UPSC Daily Current Affairs| Prelim Bits 18-04-2025

Microbial Conditions on K2-18 b

Prelims – *General Science.*

Mains (GS III) – *Awareness in the fields of Space.*

Why in News?

Researchers utilizing the James Webb Space Telescope have detected possible bio-signature gases in the atmosphere of exoplanet K2-18 b hinting at the presence of microbial life.

- **Recent Findings -** The atmosphere of the planet holds chemical signatures of gases that, on Earth, are exclusively generated through biological activities, primarily microbial life such as marine phytoplankton algae.
- The two gases
  - Dimethyl sulfide, or DMS, and
  - Dimethyl disulfide, or DMDS
- The gases were detected at atmospheric concentrations of more than 10 parts per million by volume.
- To ascertain the chemical composition of an exoplanet's atmosphere, astronomers analyze the light from its host star as the planet passes in front of it from the perspective of Earth, called the ***transit method.***
- Earlier observations by Webb had identified methane and carbon dioxide in K2-18 b's atmosphere, the first time that carbon-based molecules were discovered in the atmosphere of an exoplanet in a star's habitable zone.

K2-18 b

- It is an ***exoplanet*** (orbits a star outside of our own solar system) found in a habitable zone, a distance where liquid water, a key ingredient for life, can exist on a planetary surface.
- **Discovered by -** Kepler Space Telescope in 2009.
- Constellation – Leo.
- **Location -** It orbits the red dwarf star K2-18, located approximately 124 light-years away from Earth.

  A light-year is the distance light travels in a year, 9.5 trillion km.

- **Size & weight –** It is with a radius 2. 6 times that of Earth and a mass 8. 6 times greater.

- **Type of Planet –** It is part of the "sub-Neptune" class of planets, with a diameter greater than Earth's but less than that of Neptune, our solar system's smallest gas planet.

James Webb Space Telescope (JWST)
• It is the largest and most powerful infrared space telescope ever built. • **Joint project by -** NASA, the European Space Agency (ESA), and the Canadian Space Agency (CSA). • **Launched in -** December 2021. • **Location -** JWST is positioned at the Sun-Earth L2 Lagrange point, a stable location for observation and minimal orbital adjustments. • **Objective -** To study the formation of stars and galaxies, examine exoplanet atmospheres, observe the early universe, and explore the origins of life. • **Infrared Focus -** Unlike Hubble, which primarily observes visible and ultraviolet light, JWST is optimized for infrared, enabling it to see through dust clouds and observe objects far beyond Hubble's reach.

Reference

The Hindu | exoplanet K2-18 b

India Justice Report, 2025

Prelims – *Current events of National Importance.*

Mains (GS II) – *Judiciary | Dispute Redressal Mechanisms | E-Governance.*

Why in News?

India Justice Report (IJR) 2025 released recently said that not a single State or Union Territory has met their own reserved quotas for women in the police.

- It is India's only ***ranking of States/UTs on the delivery of justice*** released annually.
- **Initiated by** - Tata Trusts and supported by several civil society organizations and data partners.
- **Indicators** - Police, Judiciary, Prisons and Legal Aid.
- **Filters** - human resources, infrastructure, workload and diversity.

Key Findings

Positive Findings

- Southern states of India are performing the best when it comes to policing, justice delivery and prison management.
- **Top states -** All the top spots in the large and mid-sized category were taken by southern states - *Karnataka, Andhra Pradesh, Telangana, Kerala and Tamil Nadu.*

Karnataka is the only State that met quotas in both Police and Judiciary and Bihar has the highest share of women in State police.

- **Bottom states -** Bengal came at the bottom of the table, followed by Uttar Pradesh, Uttarakhand, Jharkhand and Rajasthan.
- Among the 7 small states, Sikkim was the best-performer, while Goa was the laggard.
- **Improving states -** Telangana, which ranked 11th in the last survey, jumped to the 3rd spot in the latest report.
- Bihar showed the most improvement in the category of police from 2022 to 2025.

- **Case disposal rate -** High Courts have consistently achieved a disposal rate exceeding 100%, while subordinate courts have also shown progress.
    - For instance, more than 86% of prisons are now equipped with video-conferencing facilities for conducting trials.
- **Prison Management -** Tamil Nadu retained its top position in managing prisons, with increased budget allocation and 100% utilization.

Negative Findings

- **Reserved quota gap -** Not a single State/UT meets their own reserved quotas for women in police force
- **Infrastructure gap -** 17% of police stations in the country do not have a single CCTV, while 3 in 10 police stations do not have women help desks.
- **Police-population ratio -** Nationally, the ratio remained stagnant at 155 police personnel per 100,000 population, significantly below the sanctioned strength of 197.5.
    - In India, one civil police personnel is available for 831 people.
- **Under-trial issue -** 91% of Delhi's prison population consisted of under-trials.
- **Prison overcrowding -** 176 prisons operate at over 200% capacity.
- **Inadequate spending**
    - **On legal aid –** Rs. 6 per annum.
    - **On prisons** - Rs. 57.
    - **On the judiciary** - Rs. 182.

Reference

The Hindu | India Justice Report 2025

Rishikesh-Karnaprayag Rail Link Project

Prelims – *Current events of National Importance.*

Mains (GS III) – *Infrastructure.*

Why in news?

Recently, the Railway Minister observed the completion of India's longest rail tunnel, Tunnel

No. 8, located between Devprayag and Janasu, part of the Rishikesh-Karnaprayag Rail Link Project in Uttarakhand.

- It is set to become the India's ***longest transport tunnel***, surpassing existing rail and road tunnels in ***Jammu and Kashmir and Himachal Pradesh.***
- **Completion expected by** - 2026-27.
- **Agency -** Rail Vikas Nigam Limited (RVNL), a public sector undertaking under the Ministry of Railways.
    - Achieved breakthrough using a German-made tunnel boring machine (TBM) named ***'Shakti'.***
- This initiative aims to enhance access to the Char Dham pilgrimage sites of ***Yamunotri, Gangotri, Badrinath, and Kedