of developing sexually transmitted infection (STI) or reproductive tract infection (RTI) than women who do not report facing control or intimate partner violence (IPV) in their marriage, a new study reveals

What are STIs?

More than 30 different bacteria, viruses and parasites are known to be transmitted through sexual contact, including vaginal, anal and oral sex. Some STIs can also be transmitted from **mother-to-child during pregnancy, childbirth and breastfeeding. Eight pathogens** are linked to the greatest incidence of STIs. Of these, 4 are currently curable: **syphilis, gonorrhoea, chlamydia and trichomoniasis**. The other 4 are incurable viral infections: **hepatitis B, herpes simplex virus (HSV), HIV and human papillomavirus (HPV)**.

In addition, emerging outbreaks of new infections that can be acquired by sexual contact such as *as monkeypox, Shigella sonnei, Neisseria meningitidis, Ebola and Zika*, as well as re-emergence of neglected STIs such as lymphogranuloma venereum. These herald increasing challenges in the provision of adequate services for STIs prevention and control.

Prevention of STIs

When used correctly and consistently, condoms offer one of the most effective methods of protection against STIs, including HIV. Although highly effective, condoms do not offer protection for STIs that cause extra-genital ulcers (i.e., syphilis or genital herpes). When possible, condoms should be used in all vaginal and anal sex.

Safe and highly effective vaccines are available for 2 viral STIs: hepatitis B and HPV. These vaccines have represented major advances in STI prevention. By the end of 2020, the HPV vaccine had been introduced as part of routine immunization programmes in 111 countries, primarily high- and middle-income countries. To eliminate cervical cancer as a public health problem globally, high coverage targets for HPV vaccination, screening and treatment of precancerous lesions, and management of cancer must be reached by 2030 and maintained at this high level for decades.

Research to develop vaccines against genital herpes and HIV is advanced, with several vaccine candidates in early clinical development. There is mounting evidence suggesting that the vaccine to prevent meningitis (MenB) provides some cross-protection against gonorrhoea. More research into vaccines for chlamydia, gonorrhoea, syphilis and trichomoniasis are needed.

Other biomedical interventions to prevent some STIs include adult voluntary medical male circumcision, microbicides, and partner treatment. There are ongoing trials to evaluate the benefit of pre- and post-exposure prophylaxis of STIs and their potential safety weighed with **antimicrobial resistance (AMR)**.

Diagnosis of STIs

STIs are often asymptomatic. When symptoms occur, they can be non-specific. Moreover, laboratory tests rely on blood, urine or anatomical samples. Three anatomical sites can carry at least one STI. These differences are modulated by sex and sexual risk. These differences can mean the diagnosis of STIs is often missed and individuals are frequently treated for 2 or more STIs.

Accurate diagnostic tests for STIs (using molecular technology) are widely used in high-income countries. These are especially useful for the diagnosis of asymptomatic infections. However, they are largely unavailable in low- and middle-income countries (LMICs) for chlamydia and gonorrhoea. Even in countries where testing is available, it is often expensive and not widely accessible. In addition, the time it takes for results to be received is often long. As a result, follow-up can be impeded and care or treatment can be incomplete.

On the other hand, inexpensive, rapid tests are available for syphilis, hepatitis B and HIV. The rapid syphilis test and rapid dual HIV/syphilis tests are used in several resource-limited settings.

Several other rapid tests are under development and have the potential to improve STI diagnosis and treatment, especially in resource-limited settings.

Treatment of STIs

Effective treatment is currently available for several STIs.

- Three bacterial (chlamydia, gonorrhoea and syphilis) and one parasitic STIs (trichomoniasis) are generally curable with existing single-dose regimens of antibiotics.
- For herpes and HIV, the most effective medications available are antivirals that can modulate the course of the disease, though they cannot cure the disease.
- For hepatitis B, antivirals can help fighting the virus and slowing damage to the liver.

AMR of STIs – in particular gonorrhoea – has increased rapidly in recent years and has reduced treatment options. The Gonococcal AMR Surveillance Programme (GASP) has shown high rates of resistance to many antibiotics including quinolone, azithromycin and extended-spectrum cephalosporins, a last-line treatment (4).

AMR for other STIs like *Mycoplasma genitalium*, though less common, also exists.

WHO updates Bacterial Priority Pathogens List to combat antimicrobial resistance

Sub: Science and tech

Sec: Health

Context:

- The **World Health Organization (WHO)** today released its updated Bacterial Priority Pathogens List (BPPL) 2024, featuring 15 families of antibiotic-resistant bacteria grouped into critical, high and medium categories for prioritization.

More on news:

- Since the **first Bacterial Priority Pathogens List was released in 2017**, the threat of antimicrobial resistance has intensified, eroding the efficacy of numerous antibiotics and putting many of the gains of modern medicine at risk.

What is Bacterial Priority Pathogens List (BPPL)?

- The list categorizes pathogens into critical, high, and medium priority groups to inform **research and development (R&D) and public health interventions**.
- The 2024 **WHO Bacterial Priority Pathogens List (WHO BPPL)** is an important tool in the global fight against antimicrobial resistance.
- The 2024 **WHO BPPL** updates and refines the prioritization of antibiotic-resistant bacterial pathogens to address the evolving challenges of antibiotic resistance.

About the recent Bacterial Priority Pathogens List (BPPL) 2024:

- The **2024 WHO BPPL covers 24 pathogens, spanning 15 families of antibiotic-resistant bacterial pathogens**.
- The list features **15 families of antibiotic-resistant bacteria grouped into critical, high and medium categories for prioritization**.
- The list includes **gram-negative bacteria resistant to last resort antibiotics, and Mycobacterium tuberculosis resistant to the antibiotic Rifampicin**.
- Other high-burden resistant pathogens such as **Salmonella, Shigella, Neisseria gonorrhoeae, Pseudomonas aeruginosa, and Staphylococcus aureus** are included in the list.
- Other high priority pathogens such as antibiotic-resistant **Neisseria gonorrhoeae and Enterococcus faecium**, present unique public health challenges.
- Medium priority pathogens include **Group A and B Streptococci** (both new to the 2024 list), **Streptococcus pneumoniae, and Haemophilus influenzae**, which present a high disease burden.

Classification:

The WHO BPPL 2024 includes the following bacteria:

Critical priority:

- Acinetobacter baumannii, carbapenem-resistant;
- Enterobacterales, third-generation cephalosporin-resistant; and
- Enterobacterales, carbapenem-resistant;
- Mycobacterium tuberculosis, rifampicin-resistant (included after an independent analysis with parallel tailored criteria, and subsequent application of an adapted multi-criteria decision analysis matrix).

High priority:

- Salmonella Typhi, fluoroquinolone-resistant
- Shigella spp., fluoroquinolone-resistant
- Enterococcus faecium, vancomycin-resistant
- Pseudomonas aeruginosa, carbapenem-resistant
- Non-typhoidal Salmonella, fluoroquinolone-resistant
- Neisseria gonorrhoeae, third-generation cephalosporin- and/or fluoroquinolone-resistant
- Staphylococcus aureus, methicillin-resistant

Medium priority:

- Group A streptococci, macrolide-resistant
- Streptococcus pneumoniae, macrolide-resistant
- Haemophilus influenzae, ampicillin-resistant
- Group B streptococci, penicillin-resistant

Changes between the 2017 and 2024 lists:

- The BPPL 2024 saw the removal of **five pathogen-antibiotic combinations that were included in BPPL 2017, and the addition of four new combinations**.
- **Third-generation cephalosporin-resistant Enterobacterales** are listed as a standalone item within the critical priority category and emphasizes their burden and need for targeted interventions.
- **Carbapenem-resistant Pseudomonas aeruginosa (CRPA)** infection moving from critical to high priority in BPPL 2024.

What is Antimicrobial Resistance?

- **Antimicrobial Resistance (AMR) is an ability of a microbe to resist the effects of medication previously used to treat them. It is also known as antibiotic resistance.**
- Antimicrobial Resistance (AMR) occurs when **bacteria, viruses, fungi and parasites no longer respond to medicines, making people sicker and increasing the risk of disease spread, illness and deaths.**
- The **WHO defines antimicrobial resistance** as a microorganism's resistance to an antimicrobial drug that was once able to treat an infection by that microorganism.
- The resistance to antimicrobials is a **natural biological phenomenon.**

Balancing two forms of SNCA protein could help manage Parkinson's, study finds

Sub: Science and tech

Sec: Health

Context:

- Many **Parkinson's disease researchers** are focused on reducing the prevalence of SNCA proteins in neurons as a therapeutic measure.

What is Parkinson's disease?

- **Parkinson's disease is a chronic, degenerative neurological disorder** that affects the central nervous system.
- It damages nerve cells in the brain, dropping the levels of **dopamine**.
- **Dopamine** is a chemical that sends behavioral signals from the brain to the body.
- The disease causes a variety of **"motor" symptoms (symptoms related to movement of the muscles), including rigidity, delayed movement, poor balance, and tremors.**
- Medication can help control the symptoms of the disease but it can't be cured.
- It affects the age group from 6 to 60 years. Worldwide, about 10 million people have been affected by this disease.
- Parkinson's is treated symptomatically by increasing the levels of dopamine or, more drastically, by grafting new neurons in place of dead ones.
- An **SNCA-based solution** is more desirable because it offers a more sustainable resolution.

What are SCNA proteins?

- **Synuclein alpha (SNCA) is a mysterious protein.**
- Alpha-synuclein (aSyn) is a protein that, in humans, is **encoded by the SNCA gene.**
- **Alpha-synuclein is a neuronal protein** that regulates synaptic vesicle trafficking and subsequent neurotransmitter release.
- **SNCA is abundant in neurons, especially in dopaminergic neurons.**
- It is found near the nuclei of these cells and at the junctions between two neurons.
- It is capable of misfolding as well as forming filamentous structures.
- So unlike most other proteins, which take up predictable three-dimensional structures, SNCA can fold in multiple ways.
- **Misfolded proteins don't function correctly.**
- It promotes **Neuronal Dysfunction and Death by Disrupting** the Binding of Ankyrin to beta-Spectrin.
- Twenty-seven years ago, researchers first associated SNCA with Parkinson's disease.
- Diseases associated with SNCA **include Parkinson Disease 1, Autosomal Dominant and Dementia, Lewy Body.**

About the study:

- **SNCA is present as aggregates in cells in two ways:**
 - one that interferes with the structural integrity of cells' nuclei and
 - another that allows the cell to degrade misfolded proteins.
- The researchers found that the **former are related to diseased states while the latter is important for healthy cells.**
- The study highlights the importance of striking a balance between these two SNCA populations to manage **Parkinson's disease.**
- **Cultivation of neurons:** The researchers cultivated neurons outside a living body, providing them with nutrients in a laboratory setup.
- **Artificially created structure:** In these neurons, they artificially created structures resembling Lewy bodies by adding some amount of misfolded SNCA, called seeds.
- **Two SCNA populations:** Over time, two SNCA populations in the cells are witnessed.
 - One was around the nuclei, shaped like filaments tens of micrometers long, much like Lewy bodies.

- The other population was also around the nuclei but as much smaller clumps called aggresomes.
- Such aggresomes are formed when cells localize misfolded proteins into a small bunch (like collecting the trash in a corner) for further processing.
- When the researchers repeatedly seeded neurons with misfolded SNCA, the Lewy-body-like structures formed faster and became big enough to affect other parts of the cell.

About nucleus of the cell:

- A nucleus is the control center of the cell.
- It contains the cell's genetic material, and is the seat of upkeep of this genetic material and its utilization to make proteins.
- The accumulation of misfolded SNCA would render the nucleus dysfunctional and eventually kill it.
- **Lewy-body-like structures** can pass from one cell to another, so the effect could cascade to neighboring cells as well.

Various therapeutic impacts:

- A smaller population of SNCA means fewer misfolded SNCA.
- This can be achieved by stopping the SNCA gene from expressing itself or by destroying the SNCA protein inside cells, once the cells make them.
- Another workable solution has been to use a gene-silencing tool, like CRISPR-Cas9, at a precise location.

Terms in news:

Lewy Bodies:

- **Lewy bodies** are clumps of abnormal protein particles that, for reasons that are not fully understood, accumulate in the brain.
- These deposits cause a form of **dementia called Lewy body dementia, or LBD** — which is what the late actor and comedian Robin Williams suffered from.

CRISPR:

- **CRISPR stands for Clustered Regularly Interspaced Short Palindromic Repeats.**
- **CRISPR-Cas9** is the most prominent technology that enables editing parts of the genome by removing, adding or altering sections of the DNA sequence.
- The **CRISPR-Cas9** system consists of two key molecules that introduce a change mutation into the DNA.
- **Cas9- An enzyme that acts as a pair of 'molecular scissors' that can cut the two strands of DNA at a specific location in the genome.**
- **Guide RNA (gRNA)- The gRNA is designed to find and bind to a specific sequence in the DNA.**

SII ships first set of malaria vaccine doses to Africa

Sub: Science and tech

Sec: Health

Context:

- **Serum Institute of India (SII)** marked a significant milestone on Monday with the shipment of the first set of R21/Matrix-M malaria vaccine to seven-eight countries in Africa.

More on news:

- Close to half-a-million children die of malaria each year in the African region, according to the **World Health Organisation (WHO).**
- SII has entered into a partnership with **Novovax, University of Oxford and the United States government.**
- 1,63,800 doses were allocated for the **Central African Republic (CAR) region and 43,200 doses were dispatched from the SII facility.**
- The initial shipment will be sent to CAR, followed by other African countries such as South Sudan and the Democratic Republic of Congo in the coming days.

What is Malaria?

- **Malaria is a life threatening mosquito borne blood disease caused by plasmodium parasites.**
- It is predominantly found in the tropical and subtropical areas of Africa, South America as well as Asia.
- **The parasites spread through the bites of infected female Anopheles mosquitoes.**
- After entering the human body, parasites initially multiply within the liver cells and then attack the **Red Blood Cells (RBCs) resulting in their rupture.**
- There are 5 parasite species that cause malaria in humans, and 2 of these species – **Plasmodium falciparum and Plasmodium vivax – pose the greatest threat.**

- Symptoms of malaria include fever and flu-like illness, including shaking chills, headache, muscle aches, and tiredness.
- It is preventable as well as curable.

What is the R21/Matrix-M malaria vaccine?

- The **low-cost, high-efficacy R21/Matrix-M malaria vaccine** is developed by the University of Oxford and SII leveraging Novavax's adjuvant technology.
- The vaccine has demonstrated high efficacy with a reassuring safety profile and the **R21/Matrix-M vaccine is the second malaria vaccine** to be authorized for use in children in malaria-endemic regions.
- On a vaccine for India, it was pointed out that the particular parasite (found in Africa) was not in India.
- It will take another five years for a malaria vaccine, for India.

X chromosome revival in older women increases autoimmune disease risk

Sub: Science and tech

Sec: Health

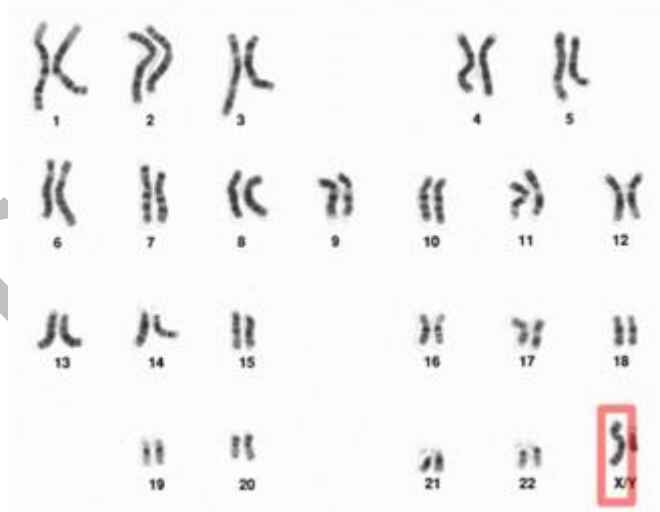
Tags: X chromosome

Context:

- Scientists have found a molecular link between altered X-chromosome inactivation and autoimmune diseases.

What is the X chromosome?

- The **X chromosome is one of the two sex chromosomes in many organisms, including mammals, and is found in both males and females.**
- It is a part of the **XY sex-determination system and XO sex-determination system.**
- In mammals, the females have two copies of the X chromosome while the males carry a single copy. The X chromosome is more significant than its role in determining sex.
- Each person usually has one pair of sex chromosomes in each cell.
- Females typically have **two X chromosomes, while males typically have one X and one Y chromosome.**
- The X chromosome spans about 155 million DNA building blocks (base pairs) and represents approximately 5 percent of the total DNA in cells.



Diseases linked to X chromosome:

- A loss of function of these genes could thus lead to a variety of genetic diseases.
- The diseases whose onset and/or **progression the X chromosome influences** can be grouped into three types:
 - (i) **X-linked genetic diseases,**
 - (ii) **diseases influenced by XCI escape, and**
 - (iii) **those linked to X-chromosome aneuploidy.**
- **Red-green color blindness is X-linked, and affects around 8% of males.**
- Duchenne muscular dystrophy, caused by mutations in the dystrophin gene and affecting 1 in every 3,500-5,000 boys born in India.
- **Agammaglobulinemia, an immunodeficiency disorder** that affects around 1 in 200,000 live births, are also X-linked.

- **Klinefelter syndrome** is characterized by an extra X chromosome (XXY) and Turner's syndrome by a loss of one X chromosome in females (X instead of XX).

Inactivation of the X chromosome:

- In mammalian species, **the females typically carry two X chromosomes** while males possess one X and one Y chromosome.
- **Each of the X chromosomes is inherited from the parents.**
- Since females have **two copies of the X chromosome, one of the X chromosomes is randomly inactivated during early embryonic development**, in a process called **X chromosome inactivation (XCI)**, to prevent the overexpression of X-linked genes in females.
- In this process, **epigenetic changes silence most genes on one X chromosome** (epigenetics refers to the processes by which genes are influenced by the environment in which they operate).
- Issues such as **incomplete inactivation or skewed inactivation can lead to the abnormal expression of genes**, which contributes to diseases including X-linked disorders, certain cancers, and autoimmune conditions.
- Researchers unraveled the **molecular mechanisms of X inactivation when they discovered Xist, a non-protein-coding RNA.**
- The body deactivates the X chromosome with the help of Xist and another non-protein-coding RNA, called Tsix (reverse of Xist).
- The differential regulation of these two genes means, in the X chromosome that is to be deactivated, the Xist RNA is overexpressed such that it coats or covers the chromosome.

Linkage between X chromosome and Autoimmune diseases:

- Number of immune diseases — including **systemic lupus erythematosus, rheumatoid arthritis, and Sjögren's syndrome are more common in females than males.**
- The reactivation of specific **X-linked genes in response to XCI alteration** varies across immune cell types, which is to say diverse molecular pathways are affected.
- The resulting effects in autoimmune diseases are likely due to a combination of reactivation events in different cell types and global changes in gene expression.

Linkage between X chromosome and Alzheimer's disease:

- **Another disease with a sex bias and linked to the X chromosome is Alzheimer's disease.**
- Women seem to have a higher risk of getting it, almost twice as many women have Alzheimer's as men.
- A Gene called ubiquitin specific peptidase 11 (USP11), involved in a protein modifying process, encourages tau protein to accumulate in the brain.
- The researchers suggested the gene escapes X inactivation and is expressed more in females. This also opens new avenues to develop treatments for Alzheimer's.

Terms in news:

Epigenetics:

- Epigenetics is the study of how cells control gene activity without changing the DNA sequence.

Y chromosome:

- The Y chromosome is one of two sex chromosomes in therian mammals and other organisms.
- Along with the X chromosome, it is part of the XY sex-determination system, in which the Y is the sex-determining because it is the presence or absence of Y chromosome that determines the male or female sex of offspring produced in sexual reproduction.

Autoimmune diseases:

- An autoimmune disease is a condition that results from an anomalous response of the adaptive immune system, wherein it mistakenly targets and attacks healthy, functioning parts of the body as if they were foreign organisms.

Glenmark to commercialize BeiGene's oncology drugs in India

Sub: Science and tech

Sec: Health

Tags: Tislelizumab, Zanubrutinib

Context:

- Drugmaker Glenmark has entered into an exclusive marketing and distribution agreement with BeiGene to register and commercialize the latter's oncology medicines Tislelizumab and Zanubrutinib in India.

More on news:

- **Glenmark** will be responsible for locally required development, registration and distribution providing access to **BeiGene's oncology** medicines for cancer patients across India.

About the drugs:

Tislelizumab:

- **Tislelizumab** is a **novel anti-programmed cell death protein 1 (PD-1) monoclonal antibody** for the treatment of advanced or metastatic esophageal squamous cell carcinoma and broad development for the treatment of various types of cancers.
- **Tislelizumab** is a **humanized monoclonal IgG4 antibody against programmed death receptor-1 (PD-1)**.
- It was engineered to have a nullified Fc portion, thus minimizing binding to FcγR on macrophages and limiting treatment resistance via antibody-dependent phagocytosis.

Zanubrutinib:

- **Zanubrutinib** is a **BTK inhibitor** approved for treatment of certain hematological malignancies, with results of several studies reinforcing its favorable efficacy and safety profile.
- **Zanubrutinib** is a **chemotherapy drug** used to treat certain types of B-cell cancers.
- These cancers affect B-lymphocytes, a type of white blood cell that helps you fight off infection.
- They occur when your body makes too many abnormal B-cells.

The 'chilling cover-up' of the U.K.'s infected blood scandal

Sub: Science and tech

Sec: Health

Context:

- The **Infectious Blood Inquiry led by former judge Brian Langstaff catalogs** preventable failures by doctors and successive governments that led to decades-long treatment disasters in the U.K.

About the scandal:

- Between the **1970s and 1990s, more than 30,000 people were infected with HIV, Hepatitis C and Hepatitis B** after receiving contaminated blood and blood products imported from the U.S.
- This made it the **"worst treatment disaster" in the history of Britain's state-funded National Health Service (NHS)**.

Key highlightings of the investigation:

- The public inquiry in the UK was commissioned in 2017 to examine the circumstances in which men, women, and children were treated by National Health Services.
- The blood scandal revealed failures at an individual, collective and systemic level.
- The affected included two groups: those with hemophilia (and similar blood disorders), and people who received blood transfusions during surgeries and childbirth.
- At least 3,000 people have died due to receiving infected blood.
- Deaths and infections linked to contaminated blood were also recorded in Australia, Canada, China, France, Ireland, Italy, Japan, Portugal, and the U.S.

What is Haemophilia?

- **Hemophilia** is a **rare disorder** in which the blood doesn't clot in the typical way because it doesn't have enough **blood-clotting proteins (clotting factors)**.
- This results in people bleeding for a longer time after an injury, easy bruising, and an increased risk of bleeding inside joints or the brain.

There are two main types of hemophilia:

- **Hemophilia A, which occurs due to low amounts of clotting factor VIII, and**
- **Haemophilia B, which occurs due to low levels of clotting factor IX.**
- They are typically inherited from one's parents through an **X chromosome carrying a nonfunctional gene**.
- Most commonly found in men, hemophilia can affect women too, though very rarely.
- A woman would need to inherit two affected X chromosomes to be affected, whereas a man would only need one X chromosome affected.
- Haemophilia C, which occurs due to low levels of factor XI, Von Willebrand disease, which occurs due to low levels of a substance called von Willebrand factor, and parahemophilia, which occurs due to low levels of factor V

Treatment:

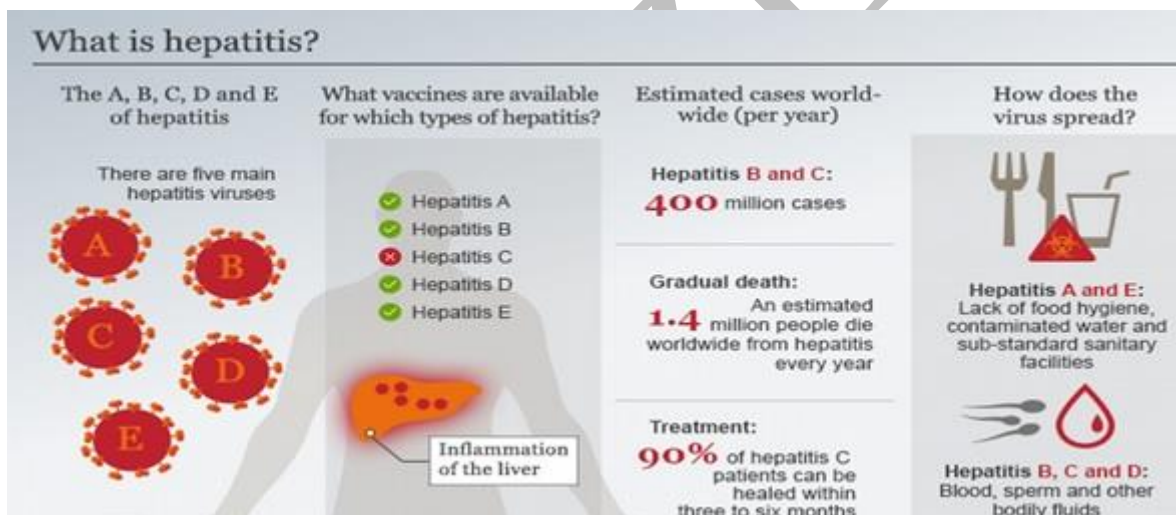
- Up until the 1970s, treatment options included administering the frozen blood product cryoprecipitate. It carried a low risk of passing on an infection since it was formulated from a single blood donation, but cryo was hard to store and harder to administer to patients.
- Enter Factor VIII, a revolutionary ‘wonder treatment’ made using concentrating pooled plasma from tens of thousands of donors.
- Factor VIII had a high risk of infection.
- Even one blood sample, if infected with HIV or Hepatitis C, could contaminate the entire batch.

Other Blood related infections:

- The agent for Hepatitis C was identified in 1988, and the first case of AIDS in the U.K. was recorded in 1981.
- Research as early as the 1940s shows transfusions or the use of plasma could transmit “serum hepatitis,” which could be fatal or lead to long-term diseases such as liver failure and cancer.

About Hepatitis:

- **Hepatitis is an inflammation of the liver** that can be caused by various infectious viruses and non-infectious agents, leading to potentially fatal health issues.
- There are five main types of the hepatitis virus—**A, B, C, D, and E**.
- **Each type causes liver disease but varies in transmission modes**, illness severity, and geographic prevalence.
- Types B and C are particularly significant as they often lead to chronic conditions and are the major causes of liver cirrhosis, liver cancer, and deaths related to viral hepatitis.
- **There is no vaccine for hepatitis C.**
- **Patients with the hepatitis C virus can recover completely.**
- **Hepatitis B is dangerous because it is a “silent infection,” which means it can infect people without them knowing it.**



About HIV:

- **HIV attacks CD4, a type of White Blood Cell (T cells) in the body’s immune system.**
- **T cells** are those cells that move around the body detecting anomalies and infections in cells.
- After entering the body, **HIV multiplies itself and destroys CD4 cells**, thus severely damaging the human immune system. Once this virus enters the body, it can never be removed.
- The CD4 count of a person infected with HIV reduces significantly. In a healthy body, CD4 count is between 500- 1600, but in an infected body, it can go as low as 200.
- Weak immune system makes a person prone to opportunistic infections and cancer. It becomes difficult for a person infected with this virus to recover from even a minor injury or sickness.
- HIV can be treated and prevented with antiretroviral therapy (ART).
- Untreated HIV can progress to AIDS, often after many years.

Why COVID vaccine safety needs scrutiny

Sub: Science and tech

Sec: Health

Context:

- The **Indian Council for Medical Research (ICMR)** issued a letter to the researchers of Banaras Hindu University last week, countering their study on the side effects of India's indigenous vaccine for COVID — Covaxin.

What did the BHU study conclude?

- Adolescent girls and those with comorbidities were at a higher risk of adverse events after receiving **Bharat Biotech's BBV152 (Covaxin) vaccine against COVID-19.**
- A third of the participants reported **adverse events of special interest (AESI).**
- Findings from a one-year prospective study in North India, also said that serious adverse events occurred in **1% of BBV152 recipients**, and that extended surveillance is warranted following the vaccine administration.
- Viral upper respiratory tract infections were reported in 47.9% adolescents and 42.6% adults, as per the study.
- Menstrual abnormalities were noticed in **4.6% of female participants.**
- Ocular abnormalities and hypothyroidism were observed in 2.7% and 0.6% of the participants, respectively.
- **Among the serious AESIs (1%), stroke and Guillain-Barre syndrome were identified in 0.3% and 0.1% of the participants, respectively.**

What is the ICMR stance?

- With reference to the study itself, ICMR claimed there were critical flaws:
- the study had no control arm of unvaccinated individuals for comparison with the vaccinated group, and therefore,
- the reported events in the study cannot be linked or attributed to COVID-19 vaccination;
- it did not provide background rates of patterns observed in the general population, and
- thereby made it impossible to study the observed events in the post vaccination period.

What was the fallout?

- Multiple accounts of doctors and researchers on social media also pointed out that the ICMR developed the vaccine along with the company, and not declaring its vested interest was also a serious lapse in research terms.

About COVAXIN:

- **COVAXIN** is an inactivated vaccine, created from a strain of the infectious SARS-CoV-2 virus, that has shown promise in preclinical studies, demonstrating extensive safety and effective immune responses.
- **COVAXIN has been developed by Bharat Biotech in collaboration with the Indian Council of Medical Research (ICMR) and the National Institute of Virology (NIV).**
- The SARS-CoV-2 strain was isolated in NIV, Pune and transferred to Bharat Biotech.
- It is an **inactivated vaccine** that is made by using particles of the Covid-19 virus that were killed, making them unable to infect or replicate.
- Injecting particular doses of these particles serves to **build immunity by helping the body create antibodies against the dead virus.**
- Bharat Biotech's track record in developing Vero cell culture platform technologies has been proven in several vaccines for polio, rabies, rotavirus, Japanese Encephalitis, Chikungunya and Zika.

How an altered protein and fussy neurons conspire to cause microcephaly

Sub: Science and tech

Sec: Health in news

Microcephaly:

- **Microcephaly** is a condition where a **baby's head and brain** are **significantly smaller than normal.**
- **Symptoms** include poor motor function, speech, abnormal facial features, and intellectual disability.
- The condition **originates** during the **embryo's peak brain development phase** due to **abnormal cell division.**
- **Diagnostic Methods:** Clinicians diagnose microcephaly before birth using **fetal ultrasound** and **magnetic resonance imaging (MRI).**

Role of the SASS6 Gene:

- Since **2014**, the **SASS6 gene** and its variants have been linked to **microcephaly.**
- Researchers at **Nantong University, China**, found that **one functional copy of the SASS6 gene** retains some function, while both **non-functional copies** lead to **embryo death.**
- Findings **confirm SASS6's crucial role in microcephaly** and **expand** the understanding of its **mutation spectrum.**
- **Recent Studies and Findings:**
 - **Six more SASS6 gene variants** have been **identified** since the March study.

- Researchers continue to explore the implications of these variants and their impact on cell division and development.
- In February 2024, **University of Cologne** researchers showed that **cells without functional SASS6 genes** could make **abnormal centrioles** but **failed to develop into neurons**.

Impact of Consanguinity:

- **Consanguinity**, or **marriages between closely related individuals**, significantly **increases the risk of congenital microcephaly**.
- **Microcephaly** can result from **mutations in 30 genes**, **10 of which are crucial for centriole assembly and function during cell division**.

The Ile62Thr Mutation:

- The **SASS6 gene**, discovered in **C. elegans** in **2004**, encodes a protein essential for **centriole assembly**.
- In **2014**, researchers identified the **Ile62Thr mutation** in the **SASS6 gene** in a **consanguineous Pakistani family with microcephaly**.
- The **Ile62Thr mutation** impairs **centriole function**, causing **microcephaly** but **allowing survival into adulthood**. When combined with another **centriolar protein mutation**, it **increases replication failure and embryo death**.

Variability in Cell Tolerance:

- **Different cell types** have varying tolerances for **centriole defects**. **Neuron precursor cells** are particularly sensitive.
- This **sensitivity** leads to **brain and head deficits** and **intellectual disability** in **individuals with defective SASS6 genes**.

The Tobacco Epidemic in India

Sub: Science and tech

Sub: Health

Impact of Tobacco in India:

Health Impact	Environmental Impact	Economic Burden
<ul style="list-style-type: none"> ● Tobacco is the leading preventable cause of disease and death worldwide. ● In India, nearly 26 crore people consumed tobacco as of 2016-2017. ● Over 60 lakh people working in the tobacco industry are at risk of diseases from skin absorption of tobacco. ● Tobacco use causes various health problems and negatively affects those who cultivate it. 	<ul style="list-style-type: none"> ● Tobacco farming depletes soil nutrients rapidly, requiring more fertilizers and worsening soil quality. ● Tobacco production contributes significantly to deforestation, with up to 5.4 kg of wood needed to process 1 kg of tobacco. ● Tobacco production and consumption generate nearly 1.7 lakh tonnes of waste annually in India. 	<ul style="list-style-type: none"> ● A 2021 study estimated that tobacco's health impact cost India over ₹1.7 lakh crore in 2017-2018. ● The Union Budget for Health in the same year was ₹48,000 crore. ● Cleaning up tobacco waste costs approximately ₹6,367 crore annually, excluding soil erosion and deforestation costs.

Tobacco Use Surveys:

- The **Global Adult Tobacco Survey (GATS)**, **Global Youth Tobacco Survey (GYTS)**, and **National Family Health Survey (NFHS)** track tobacco use in **India**.
 - **GYTS** assesses **tobacco use** in **students** between the ages of **13 and 15 years** and **GATS** and **NFHS** in people **above 15 years of age**.
- These surveys show a **general decline in tobacco use**, except for an **increase in tobacco use among women by 2.1%** between **2015-2016** and **NFHS 2019-2021**.
- **No surveys** have been conducted since the **COVID-19 pandemic**.

Law to control tobacco use in India

1. Cigarettes and Other Tobacco Products (Prohibition of Advertisement and Regulation of Trade and Commerce, Production, Supply and Distribution) Act, 2003 (COTPA)	<ul style="list-style-type: none"> ● It is the principal comprehensive law governing tobacco control in India. ● Replaced the Cigarettes Act of 1975 (largely limited to statutory warnings- 'Cigarette Smoking is Injurious to Health')
--	---

	<p>to be displayed on cigarette packs and advertisements. It did not include non-cigarettes).</p> <ul style="list-style-type: none"> The 2003 Act also included cigars, bidis, cheroots, pipe tobacco, hookah, chewing tobacco, pan masala, and gutka.
2. Cigarettes and other Tobacco Products (Packaging and Labelling) Amendment Rules, 2020	<ul style="list-style-type: none"> It was mandated that the specified health warning shall cover at least 85% of the principal display area of the package. Of this, 60% shall cover pictorial health warning and 25% shall cover textual health warning.
3. National Tobacco Control Programme (NTCP), 2008	<ul style="list-style-type: none"> Objective: To control tobacco consumption and minimize tobacco consumption related deaths Activities: Training and capacity building; information, education, and communication (IEC) activities; tobacco control laws; reporting survey and surveillance and tobacco cessation.
4. mCessation Programme	<ul style="list-style-type: none"> It is an initiative using mobile technology for tobacco cessation. India launched mCessation using text messages in 2016 as part of the government's Digital India initiative. <ul style="list-style-type: none"> It uses two-way messaging between the individual seeking to quit tobacco use and programme specialists providing them dynamic support.
5. Other important initiatives	<ul style="list-style-type: none"> Prevention and Control of Pollution Act of 1981- Recognized smoking as an air pollutant. Cable Television Networks Amendment Act of 2000- Prohibited the transmission of advertisements on tobacco and liquor in India. The Government of India has issued regulations under the Food Safety and Standards Act 2006 which lay down that tobacco or nicotine cannot be used as ingredients in food products. 31st May is observed as 'World No Tobacco Day' every year to spread awareness about the deadly effects of tobacco consumption.
6. International Convention	<ul style="list-style-type: none"> Governments adopt and implement the tobacco control provisions of the WHO Framework Convention on Tobacco Control (WHO FCTC). It is the first international treaty negotiated under the auspices of the WHO. It was adopted by the World Health Assembly on 21 May 2003 and entered into force on 27 February 2005.

Implementation Issues:

- Many **smokeless tobacco products** do **not** comply with **COTPA packaging guidelines**.
- Smuggled tobacco products are poorly regulated.
- Fines for **COTPA violations** have not been updated since **2003**.
- Surrogate advertisements are used to **indirectly promote tobacco**, as seen in the **ICC Men's Cricket World Cup 2023**.

Legislative Amendments:

- Proposed amendments to **COTPA in 2015 and 2020** aimed to **regulate surrogate advertisements**, include **films and video games in advertisement definitions**, and **increase fines**, but were **not passed**.
- The **NTCP's** effectiveness is questioned due to insufficient staffing, resources, and monitoring.

Tax Evasion and Affordability:

- Excise duty on tobacco** faces **tax evasion** through **smuggling, illicit manufacturing, and counterfeiting**.
- Low tobacco taxes** and **increasing incomes** have kept **tobacco** affordable.

- A 2021 BMJ Tobacco Control study reported increasing affordability of cigarettes, bidis, and SLTs over the past decade.

Tax and Lobbying:

- The tax burden on tobacco products in India is lower than the FCTC recommendation of at least 75%.
- The tobacco industry argues high taxes lead to tax evasion, but weak governance and other factors are also significant.
- Lobbying by the tobacco industry influences policy, with government officials often involved in the industry post-retirement.
 - The Central government holds a 7.8% stake in ITC Ltd., India's largest tobacco company.

The rise of pediatric inflammatory bowel disease in India

Sub: Science and tech

Sub: Health

What is Inflammatory Bowel Disease (IBD)?

- IBD is a chronic autoimmune condition where the white blood cells mistakenly identify cells in the human gut as their enemy and decide to attack it, causing ulcers in the mucosa.
- As a result, a child with IBD may develop fever, loose stools and bloody diarrhea.
- These children may not absorb macro and micronutrients and hence lose weight, muscle mass, become anemic and may have vitamin deficiencies.

What are various types of IBD?

There were two types of IBD.

Ulcerative colitis:

- Ulcerative colitis affects only the large bowel.
- Ulcerative colitis is a chronic inflammatory bowel disease (IBD) in which abnormal reactions of the immune system cause inflammation and ulcers on the inner lining of your large intestine.
- Ulcerative colitis can develop at any age, but the disease is more likely to develop in people between the ages of 15 and 30.

Crohn's disease:

- Crohn's disease can affect any part of the gut from mouth to anus.
- Crohn's disease is a type of inflammatory bowel disease (IBD).
- It causes swelling of the tissues (inflammation) in your digestive tract, which can lead to abdominal pain, severe diarrhea, fatigue, weight loss and malnutrition.
- Sometimes when we find it difficult to distinguish between these two conditions, we label it Indeterminate Colitis for a while until it evolves into one of the above conditions.

Why does IBD occur frequently in children?

- Children who are susceptible to IBD often have a weak or dysregulated immune system which responds inappropriately to environmental triggers such as a virus or bacteria.
- There may also be genetic factors which predispose these children to IBD as sometimes it seems to affect members of the same family.
- The human gastrointestinal tract harbors millions of microorganisms, often referred to as gut microbiota which plays an important role in IBD.
- The gut microbiota of each individual is unique and influences health and disease.
- The nature and composition of gut microbiota can be altered by frequent antibiotics.
- Westernization of food habits and lifestyle is also strongly linked to changes in the gut microbiota and a predisposition to develop IBD.

How can we treat and cure IBD?

- IBD - Crohn's disease can be treated with very effective medications that control the inflammation and suppress the dysregulated and overactive immune system.
- These medications include steroids and a new class of drugs called biologics.
- IBD – Ulcerative colitis is also treated similarly, though another group of drugs called 'aminosalicylates' are used to treat milder forms of Ulcerative colitis.

- **Exclusive Enteral Nutrition** has not been found to be useful in treating Ulcerative Colitis.

Particles called quarks hold the key to the final fate of some stars

Subject: Science and tech

Sec: Space sector

Tags: Quarks , Neutron Star

What is Quark?

- **Matter** is made up of **atoms**, consisting of a **nucleus** with **protons** and **neutrons**, and **electrons** around it.
- **Protons** and **neutrons** are **not fundamental particles** but are composed of even smaller particles called **quarks**.
- **Quarks** are unique because **they cannot exist alone but only in groups**, known as **hadrons**, like **protons** and **neutrons**.
- **Origin and naming:**
 - The concept of quarks emerged in the **1960s** when physicists, explaining **why neutrons (neutral in charge) have a magnetic moment**, hypothesized that **neutrons** are composed of **smaller, charged particles (quarks) whose charges cancel out**. This theory was confirmed in the **1970s**.
 - **Quarks**, named by physicist **Murray Gell-Mann** from **James Joyce's "Finnegan's Wake,"** come in six "flavors," including charm and strange, and have properties such as "color charge."
- **Properties:**
 - **Quarks**, which come in **six types** (up, down, top, bottom, strange, and charm) and each bear one of three color charges, are **fundamental components of matter**.
 - Their **antimatter** counterparts are known as **antiquarks**.
 - **Quark-antiquark pairs** form **mesons**, while **clusters of three quarks** make up **baryons**, the constituents of normal matter.
 - **Quarks** are bound together by **gluons** through the **strong nuclear force**, described by **quantum chromodynamics**, which suggests that under extremely high energies, quarks can become '**deconfined**'.
 - This deconfined state, called **quark-gluon plasma**, has been briefly observed in **high-energy lead ion collisions** at the **Large Hadron Collider**, reminiscent of the early universe conditions postulated by the **Big Bang theory**.
 - This plasma indicates a **phase** where **quarks are not bound into clumps**, potentially leading to phenomena like **quark stars**, an area still under exploration in physics.

When quarks clump:

- Two recent studies have advanced our understanding of how quarks, the fundamental constituents of matter, group together.
 - The **first study** found that **clumps of three quarks are more likely to form than clumps of two** when certain types of quarks are densely surrounded by other particles, challenging **traditional particle physics models** that view quark consolidation as independent of surrounding particles.
 - The **second study** observed **clumps** made entirely of **heavier quarks**, which unlike the more stable, lighter-quark clumps found in **protons** and **neutrons**, are **very short-lived and difficult to study**.
- Despite these challenges, understanding **heavy-quark clumps** is crucial for a complete picture of quark behavior, which influences key processes such as **nuclear fusion** and the **evolution of stars**, including potentially in **quark stars**.

The tension of every star:

- A **star maintains its existence** by **balancing two opposing forces: gravity**, which pulls its mass inward, and the **nuclear force from fusion reactions in its core**, which pushes outward.
- This equilibrium enables the star to shine. However, once a star exhausts its nuclear fuel, gravity begins to dominate, leading to the **star's collapse and eventual death**.
- The outcome of this collapse—whether the star ends up as a **white dwarf, a neutron star, or a black hole**—depends on its **mass**.
 - For instance, if the Sun were 20 times more massive, it could collapse into a black hole, and if it were 8 times heavier, it might become a neutron star.
- This raises a question about the **existence of stars with specific mass ranges** that might collapse into neither a **neutron star** nor a **black hole** but instead become a **quark star**.

Enter 'quark matter':

- In **neutron stars**, **extreme pressures** may convert all **protons** and **electrons** into **neutrons** due to the **intense gravitational collapse**, giving these stars their name.
- However, a longstanding question in physics is whether these neutrons might be further compressed into **quark matter**, a hypothetical state consisting solely of quarks.

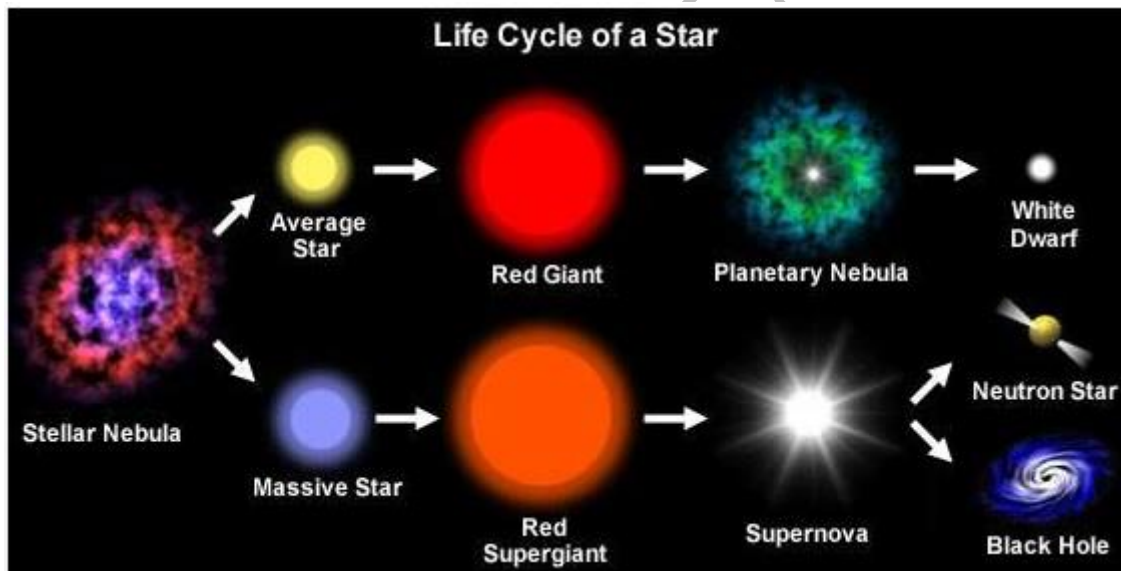
- Researchers from the University of Helsinki reported that there is an **80-90%** likelihood that the **cores of the most massive neutron stars contain quark matter**.
- These results are preliminary, and more data is needed to confirm the presence of quark matter and understand its properties fully.
- The **Tolman-Oppenheimer-Volkoff equation**, used in **neutron star physics**, incorporates data about physical properties to predict other attributes, including the probability of quarks being present in neutron stars.

Neutron stars:

- A neutron star is the **collapsed core of a massive supergiant star**.
- The stars that later collapse into neutron stars have a total mass of between **10 and 25 solar masses**, possibly more if the star was especially rich in elements heavier than hydrogen and helium.
- Except for **black holes**, **neutron stars** are the **smallest and densest known class of stellar objects**.

Black hole:

- A black hole is a **region of spacetime** where **gravity is so strong** that **nothing, including light and other electromagnetic waves**, is capable of possessing enough energy to escape it.
- **Einstein's theory of general relativity** predicts that a sufficiently compact mass can deform spacetime to form a black hole.
- The **boundary of no escape** is called the **event horizon**.
- A **black hole** has a great effect on the fate and circumstances of an object crossing it, but it has **no locally detectable features** according to general relativity.
- In many ways, a **black hole acts like an ideal black body**, as it reflects no light.



The Eta Aquariid meteor shower and how it can be spotted

Subject: Science and tech

Sec: Space

Context:

- **The Eta Aquariid meteor shower**, which has been active since April 15, will peak on May 5 and 6.

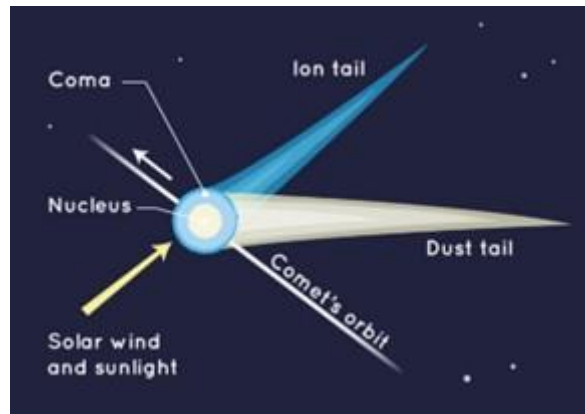
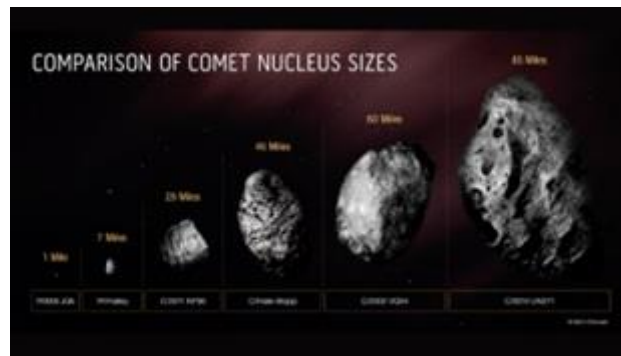
More on news:

- Comprising **burning space debris** moving at speeds of around 66 km per second (2.37 lakh kmph) into **Earth's atmosphere**, these showers are seen in **May every year**.
- They are best visible to countries such as **Indonesia and Australia in the Southern Hemisphere**.

What are comets?

- Meteor showers come from comets, which are frozen leftovers from the formation of our solar system, some 4.6 billion years ago.
- **Comets are composed of dust, rock and ice**, and orbit around the Sun in highly elliptical orbits which can take **hundreds of thousands of years to complete**.
- Billions of comets are orbiting the **Sun beyond Neptune**, in the **Kuiper Belt** and even more distant **Oort cloud**.
- Comets come in **different sizes**, although most are roughly **10 km wide**.

- As they come closer to the Sun, **comets heat up and spew gasses and dust into a glowing head that can be larger than a planet.**
- This material also forms a tail which stretches millions of miles.



How exactly are meteor showers related to comets?

- Meteors are simply grains of dust or rock that burn up as they enter the Earth's atmosphere.
- This burning also creates a brief tail.
- Since most meteors are tiny (the size of a grain of sand) they completely burn up in Earth's atmosphere.
- However, sometimes, a large enough meteor passes through and hits the ground (at which time it is called a meteorite), often causing significant damage.
- A meteor shower can be observed when Earth passes through the clouds of dust left behind in a comet's orbital plane.
- The sky lights up with small and large meteor tails as the debris left behind by the comet interacts with Earth's atmosphere.



How do Eta Aquariids meteor form?

- The Eta Aquariid meteor shower is formed when Earth passes through the orbital plane of the famous Halley's Comet, which takes about 76 years to orbit the Sun once.
- While it was observed as early as 240 BCE, it was only in 1705 that **astronomer Edmond Halley** realized that the periodic appearances were re-appearances of the same comet.
- Last seen in 1986, **Halley's comet** is due to enter the **inner solar system again in 2061.**
- Like Eta Aquariids, the Orionids meteor shower is also caused by the Halley's Comet.

Why are Eta Aquariids unique?

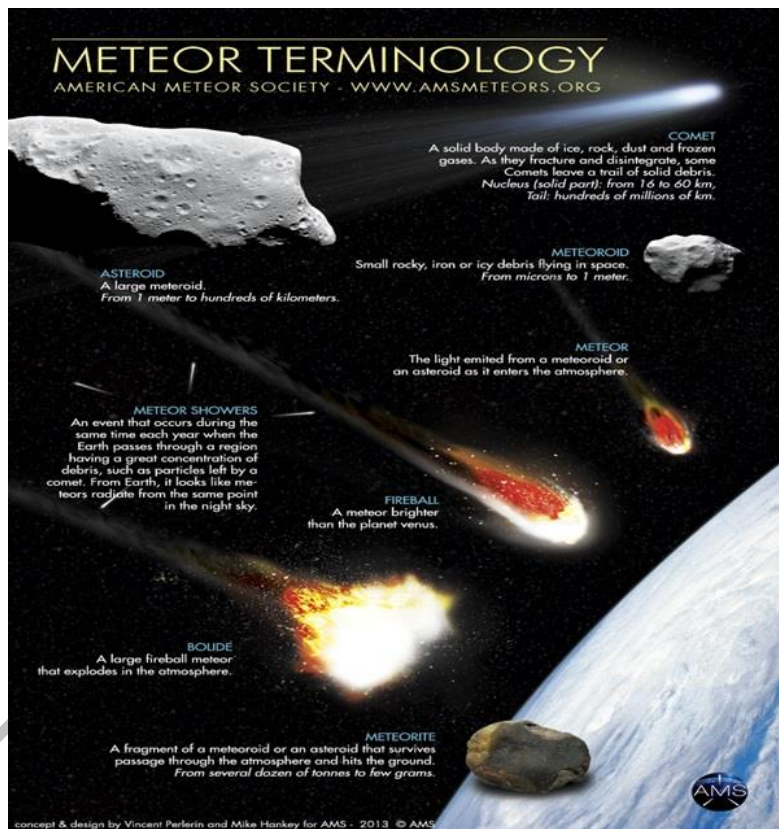
- The Eta Aquariid meteor shower is known for its rapid speed.

- This makes for long, glowing tails which can last up to several minutes.
- About 30 to 40 Eta Aquarid meteors can be seen per hour during the peak of the meteor shower, if observed from the Southern Hemisphere.
- The number decreases to about 10 meteors per hour if being viewed in the Northern Hemisphere.
- This is due to the location of the “radiant” i.e. the position in the sky where the meteor shower seems to come from.
- In the Northern Hemisphere, Eta Aquarid meteors most often appear as ‘Earthgrazers’ — long meteors which appear to skim the surface of the Earth.
- In the South, however, they can be seen higher up in the sky, and hence are more visible.

How to catch the Eta Aquariid meteor shower?

- The meteor shower is likely to be visible across the sky.
- The shower seems to be originating from the Aquarius constellation — hence ‘Eta Aquariid’.
- The meteor shower is going to be visible to the naked eye on a clear night sky, provided there is minimum light pollution (from the Moon or artificial lighting from buildings, streetlights on Earth).

Other related geographical terms:



Significance of Boeing Starliner's first crewed test flight on May 7

Subject: Science and tech

Sec: Space

Tags: Space X, Soyuz, Being Satrliner

Context:

- The **Atlas V rocket** launched with astronauts **Barry Wilmore** and **Sunita Williams** aboard **Boeing's Starliner crew capsule**, marking its **first crewed test flight**.
- The mission, heading to the **International Space Station**, aims to establish the U.S. with **two operational spacecraft** for **astronaut launches** if successful.

Atlas V Rocket:

- **Atlas V** is an **expendable launch system** and the **fifth major version** in the **Atlas launch vehicle** family.
- Originally designed by **Lockheed Martin**, now being operated by **United Launch Alliance (ULA)**, a joint venture between **Lockheed Martin** and **Boeing**.
- It is used for **DoD (Department. Of Defense)**, **NASA**, and **Commercial payloads**.

- It is America's longest-serving active rocket.

Dragon capsule of SpaceX:

- The Dragon spacecraft is capable of carrying up to 7 passengers to and from Earth orbit, and beyond.
- It is the only spacecraft currently flying that is capable of returning significant amounts of cargo to Earth, and is the first private spacecraft to take humans to the space station.

Soyuz spacecraft of Russia:

- It is a series of spacecraft which has been in service since the 1960s. It was designed for the Soviet space program by the Korolev Design Bureau (now Energia).
- The Soyuz succeeded the Voskhod spacecraft and was originally built as part of the Soviet crewed lunar programs.
- It is launched on a Soyuz rocket from the Baikonur Cosmodrome in Kazakhstan.
- Between the 2011 retirement of the Space Shuttle and the 2020 demo flight of SpaceX Crew Dragon, the Soyuz served as the only means to ferry crew to or from the International Space Station, for which it remains heavily used.
- Although China did launch crewed Shenzhou flights during this time, none of them docked with the ISS.

What is Boeing Starliner?

- The Boeing Starliner is a spacecraft designed to transport astronauts to space.
- It includes a crew capsule, where astronauts reside and which can withstand reentry to Earth, and a service module equipped with life support systems and engines.
- While the crew capsule is reusable, the service module is not.
- It is more than 4 m wide and can house up to seven astronauts. It can be fit atop an Atlas V rocket.
- **Purpose:**
 - To transport astronauts to and from the International Space Station (ISS), serving as an alternative to SpaceX's Dragon capsule and Russia's Soyuz, which were the only means of transport after NASA's Space Shuttle program ended in 2011.
- **Significance:**
 - Since the introduction of the 737 Max 8 in 2017, Boeing has faced severe challenges due to two fatal crashes involving the aircraft, attributed to flaws in its Manoeuvring Characteristics Augmentation System (MCAS) and insufficient pilot training.
 - MCAS is a flight control law implemented on the 737 MAX to improve aircraft handling characteristics and decrease pitch-up tendency at elevated angles of attack.
 - Thus, a successful Starliner flight is vital for regaining stakeholder confidence and demonstrating Boeing's capability in spacecraft technology amidst ongoing difficulties in its aviation sector.

International Space Station (ISS):

- ISS is the largest man-made object in space launched on November 20, 1998. It serves as a habitat for astronauts in space. Since 2011, the ISS has been continuously inhabited.
- **Participating States:** ISS is a collaborative project of the United States (NASA), Russia's (Roscosmos), Europe's (ESA), Japan's (JAXA), and Canada's (CSA) space agencies.
- **Orbit:** The International Space Station is in orbit about 400 kilometres above Earth.
- **Speed:** It travels around Earth at a speed of about 28,000 kilometres per hour. This means that it orbits Earth about every 90 minutes.
- **Objectives:** To expand our knowledge about space and microgravity and promote new scientific research. It also serves as an example of international cooperation.

Why is the launch of Boeing's Starliner significant?

Subject: Science and tech

Sec: Space

Context:

- Boeing's Starliner spacecraft, carrying two NASA astronauts, will be launched by an Atlas V rocket from the Kennedy Space Center in Cape Canaveral, Florida, to the International Space Station (ISS) on Tuesday.

More on news:

- This will be Starliner's first crewed test flight.
- If the mission is successful, Boeing will become the second private firm to be able to provide NASA crew transport to and from the ISS, alongside Elon Musk's SpaceX.

What is Boeing's Starliner?

- **Starliner is a partially reusable crew capsule**, officially known as CST-100 (crew space transportation).
- The capsule, which is **5 m tall and 4.6 m wide, consists of two modules**.
- It includes a **crew capsule, where astronauts reside** and which can withstand reentry to Earth, and a service module equipped with life support systems and engines.
- It is more than **4 m wide and can house up to seven astronauts**.
- It can be fitted atop an **Atlas V rocket**.
- The crew module can be **reused up to 10 times, with a six-month turnaround**.

What is the mission?

- The **main objective of the mission is to see how Starliner performs** in space with a crew onboard.
- It is supposed to dock with the ISS — a day after the launch — for around 10 days before it returns to the Earth.
- The **crew members will test flying it manually**.
- The crew will also test seats, **assess onboard life-support and navigation systems, as well as evaluate the system that moves cargo into the ISS**.
- The space suits will also be tested as these blue suits are around 40% lighter than their predecessors and have touchscreen-sensitive gloves.
- During the return journey, **NASA and Boeing will be keeping an eye on the spacecraft's heat shield and parachutes**.
- They will slow the descent before airbags open to soften the moment of impact with the ground — unlike other crew capsules, Starliner will land on the ground and not in the sea.

Why is the mission significant?

- The mission's success is crucial for both NASA and Boeing.
- Currently, NASA has only one private company, SpaceX, which can take its astronauts and cargo to the ISS.
- Starliner getting approval for conducting routine flights to and from the ISS would give NASA a backup and option to not depend on one company or vehicle for space launches.

About Atlas V Rocket:

- **Atlas V is an expendable launch system** and the fifth major version in the Atlas launch vehicle family.
- Originally designed by **Lockheed Martin, now being operated by United Launch Alliance (ULA)**, a joint venture between Lockheed Martin and Boeing.
- It is used for **DoD (Department. Of Defense), NASA, and Commercial payloads**.
- **It is America's longest-serving active rocket**.

About International Space Station (ISS):

- ISS is the largest man-made object in space launched on **November 20, 1998**. It serves as a habitat for **astronauts in space**.
- Since 2011, the ISS has been **continuously inhabited**.
- ISS is a collaborative project of the **United States (NASA), Russia's (Roscosmos), Europe's (ESA), Japan's (JAXA), and Canada's (CSA) space agencies**.
- The International Space Station is in **orbit about 400 kilometers above Earth**.
- It travels around Earth at a speed of about 28,000 kilometers per hour. This means that it orbits Earth about every 90 minutes.
- **Objectives: To expand our knowledge about space and microgravity and promote new scientific research. It also serves as an example of international cooperation.**

About SpaceX:

- **Space Exploration Technologies Corporation**, commonly referred to as SpaceX, is an American spacecraft manufacturer, launch service provider, defense contractor and satellite communications company headquartered in **Hawthorne, California**.
- The company was founded in **2002 by Elon Musk** with the goal of reducing space transportation costs and ultimately developing a sustainable colony on Mars.



Dragon capsule of SpaceX:

- **The Dragon spacecraft** is capable of carrying up to 7 passengers to and from Earth orbit, and beyond.
- It is the **only spacecraft currently flying that is capable of returning significant amounts of cargo to Earth**, and is the first private spacecraft to take humans to the space station.

Aurora lights in India: What caused them to be visible even from Ladakh?

Sub: Science and tech

Sec: Space

Context:

- **Aurora lights**, typically visible only in high-latitude regions near the poles, were observed from Ladakh, India, during the late hours of May 10 and early hours of May 11. This phenomenon was recorded using all-sky cameras at the **Indian Astronomical Observatory (IAO)** in Hanle, Ladakh, operated by the **Indian Institute of Astrophysics, Bengaluru**.

Auroras:

- Auroras are **natural light** displays that occur when **charged particles from solar winds interact with the Earth's magnetosphere**.
 - The **magnetosphere** is the **region surrounding the Earth** where the dominant magnetic field is the **Earth's**, rather than the magnetic field of interplanetary Space.
 - It **protects** the Earth against **solar winds** and is **strongest at the poles**.
- These particles travel along the **Earth's magnetic field** and upon colliding with atmospheric molecules and atoms, cause **emissions of light** seen as auroras.
- In North Pole- **Aurora Borealis**
- In South Pole- **Aurora Australis**

Causes of the Aurora's Visibility in Lower Latitudes:

- This unusual visibility of auroras in regions far from the poles, including **India**, was triggered by a **significant increase in solar flare activity**.
- Indian solar physicists noted that **several strong solar storms**, originating from **Coronal Mass Ejections (CMEs)** from an **active sunspot, AR13664**, hit the Earth between May 10 and May 11.
- These storms caused **disturbances in space weather**, leading to the display of **auroras in lower latitudes**.
 - **Coronal Mass Ejections (CMEs)** are **large expulsions of plasma and magnetic fields** from the **Sun's corona**.

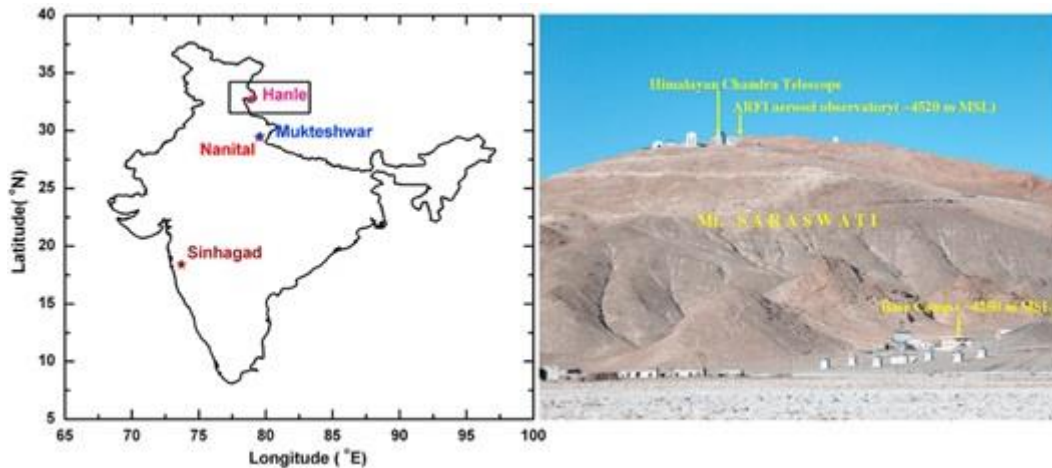
Impact of Solar Storms:

- The **CMEs**, travelling at **high speeds (700- 815km/second)**, significantly **disturbed the Earth's magnetic field**, affecting the **space weather**.
- This activity was part of a **series of solar flares and storms** predicted to continue affecting the Earth around this period.
- The **intense solar storms pose risks to satellites in Low Earth Orbit (LEO)** (an altitude ranging between **200-1,600km**), affecting their operations due to induced **heating** in the **upper atmosphere** and **potential drag effects**.
- This can result in **radiation hazards** and **physical damage** to **satellites**, potentially **compromising navigation, communication, military, and intelligence systems** relying on these satellites.

Indian Astronomical Observatory (IAO):

- **IAO** is a **high-altitude astronomy station** operated by the **Indian Institute of Astrophysics**.
- **IAO** stands on **Mt. Saraswati, Digpa-ratsa Ri, Hanle** in the **south-eastern Ladakh Union territory of India**.
 - **Nyoma, 75 km northwest of Hanle**, has an **Indian military airbase**.

- Situated in the **Western Himalayas** at an **elevation of 4,500 meters (14,764 ft)**, the IAO is **one of the world's highest-located sites for optical, infrared and gamma-ray telescopes**.
- It is currently the **tenth-highest optical telescope in the world**.
 - It is **India's first dark-sky reserve**.
 - **Changthang Wildlife Sanctuary in Changthang plateau** is also located here.
- The **Observatory has several active telescopes**. These are the 2.01 meter optical-infrared **Himalayan Chandra Telescope (HCT)**, **GROWTH-India telescope**, **Cassegrain telescope**, and a **High Altitude Gamma Ray Telescope (HAGAR)**.
 - The **HCT is remotely operated from Bangalore** from the **Centre for Research and Education in Science and Technology (CREST)** using a dedicated satellite link.



Nissar Satellite will monitor tectonic movements to Centimeter Accuracy: S.Somnath

Sub: Science and tech

Sec: Space tech

Tags: Nissar Satellite, NASA-ISRO

What is NASA-ISRO SAR (NISAR) Satellite?

- The **NASA-ISRO Synthetic Aperture Radar mission** is a joint project between NASA and ISRO to co-develop and launch a dual-frequency synthetic aperture radar on an Earth observation satellite. The satellite will be the first radar imaging satellite to use dual frequencies.
- **NISAR is the first satellite mission** to collect radar data in two microwave bandwidth regions, called the L-band and the S-band, to measure changes of our planet's surface, including movements as small as centimeters.
- **NISAR uses a sophisticated information-processing technique** known as synthetic aperture radar to produce extremely high-resolution images.

What is unique about the NISAR (NASA-ISRO Synthetic Aperture Radar) satellite?

- This is a Synthetic Aperture Radar satellite with two bands.
 - **One is S-band and the other is L-band.**
 - **The S-band payload has been made by the ISRO and the L-band payload by the U.S.**
- The U.S. will contribute the large deployable antenna.
- It is a dual band polarisable radar.
- It is supposed to go in July but it may go only in October-November.

Benefits of NISAR:

- It has a large deployable antenna with an 18-meter diameter, it has a very high swath.
- It can fully cover the earth in approximately 14 to 15 days, in radar. It can monitor various aspects in very high resolution.
- It can monitor the tectonic movements to centimeter accuracy.
- It can accurately measure water bodies.
- It can look at water stressing on the earth, wherever there is deficiency of water.
- It can ground-penetrate to a certain depth. It is capable of monitoring the vegetation cover and snow cover

What are the features of Chandrayaan-4, which will be a sample-return mission?

- **Chandrayaan-4 is a planned lunar sample-return mission** and the fourth mission in the Chandrayaan programme, a series of lunar-exploration missions developed by the Indian Space Research Organisation.
- The mission is currently under **conceptualisation phase and is slated for launch no earlier than 2028**.

What is Spadex (space docking experiment)?

- **SPADEX or Space Docking Experiment is a twin spacecraft mission** being developed by the Indian Space Research Organisation to mature technologies related to orbital rendezvous, docking, formation flying, with scope of applications in human spaceflight, in-space satellite servicing and other proximity operations
- The **SPADEX mission involves a spacecraft with two components - Chaser and Target.**
- This will dock and separate as a mock drill for the Moon mission.
- While in the low-Earth orbit, the Chaser and Target will separate only to rendezvous autonomously later on.

About Gaganyaan Mission:

- Gaganyaan is an **ISRO mission aiming to send Indian astronauts to low-Earth orbit using an Indian launch vehicle.**
- It is a demonstration mission to test technologies essential for human spaceflight, showcasing India's capability in producing, qualifying, and utilizing these technologies.
- Future goals for **ISRO include establishing an indigenous space station by 2035 and landing an Indian on the moon by 2040.**
- ISRO plans to integrate these ambitious projects with future lunar explorations, starting with a joint mission with Japan for lunar rover landing and a mission to return lunar soil samples to Earth.

PAD abort test:

- A **pad abort test** is a kind of test of a launch escape system which is **conducted by setting the system along with the spacecraft still on the ground and letting the system activate to carry the spacecraft flying away, then separate in the air and make the spacecraft land safely.**
- The purpose of the test is to determine how well the system could get the crew of a spacecraft to safety in an emergency on the launch pad.
- As the spacecraft is set still on the ground, the test is also called "zero-altitude abort test" against "high-altitude abort test".

Integrated Air Drop Test:

- This **critical test aims to validate the functionality of the parachute system and the integrity of the crew capsule, crucial components for the safe return of astronauts from space.**

What are other new projects of ISRO?

Bharatiya Antariksha Station:

- The **Indian Orbital Space Station, officially called, Bharatiya Antariksha Station,** is a planned modular space station to be constructed by India and operated by the Indian Space Research Organisation (ISRO).

NGLV (New Generation Launch Vehicle):

- The **Next Generation Launch Vehicle or NGLV is a three-stage partially reusable rocket,** currently under development by the Indian Space Research Organisation.
- This vehicle is designed to **replace currently operational systems like PSLV, GSLV and LVM3.**

Software-defined radio satellite:

- **Space-based Software Defined Radios (SDRs) are primarily used in satellites to increase processing power, as well as to complement the overall communications architecture; both for transmitting and receiving signals.**
- A satellite constellation (or swarm) is a network of identical or similar-type artificial units with the same purpose and shared control. Such groups communicate to worldwide-located ground stations and sometimes are inter-connected. They work as a system and are designed to complement each other.

IDRSS (the Indian Data Relay Satellite System):

- **Indian Data Relay Satellite System or IDRSS is a planned Indian constellation of Inter-satellite communications satellites.**
- It is planned to initially comprise two satellites, CMS-04 & IDRSS-2 in geostationary orbit.

Technology Development Satellite, TDS-01:

- **TDS-01 (Technology Demonstration Satellite-01) is an Indian geostationary orbit technology demonstration satellite carrying payloads** for the Indian Space Research Organisation (ISRO)'s Institute of Plasma Research, Gandhinagar and the CSIR-CEERI, Pilani.

More solar storms brewing after last week's aurorae as Sun 'wakes up'

Sub: Science and tech

Sec: Space sector

Tags: aurorae, Solar storms

Context:

- On the night of May 10, 2023, a **vivid display of aurorae was visible globally**, including in atypical locations such as **Hanle, Ladakh**.

Details of the event:

- The **aurorae** were caused by a **geomagnetic storm** triggered by **coronal mass ejections (CMEs)** from the **Sun**, which interacted with **Earth's magnetic field** and **upper atmosphere**.
- The event **coincided** with the **Sun approaching the peak of its 11-year solar cycle**, marked by **increased sunspot activity** and **magnetic field reversals**.
 - The **solar cycle** is the cycle that the **Sun's magnetic field** goes through **approximately every 11 years**.
 - The **solar cycle** affects activity on the surface of the Sun, such as sunspots which are caused by the **Sun's magnetic fields**.
- The specific **sunspot AR 3664** was noted to be **exceptionally active**, growing **16 times** as wide as Earth by May 7 and releasing **three CMEs** that impacted Earth on May 10.
- The last **similar intensity geomagnetic storm** occurred in **2003**. The **most severe historical geomagnetic storm** recorded occurred in **1859**, known for causing **widespread telegraph disruptions**.

Potential Hazards:

- Such solar events can cause significant disruptions, including **blackouts**, **satellite malfunctions**, and **dangers to astronauts** due to **intensified solar radiation and charged particles**.



Auroras:

- **Auroras are natural light displays** that occur when **charged particles from solar winds interact with the Earth's magnetosphere**.
 - The **magnetosphere** is the **region surrounding the Earth** where the dominant magnetic field is the **Earth's**, rather than the magnetic field of interplanetary Space.
 - It **protects** the Earth against **solar winds** and is **strongest at the poles**.
- These particles travel along the **Earth's magnetic field** and upon colliding with atmospheric molecules and atoms, cause **emissions of light** seen as auroras.
 - In North Pole- **Aurora Borealis**
 - In South Pole- **Aurora Australis**

Role of Aditya- L1:

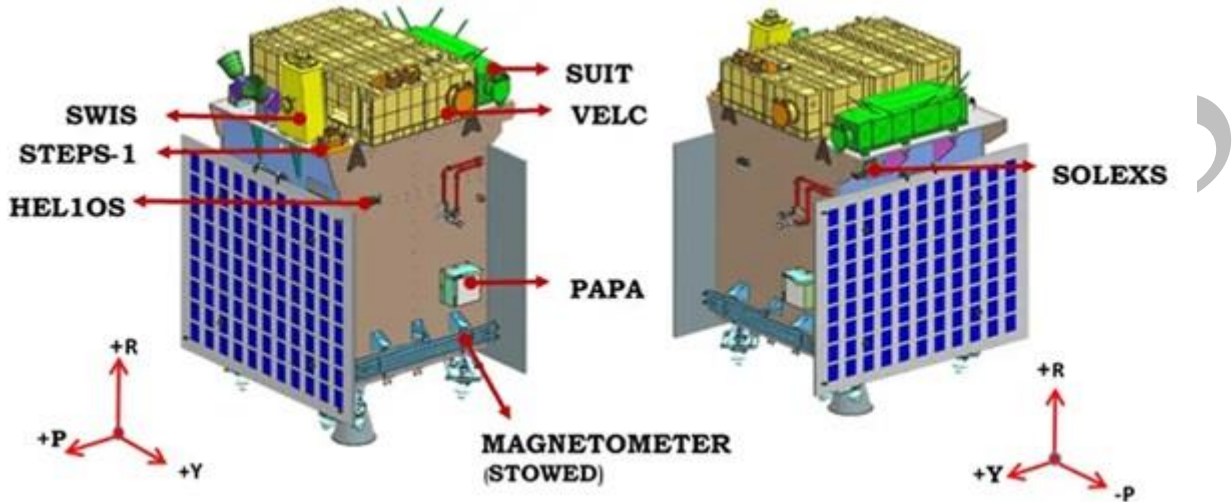
- **ISRO's spacecraft Aditya-L1**, positioned at the **L1 Lagrange point**, is equipped to **monitor solar activities** and played a role in observing recent solar events.
 - Instruments like **ISRO's Visible Emission Line Coronagraph (VELC)** on **Aditya-L1** are critical for advancing the understanding and prediction of solar storms.
 - **ASPEX payload** had captured the **enhancement of the alpha particle** and **proton flux** of the solar wind as signatures of the solar storm.
 - **SoLEXS** and **HEL1OS payloads** had **detected** "the multiple X- and M-class flares during the last few days".
- The **Chandrayaan-2 orbiter** around the **moon** also reportedly **detected "signatures"** of the **emissions from the Sun**.

About Aditya-L1 Mission:

- **Aditya-L1** is the **first space based observatory class Indian solar mission** to study the **Sun** from a substantial distance of **1.5 million kilometers**.
- Aditya-L1 is also ISRO's **second astronomy observatory-class mission after AstroSat (2015)**.
- The spacecraft is placed in a **halo orbit** around the **Lagrangian point 1 (L1)** of the **Sun-Earth system**.

Objective:

- The mission aims to provide valuable **insights into the solar corona, photosphere, chromosphere, and solar wind**.
- The **primary objective** of Aditya-L1 is to **gain a deeper understanding of the Sun's behavior**, including its **radiation, heat, particle flow, and magnetic fields**, and how they **impact Earth**.



Payloads of Aditya-L1 solar observatory:

Payloads of Aditya L-1	Description
Visible Emission Line Coronagraph (VELC)	<ul style="list-style-type: none"> • The VELC payload on-board Aditya-L1 is an internally occulted solar coronagraph with simultaneous imaging, spectroscopy and spectro-polarimetry channels close to the solar limb. • Both imaging and spectroscopic observations obtained by VELC payload are key to study the diagnostic parameters of solar corona and dynamics as well as origin of the coronal mass ejections and magnetic field measurements of the solar corona.
Aditya Solar wind Particle Experiment (ASPEX) payload	<ul style="list-style-type: none"> • Studies solar wind and energetic ions. • Analyze their energy distribution. • ASPEX comprises two cutting-edge instruments – the Solar wind Ion Spectrometer (SWIS) and STEPS (SupraThermal and Energetic Particle Spectrometer). • SWIS instrument has successfully measured solar wind ions, primarily protons and alpha particles.
Solar Ultra-violet Imaging Telescope (SUIT)	<ul style="list-style-type: none"> • Captures images of the Solar Photosphere and Chromosphere in near Ultraviolet (UV). • Measures solar irradiance variations in near UV.
Solar Low Energy X-ray Spectrometer (SoLEXS)	<ul style="list-style-type: none"> • Functions as a Soft X-ray spectrometer. • Studies X-ray flares from the Sun across a wide X-ray energy range.
High Energy L1 Orbiting X-ray Spectrometer (HELIOS)	<ul style="list-style-type: none"> • Acts as a Hard X-ray spectrometer. • Investigates X-ray flares from the Sun across a wide X-ray energy range.
Plasma Analyser Package for Aditya (PAPA)	<ul style="list-style-type: none"> • Gather data on plasma characteristics and composition in the interplanetary space. • Provides insights into solar wind interactions with the environment.
Advanced Tri-axial High-Resolution Digital Magnetometers (MAG)	<ul style="list-style-type: none"> • To measure the low-intensity interplanetary magnetic field in space. • It has two sets of Magnetic Sensors.

An overlooked molecule could solve the Venus water mystery

Sub: Science and tech

Sec: Space sector

Context:

- A recent study published in Nature examines why water disappeared from Venus.

About the study:

- More than four billion years ago, **Venus had enough water to cover its surface with an ocean 3 km deep. Today, the planet only has enough for this ocean to be 3 cm deep.**

What are the reasons for loss of water?

Hellish Atmosphere:

- The first is its **hellish atmosphere which is a result of its carbon dioxide-rich composition, which causes a strong greenhouse effect.**
- The planet's surface is **hotter than water's boiling point**, simmering at 450 degrees C. So water can only exist as vapor in Venus' atmosphere.

Planet's proximity to the Sun:

- The **Sun's heat and ultraviolet radiation** combined to shred water molecules into their constituent hydrogen and oxygen atoms in **Venus's ionosphere — the upper region of the atmosphere, where charged atoms, molecules, and their electrons zoom around at high speeds.**
- The two theories broadly blame thermal and non-thermal processes for the water loss.
- The thermal process refers to hydrodynamic escape. As the Sun heated Venus's outer atmosphere, it expanded, allowing hydrogen gas to leak to space.
- This escape lasted until the outer atmosphere sufficiently cooled, by about 2.5 billion years ago.

HCO⁺ dissociative recombination reaction (DR):

- Scientists have known for a while that **HCO⁺ molecules drive hydrogen escape on Mars.**
- On Venus, **the HCO⁺ dissociative recombination reaction (DR) occurs in bulk at an altitude of about 125 km, above the clouds made of sulphuric acid.**
- **HCO⁺ is created when a carbon monoxide molecule (CO) loses an electron while absorbing an hydrogen atom.**
- **DR is the reverse reaction:** HCO⁺ absorbs an electron and breaks up into CO and a hydrogen atom. These energetic hydrogen atoms then escape into space.
- It was found that the reaction accelerated water decline once the hydrodynamic escape of hydrogen gas ended.
- **HCO⁺ DR could have doubled the rate at which Venus lost water by hydrogen escape.**
- The model predicted that the amount of water on Venus would have stayed roughly the same from nearly 2 billion years ago.
- As a non-thermal process, the HCO⁺ DR reaction would've gone on indefinitely and drained all the water.
- The thermal process was time-bound because the upper atmosphere returned to thermal equilibrium.

About Venus:

- **Venus is the second planet from the Sun, and the sixth largest planet.**
- It's the **hottest planet in our solar system.**
- Venus is a cloud-swaddled planet named for a love goddess, and often called Earth's twin.

What are various missions to Venus?

BepiColombo:

- BepiColombo is a joint mission of the European Space Agency and the Japan Aerospace Exploration Agency to the planet Mercury.
- The mission comprises two satellites launched together: the Mercury Planetary Orbiter and Mio.
- Scientists found a signature of carbon ions escaping Venus in data collected by the BepiColombo spacecraft.

NASA's MAVEN:

- MAVEN is a NASA spacecraft orbiting Mars to study the loss of that planet's atmospheric gasses to space, providing insight into the history of the planet's climate and water.

Why has NASA launched a tiny satellite to measure heat lost from Earth's poles?

Sub: Science and tech

Sec: Space sector

Context:

- **On May 25, the National Aeronautics and Space Administration (NASA)** launched one of the two climate satellites, which would study heat emissions at Earth's poles, sitting atop Rocket Lab's Electron rocket from Mahia in New Zealand.

More on news:

- The second satellite will be launched in the following days.
- The **two shoebox-sized cube satellites or CubeSats** will measure how much heat the Arctic and Antarctica, i.e. two of the coldest regions on the Earth, radiate into space and how this influences the planet's climate.
- The mission has been named PREFIRE (Polar Radiant Energy in the Far-Infrared Experiment) and was jointly developed by NASA and the University of Wisconsin-Madison (US).

What are CubeSats?

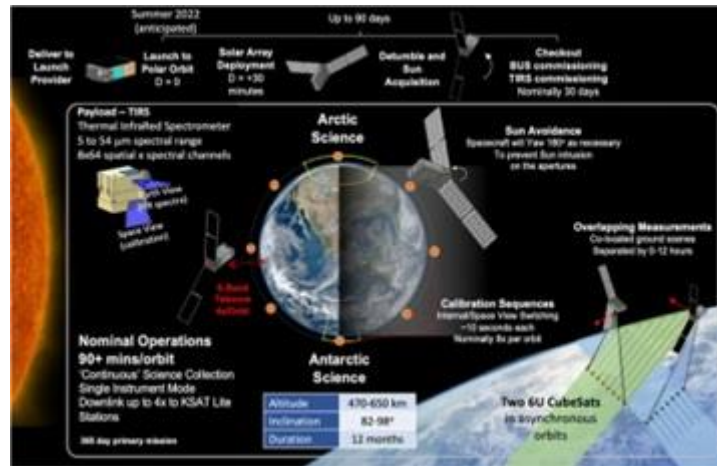
- **CubeSats are essentially miniature satellites** whose basic design is a **10 cm x 10 cm x 10 cm** (which makes up for "one unit" or "1U") cube, just a little bigger than a Rubik's cube and weight not more than 1.33 kg.
- Depending on the **CubeSat's mission, the number of units can be 1.5, 2, 3, 6, and 12U, according to NASA.**
- These satellites were first developed in 1999 by California Polytechnic State University at San Luis Obispo and Stanford University as educational tools.
- Owing to **their low cost and less mass in comparison to traditional satellites**, they began to be put in orbit for technology demonstrations, scientific research, and commercial purposes.
- Each of the PREFIRE satellites is a 6U CubeSat.
- They measure around 90 cm in height and nearly 120 cm in width when the solar panels, which will power the satellite, are deployed.
- The two satellites will be placed in a near-polar orbit at an altitude of about 525 kilometers.

Why do researchers want to measure heat emissions at Earth's poles?

- It has to do with the **Earth's energy budget, which is the balance between the amount of heat incoming to Earth from the Sun and the amount of heat outgoing from Earth into space.**
- The difference between the two determines the planet's temperature and climate.
- A large amount of the heat radiated from the Arctic and Antarctica is emitted as far-infrared radiation wavelengths of 3 μm to 1,000 μm within the infrared range of electromagnetic radiation.

What is the PREFIRE mission?

- A **mission designed for a pair of tiny satellites to measure a little-studied portion** of the radiant energy emitted by Earth, for clues about sea ice loss, ice-sheet melting, and a warming Arctic.
- Its **two CubeSats can study far-infrared radiation** from the Earth's pole and the data collected by them would help scientists better understand the energy budget of the planet.
- The observations will help us understand the fundamentals of Earth's heat balance, allowing us to better predict how our ice, seas, and weather will change in the face of global warming.
- Each of the **PREFIRE CubeSat is equipped with a thermal infrared spectrometer known as Thermal Infrared Spectrometer (TIRS)** and is aimed to measure the amount of infrared and far-infrared radiation from the Arctic and Antarctica.
- The **spectrometer features specially shaped-mirrors and detectors for splitting and measuring infrared light, according to NASA.**
- The **CubeSats** will also measure the amount of far-infrared radiation trapped by atmospheric water vapor and clouds at the poles and how this influences the greenhouse effect in the region.



What are Small Satellites?

- A **small satellite, miniaturized satellite, or smallsat** is a satellite of low mass and size, usually under **1,200 kg**.
- While all such satellites can be referred to as "small", different classifications are used to categorize them based on mass.

New light-based tool could cut cost of spotting viral infections

Sub: Science and tech

Sec: Space sector

Tags: Venus

Context:

- Recently, researchers from Harvard University, Cambridge, and Jiangsu University, Zhenjiang, reported developing one such tool which can detect if cells have been infected by a virus using only light and some knowledge of high-school physics.

Viral infections:

- A virus' spread from animals to humans could unleash pandemics like COVID-19 creating significant public health crises with considerable economic and social fallout.
- **To nip such infections in the bud, public health researchers have advocated the 'One Health' approach:**
 - **monitoring and protecting plants, animals, environment, and human health in an integrated fashion.**
- The one going on around the world killed more than 131 million poultry in 81 countries in 2022 and 2023, according to the World Health Organisation.
- The methods they use include polymerase chain reaction or antigen tests, which detect the genes or proteins associated with the H5N1 virus.

Methodology of the light based tool:

- A viral infection can stress cells and change their shapes, sizes, and features.
- The researchers behind the new study translated the cellular changes into patterns that could be used to say if a cell had been infected. They infected cells from a pig's testicles with pseudorabies virus, shone light on them through a microscope, and tracked how changes in the cells distorted the light.
- Then they compared these distortions with those in light that had been shone through healthy cells. They finally reported that the difference between the two light patterns represented a 'fingerprint' of virus-infected cells.

Diffraction:

- **Diffraction is the interference or bending of waves around the corners of an obstacle or through an aperture into the region of geometrical shadow of the obstacle/aperture.**
- **Diffraction is the tendency of light waves to spread out after they pass through narrow openings or around small objects.**
- Once this diffracted light reaches a wall it renders a pattern of alternating light and dark rings or stripes around a dark center.
- **The fingerprint was based on two parameters:**
 - the contrast between the light and dark stripes and
 - the inverse differential moment, a mathematical value that defined how textured the diffraction pattern was.
- The method can differentiate between uninfected, virus-infected, and dead cells.
- Virus-infected cells were elongated and had more clear boundaries than uninfected cells.

- This changed the contrast between light and dark stripes of the diffraction fingerprint, and increased the differences in light intensity.

Other methods used to detect viruses:

- In one technique, **researchers isolate infected cells in the lab and add chemical reagents like dimethyl thiazolyl diphenyl tetrazolium bromide to them.**
- **The reagent destroys the cells, but not before the enzymes in the cells (called oxidoreductases and dehydrogenases) react with the reagent to produce purple crystals of a chemical entity called formazan.**
- This color change tells researchers the cells could have had a viral infection.
- Cells dying of a viral infection lack these enzymes and thus produce little to no amounts of formazan crystals.

Advantages of Light Based methods:

- The researchers compared their new technique with this **standard for accuracy, time, and cost.**
- The light-based method could detect viral infections as accurately or even more accurately than **the standard method.**
- The new method was also cheaper than the standard: **while the equipment cost for the standard method using chemical reagents is about \$3,000 (Rs 2.5 lakh), the cost of the new method described in this paper was about a tenth.**
- The new method reportedly takes only about two hours to detect virus infected cells, against the 40 hours the current standard required.
- The low cost and ease of use point are likely to be lucrative to people working closely with animals, especially livestock or common pets such as dogs and cats.
- The new tool can help spot viral infections in their bodies as well as for the selection and breeding of excellent livestock and poultry species at the cellular level.
- While the new method is not specific to certain kinds of viruses, it can help detect viral infections in general and help stakeholders take preventive measures in time to avoid significant losses.

Venus has more volcanoes than previously known, new analysis finds

Sub: Science and tech

Sec: Space sector

Tags: Venus

Context:

- **Venus** appears to be **more volcanically active than previously known**, according to scientists whose new analysis of decades-old radar images has spotted evidence of eruptions at two additional sites on the surface of Earth's inhospitable planetary neighbor.

More on news:

- The new study builds on previous findings of ongoing Venusian volcanic activity. A 2023 study found that a volcanic vent on Maat Mons in a region called Atla Regio, near the equator, expanded and changed shape during the Magellan mission.
- Despite Venus and Earth being very similar in terms of size, mass, chemical composition and internal structure, there are fundamental differences that make Venus an infernal planet.

About the study:

- Radar images obtained by **NASA's Magellan spacecraft** from 1990 to 1992 indicated large lava flows at these two locations in the Venusian northern hemisphere at the time of the observations.
- **Magellan mapped 98% of the Venusian surface.**
- Advances in **computing capability have made analyzing Magellan's radar** data easier in recent years.
- One of the two sites is a **volcano called Sif Mons**, which is about 200 miles (300 km) wide and situated in a region called Eistla Regio.
- The before-and-after radar images indicate a lava flow amounting to about 12 square miles (30 square km) of rock.
- The other site is a large volcanic plain in a region called Niobe Planitia.
- The new rock at both locations was estimated to have an average depth between about 10 and 66 feet (three and 20 meters).
- The lava flows observed along the western flank of Sif Mons exhibit linear features with sinuous patterns that follow the direction of the maximum slope, generally towards the west.
- Regarding the flows in Niobe Planitia, the lava flows appear to originate near small shield volcanoes and extend towards the northeast, also following the direction of the slope.

About Magellan spacecraft:

- The **Magellan spacecraft was a 1,035-kilogram** robotic space probe launched by NASA of the United States, on May 4, 1989.

- It aims to map the surface of **Venus by using synthetic-aperture radar and to measure the planetary gravitational field.**

About Venus:

- It is the **second-brightest object in the sky after the moon.**
- It **appears bright because of its thick cloud cover that reflects and scatters light.**
- It is called the Earth's twin because of their similar sizes.
- The planet's **thick atmosphere traps heat and is the reason that it is the hottest planet in the solar system, despite coming after Mercury.**
- The surface temperatures on Venus can go up to 471 degrees Celsius, which is hot enough to melt lead.
- It moves forward on its orbit around the Sun but spins backwards around its axis slowly which implies that on Venus the Sun rises in the west and sets in the East.
- One day on Venus is equivalent to 243 Earth days because of its backward spinning, opposite to that of the Earth's and most other planets.
- Venus also does not have a moon and no rings.

Startup agnikula launches world first rocket with 3d printed engine

Sub: Science and tech

Sub: Space sector

Context:

- In a remarkable achievement, IIT Madras' startup, **Agnikula Cosmos, has launched the world's first rocket with a single-piece three-dimensional (3D) printed engine.**

More on news:

- The rocket **Agniban SORTeD (SubOrbital Technological Demonstrator) is also India's first semi-cryogenic engine-powered rocket launch that was completely designed and manufactured indigenously.**
- It was also launched from **India's first privately developed launchpad called 'Dhanush'** established by Agnikul at Sriharikota in Andhra Pradesh.
- The Indian Space Research Organisation (ISRO) is still developing a **semi-cryogenic engine known as the SCE-200 for its GSLV Mk III rocket.**
- **Agnikul is the second Indian private spaceflight** company to test its orbital launch system, following Skyroot Aerospace, who launched their Vikram-S rocket.

What is Agnibaan?

- **Agnibaan is a two-stage rocket with a capacity to carry up to 300 kg to a height of 700 km.**
- The rocket engines are powered by **liquid oxygen or kerosene.**
- It can access both low- and high-inclination orbits and is completely mobile, designed for accessing more than 10 launch ports, as per the company.
- Agnibaan used India's first semi-cryogenic engine, which uses a mix of liquid and gas for propellant. Liquid propellants can be reused and are safer than solid propellants.
- Semi-cryogenic engines help increase payload capacity, reduce launch costs and improve the overall reliability and performance of the launch vehicles.
- Agnibaan SORTeD (SubOrbital Technological Demonstrator) is a suborbital technological demonstrator of the Agnibaan launch vehicle, manufactured by Indian space startup Agnikul Cosmos.
- The **SORTeD mission is a single-stage launch vehicle demonstration that is powered by a semi-cryogenic engine called the Agnilet.**

Key Purpose of the mission:

- The test flight aims to **demonstrate in-house and homegrown technologies, gather crucial flight data, and ensure the optimal functioning of systems for Agnikul's orbital launch vehicle, the 'Agnibaan'.**
- Agnikul Cosmos is developing launch vehicles that are both affordable and customisable according to customer needs.

Can the newly discovered organelle help engineer plants to fix nitrogen?

Sub: Sci

Sec: Msc

Endosymbiotic Theory:

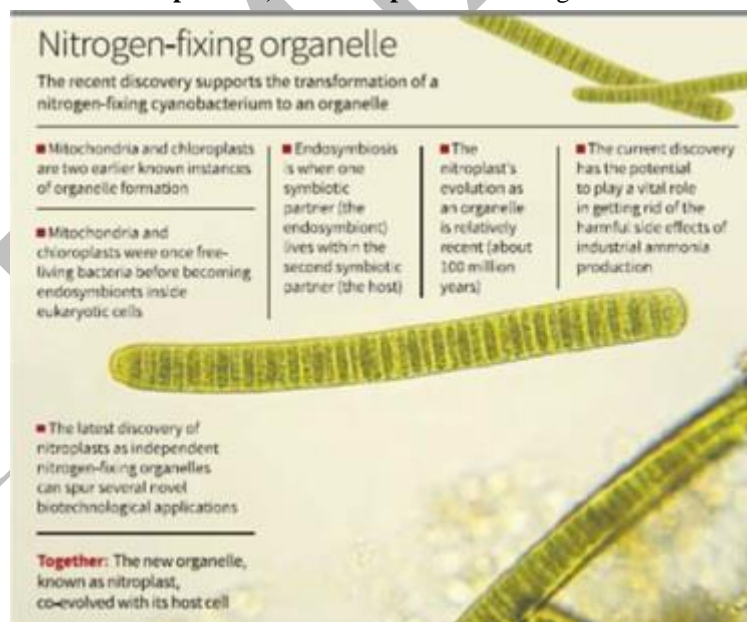
- Initially posited by **Charles Darwin** in the **19th century**, the **theory of natural selection** explains **how species adapt to their environment**.
- Contrary to the **Neo-Darwinist** focus on random genetic mutations, **Lynn Margulis** proposed the **endosymbiotic theory** suggesting that **organelles** such as **mitochondria** and **chloroplasts (the sites of cellular respiration and photosynthesis)** **originated from free-living bacteria ingested by other cells**. Despite initial resistance and rejection by 15 journals, her theory gained acceptance following publication in 1967.

Recent Discoveries in Nitrogen Fixation:

- **Nitrogen**, crucial for **DNA** and **proteins**, is mostly **inert in the atmosphere**, necessitating **biological fixation** into **ammonia** by **certain bacteria and archaea**. This process is vital for making nitrogen accessible to plants.
 - Unlike many **free-living nitrogen-fixing bacteria**, **legumes**, a class of plants in the family **Fabaceae**, bear the **nitrogen-fixing bacteria** in their **root nodules**.
 - **Ammonia** is converted to **nitrites** and **nitrates** (**nitrification**) and then back into **atmospheric nitrogen** (**denitrification**) with the help of **bacteria** to complete the cycle.
- In **marine environments**, like on Earth, **bacteria** and **archaea** are also involved in **ammonification**, **nitrification**, and **denitrification**. Beyond **mitochondria** and **chloroplasts**, the current discovery extends the earlier reports of a **nitrogen-fixing cyanobacterium** in **marine algae** and establishes it as a **new organelle**. The new organelle '**nitroplast**' **co-evolved with its host cell**.
 - **Jonathan Zehr** and **Kyoko Hagino's** research established the **symbiotic relationship** between the **marine algae Braarudosphaera bigelowii** and the **cyanobacterium Candidatus Atelocyanobacterium thalassa** or **UCYN-A (capable of fixing nitrogen)**.
- Unlike **mitochondria** and **chloroplast endosymbiosis**, which happened nearly **two billion years back**, **nitroplast's evolution** as an **organelle** is relatively **recent** (about 100 million years).

Criteria for Organelle Status:

- **Nitroplast** satisfies **essential criteria** for being considered an **organelle**, such as **integration into the host cell's function and architecture**, **protein import from the host**, **synchronization with host cell growth**, and **inheritance during cell division**.
- **Genomic and Functional Adaptation:** The **transformation of symbionts** into organelles involves significant **genetic reduction** and **reliance on host cell proteins**, with **nitroplasts** exhibiting these characteristics.



Significance of the discovery:

- The **industrial synthesis of ammonia** via the **Haber-Bosch process** has significantly **boosted agriculture** but also led to **environmental issues**. The **discovery of nitroplasts** may lead to **sustainable agricultural practices** by facilitating **biological nitrogen fixation** in plants.
- Potential applications include **engineering host cells** and **nitroplasts** with **minimal genomes for efficient growth and nitrogen fixation**, and **introducing nitroplasts into plant cells to directly fix nitrogen**. These approaches, while promising, pose significant scientific challenges and are currently theoretical.
- The extension of the **endosymbiotic theory** to include **nitrogen-fixing organelles** represents a significant leap in understanding **cellular evolution and symbiosis**. This advancement not only deepens our comprehension of **biological**

complexity but also holds **transformative potential for agriculture**, promising a future of **environmentally friendly and sustainable farming practices**.

This worm develops food habits and its offspring ‘inherit’ them

Sub: Science and tech

Sec: Msc

Context:

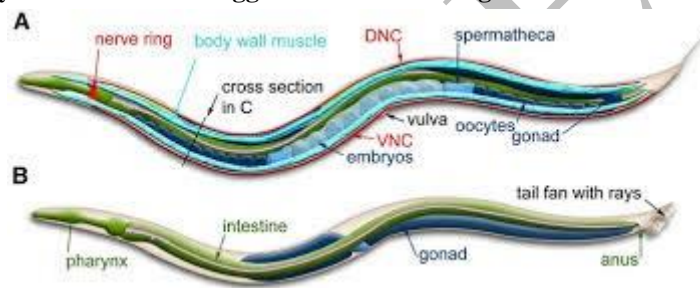
- Researchers from Princeton University in the U.S. reported that after **C. elegans worms ate a disease-causing strain of bacteria**.

More on news:

- Researchers had previously discovered this trans-generational ability in **C. elegans worms against P. aeruginosa bacteria (which also cause disease in humans)**.

About Caenorhabditis elegans:

- *Caenorhabditis elegans* is a **free-living transparent nematode** about 1 mm in length that lives in temperate soil environments.
- *C. elegans* has **two natural sexes, XO males and XX hermaphrodites**.
- The **hermaphrodites are simply self-fertile females** whose **only male character is the ability to make the limited number of sperm used solely for internal self-fertilization**.
- **Roundworm *Caenorhabditis elegans* is called “the worm”** because of its widespread use in research to understand neuronal and molecular biology.
- It was the **first multicellular organism to have its full genome sequenced and neural wiring mapped**.
- It grows within **3-5 days from a fertilized egg to a millimeter-long adult**.



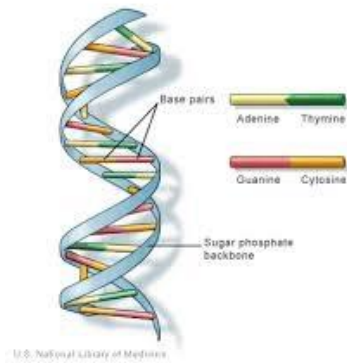
Mechanism:

- ***Pseudomonas vranovensis* is a disease-causing bacterium** found in *C. elegans*'s natural environment.
- ***P. vranovensis* makes a small RNA molecule called sRNA**.
- When the worms ingest this strain, they also take in the sRNA.
- **The sRNA then altered the worm's feeding behavior**.
- The worms 'know' to avoid feeding on this bacterium and save themselves from getting sick.
- This learned avoidance behavior was found to be transmitted to the trained worm's progeny.
- The ability decayed only from the fifth generation.

About DNA, mRNA and sRNA:

DNA:

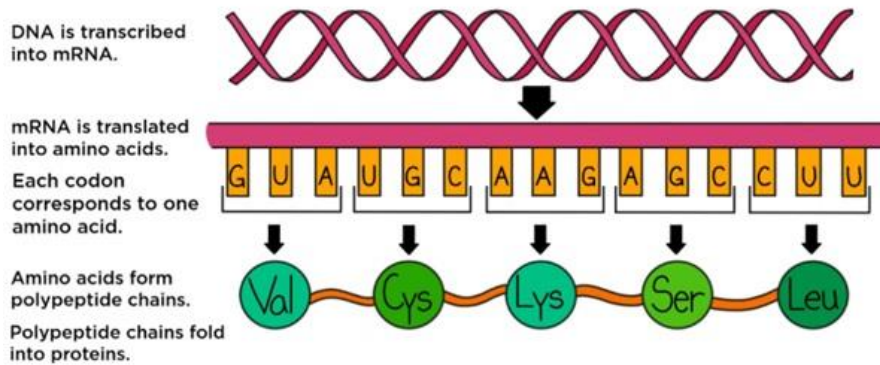
- **Deoxyribonucleic acid (abbreviated DNA) is the molecule** that carries genetic information for the development and functioning of an organism.
- DNA is made of two linked strands that wind around each other to resemble a twisted ladder — a **shape known as a double helix**.



Mrna:

- **Messenger ribonucleic acid (mRNA)** is a **single-stranded molecule of RNA** that corresponds to the genetic sequence of a gene, and is read by a ribosome in the process of synthesizing a protein.
- In cellular function, mRNA, or messenger RNA, is of paramount importance across transcription, transportation, translation, regulation, cell signaling and beyond. Converted from the genetic information in DNA, it transcribes this data into an RNA format.

mRNA: The Starting Point of Translation

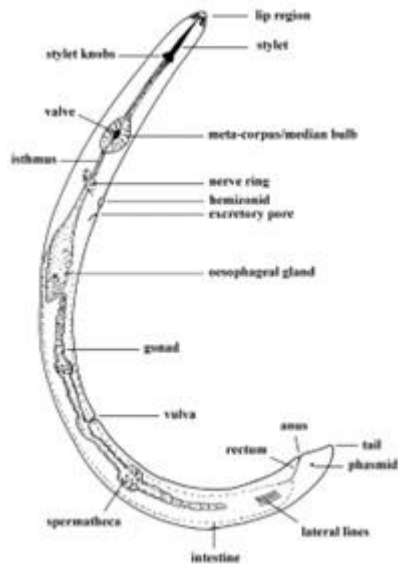


sRNA:

- **Bacterial small RNAs (sRNAs)** are an emerging class of regulatory RNAs of about 40–500 nucleotides in length and, by binding to their target mRNAs or proteins, get involved in many biological processes such as sensing environmental changes and regulating gene expression.

What are Nematodes?

- The **nematodes, roundworms or eelworms constitute the phylum Nematoda.**
- They are a diverse animal phylum inhabiting a broad range of environments.
- Most species are free-living, feeding on microorganisms, but there are many that are parasitic.
- The parasitic worms are the cause of **soil-transmitted helminthiases**



About is E coli:

- Escherichia coli is a gram-negative, facultative anaerobic, rod-shaped, coliform bacteria of the genus Escherichia that is commonly found in the lower intestine of warm-blooded organisms.

Why was Singapore flight turbulence severe?

Sub: Science and tech

Sec: Msc

Context:

- On May 20-21, a **Singapore Airlines flight, SQ321**, with 211 passengers and 18 crew, from London's Heathrow Airport to Singapore encountered severe turbulence while over the Andaman Sea/Bay of Bengal near the Irrawaddy Basin, Myanmar.

More on news:

- The **United States National Transportation Safety Board (NTSB)** is to assist Singapore's investigation as the aircraft is a Boeing jet.







What is Turbulence?

- **Turbulence occurs by the relative movement** of disturbed air through which an aircraft is flying.
- It could be **thermal or mechanical and can happen** either within or when it is clear of clouds.
- Turbulence is one of the most unpredictable of all the weather phenomena that are of significance to pilots.
- Turbulence is an irregular motion of the air resulting from eddies and vertical currents.
- It may be as insignificant as a few annoying bumps or severe enough to momentarily throw an airplane out of control or to cause structural damage.
- Turbulence is associated with fronts, wind shear, thunderstorms, etc.
- Its **severity depends on the rate at which the speed** or the direction of airflow/or both changes

- Turbulence is basically what happens when there is friction between airflow or wind flowing in different directions.
- When **it involves aviation, there are two main forms, which are Clear Air Turbulence (CAT), which happens around jet streams, and the other being inside or around cumulonimbus clouds.**
- The clouds have very strong upwards air currents in the middle and downwards air currents around the outside, which can result in quite serious turbulence.
- The faster an aircraft is, the more severe the response to the turbulence.
- **Turbulence on flights can be caused by storms, mountains, and strong air currents called jet streams.**
- It is called clear air turbulence, and can be difficult to avoid because it does not show up on the weather radar in the flight deck.

TURBULENCE INTENSITY:

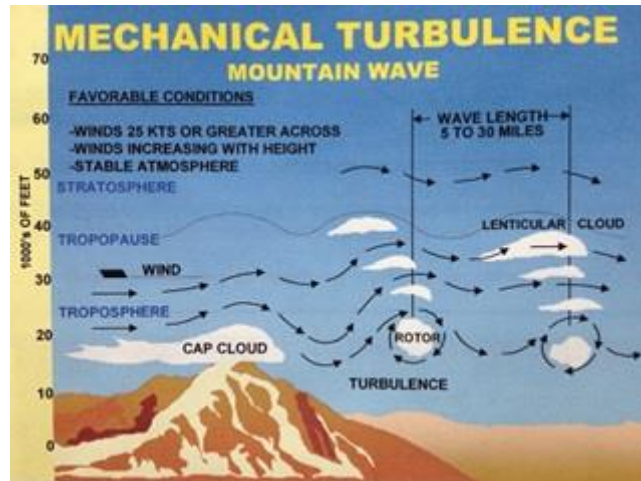
- In reporting turbulence, it is usually classed as light, moderate, severe or extreme.
- The degree is determined by the nature of the initiating agency and by the degree of stability of the air.
- **Light turbulence momentarily causes slight changes** in altitude and/or attitude or a slight bumpiness.
 - Occupants of the airplane may feel a slight strain against their seat belts.
- **Moderate turbulence is similar to light turbulence** but somewhat more intense. There is, however, no loss of control of the airplane.
 - Occupants will feel a definite strain against their seat belts and unsecured objects will be dislodged.
- **Severe turbulence causes large and abrupt changes** in altitude and/or attitude and, usually, large variations in indicated airspeed.
 - The airplane may momentarily be out of control. Occupants of the airplane will be forced violently against their seat belts.
- In **extreme turbulence, the airplane is tossed violently** about and is impossible to control.
 - It may cause structural damage.
- **Chop is a type of turbulence** that causes rapid and somewhat rhythmic bumpiness.

TURBULENCE INTENSITY		
INTENSITY	AIRCRAFT REACTION	INSIDE AIRCRAFT
 Light	MOMENTARILY CAUSES SLIGHT, ERRATIC CHANGES IN ALTITUDE AND/OR ATTITUDE	UNSECURED OBJECTS MAY BE DISPLACED SLIGHTLY. FOOD SERVICE EASILY CONDUCTED. NO DIFFICULTY IN WALKING
 Moderate	CHANGES IN ALTITUDE AND/OR ATTITUDE. AIRCRAFT REMAINS IN POSITIVE CONTROL. VARIATIONS IN INDICATED AIRSPEED	UNSECURED OBJECTS DISLODGED. FOOD SERVICE AND WALKING DIFFICULT.
 Severe	LARGE ABRUPT CHANGES IN ALTITUDE AND/OR ATTITUDE. LARGE VARIATIONS IN INDICATED AIRSPEED. AIRCRAFT MAY BE MOMENTARILY OUT OF CONTROL.	FOOD SERVICE AND WALKING IMPOSSIBLE.
 Extreme	AIRCRAFT VIOLENTLY TOSSED ABOUT AND IS PRACTICALLY IMPOSSIBLE TO CONTROL. MAY CAUSE STRUCTURAL DAMAGE.	STRONG DESIRE TO LAND.

Causes of Turbulence:

Mechanical Turbulence:

- Friction between the air and the ground, especially irregular terrain and man-made obstacles, causes eddies and therefore turbulence in the lower levels.
- The intensity of this eddy motion depends on the strength of the surface wind, the nature of the surface and the stability of the air.
- The stronger the wind speed (generally, a surface wind of 20 knots or higher is required for significant turbulence), the rougher the terrain and the more unstable the air, the greater will be the turbulence.

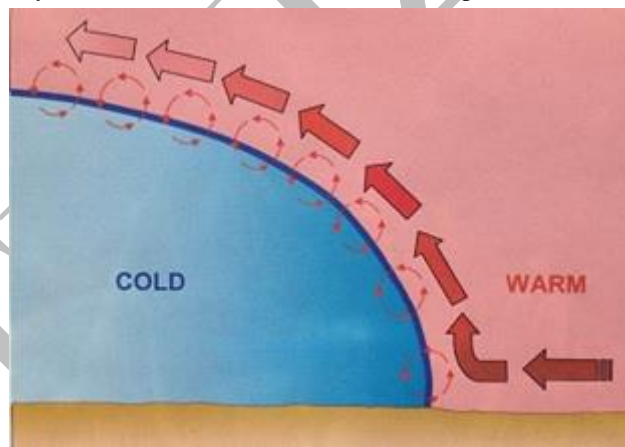


Thermal (Convective) Turbulence:

- Turbulence can also be expected on warm summer days when the sun heats the earth's surface unevenly.
- Certain surfaces, such as barren ground, rocky and sandy areas, are heated more rapidly than are grass covered fields and much more rapidly than is water.
- Isolated convective currents are therefore set in motion with warm air rising and cooler air descending, which are responsible for bumpy conditions as an airplane flies in and out of them.
- Turbulence extends from the base to the top of the convection layer, with smooth conditions found above.

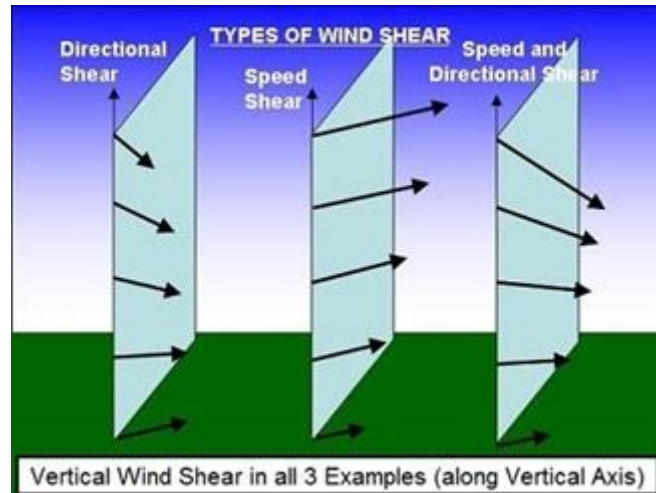
Frontal Turbulence:

- The lifting of the warm air by the sloping frontal surface and friction between the two opposing air masses produce turbulence in the frontal zone.
- This turbulence is most marked when the warm air is moist and unstable and will be extremely severe if thunderstorms develop.
- Turbulence is more commonly associated with cold fronts but can be present, to a lesser degree, in a warm front as well.



Wind Shear:

- Wind shear is the change in wind direction and/or wind speed over a specific horizontal or vertical distance.
- Atmospheric conditions where wind shear exists include: areas of temperature inversions, along troughs and lows, and around jet streams.
- When the change in wind speed and direction is pronounced, quite severe turbulence can be expected. Clear air turbulence is associated at high altitudes (i.e. above 15,000 feet AGL) with the jet stream.



Turbulence and Climate Change:

- There is **strong evidence that turbulence is increasing because of climate change.**
- It was recently discovered that severe clear air turbulence in the North Atlantic has increased by 55% since 1979.

Work of Aviation attorneys:

- Aviation attorneys work with aviation and weather experts to plot the aircraft's route, obtain satellite images of the weather at the time and location of the encounter, and to quickly secure airline data to help prove the claim.
- They even look at whether the crew knew there was bad weather ahead but decided not to deviate to save time, fuel, and airline money.

What are colours and how do people understand them?

Sub: Science and tech

Sec: Msc

What is colour?

- **Colour is a type of information our eyes receive and process based on electromagnetic radiation.**
- **An object by itself can't be said to have a color but based on which frequencies of visible-light radiation it absorbs, reflects, and/or scatters, we can perceive the object to have a particular color.**

How are humans able to perceive colors?

- In the human eye, **the rod and the cone cells receive information in the light that strikes the eye.**
- **The rod cells record brightness while the cone cells record the wavelengths, which the human brain interprets as color.**
- Human beings have three types of cone cells.
- Each type is sensitive to light of a different wavelength, and they work together to input color information to the brain.
- The possession of three types of cone cells is why humans are called trichromats.
- Many birds and reptiles, on the other hand, are tetrachromats (four types of cone cells).
- While human vision is restricted to wavelengths from 400 nm to 700 nm (visible light), honeybees can also 'see' ultraviolet light and mosquitoes and some beetles can access information in some wavelengths of infrared radiation

Science of colors:

- Until the late 19th century, traditional color theory specified the different ways in which dyes, pigments, and inks could be mixed to make other colors.
- In this paradigm, there were three primary colors e.g. red, yellow, and blue.
- These colors when combined in different ways could produce all the colors the human eye is capable of seeing.
- Modern color theory, more accurately color science, rejected the idea of there being three fixed colors. According to color science, all the colors that could be produced by combining any three colors in different ways is called the gamut of those three colors.
- Each color in a gamut populates a given color space, and all color spaces are smaller than the full range of colors the eye can see.

Rendering of colors:

- There are two broad ways to render colors i.e. additive and subtractive coloring.

- **In additive coloring, light of different wavelengths is ‘mixed’ to yield light of one combined color.**
- A common color space associated with additive coloring is the RGB space: where red, green, and blue when added to each other in varying measures produces other colors.
- **In subtractive coloring, a color is rendered by passing white light through a medium that absorbs, or takes away, specific wavelengths of light thereby leaving the rest to render a particular color.**
- The typical examples include dyes, pigments, and inks. A dye is a chemical compound that can absorb certain wavelengths of light.
- When a cloth is dyed, the dyeing compound forms chemical bonds with compounds in the cloth and imbues the cloth with the corresponding color.

What are the properties of color?

- In color science, **all colors however rendered are said to have a few appearance parameters: hue, brightness, lightness, and chromaticity.**
- **Hue:**
 - A **Technical committee of the International Commission on Illumination specified the definition of hue to be the degree to which a given (perceived) color can be said to be “similar to or different from” perceived “red, orange, yellow, green, blue, violet”.**
 - Isaac Newton defined complementary colors on the basis of hue i.e. if two colors combine to produce a grayscale color i.e. lacking in hue — they are complementary.
- **Brightness:**
 - **Brightness is related to an object’s luminance.**
 - The luminance is the power emitted by a source of light per unit area, weighted by wavelength.
 - The eye’s subjective perception of this power in some direction is inferred as the source’s brightness.
- **Lightness:**
 - **Lightness** refers to the extent to which a coloured object appears light compared to a white-coloured object that is well lit.
- **Chromaticity:**
 - **The chromaticity, or chromatic intensity,** has to do with the human perception of color and depends on the color’s quality irrespective how well it is lit.

What are LEDs?

- **A light-emitting diode (LED) is a semiconductor** device that emits light when an electric current is passed through it.
- Light is produced when the particles that carry the current (known as electrons and holes) combine together within the semiconductor material.

What are Blue LEDs?

- **Blue LED Light can be defined as light given off from light-emitting diodes (LEDs) in the visible light spectrum between the wavelengths of 400 to 500 nanometers (nm).**
- Blue Light sits on the spectrum between violet and green.
- Blue LEDs have an active region consisting of one or more InGaN quantum wells sandwiched between thicker layers of GaN, called cladding layers.
- By varying the relative In/Ga fraction in the InGaN quantum wells, the light emission can in theory be varied from violet to amber.

CSE 2025

AIMING FOR THE TOP RANK IN CSE 2025

JOIN THE BEST MENTORSHIP PROGRAM

(The only program with Daily Target & Daily Answer writing)



Ishita Kishore
ALL India Rank 1

LAQSHYA Prelims Mentorship Student
Mains Master Notes Program Student

Book one to session with
Santosh sir
82350 35144



Prepare under
Santosh Sir
All 6 Pre Qualified
4 Mains Qualified
State PCS Qualified
Ex Deputy Collector

To Be The Best
Learn From The Best

OPTIMIZED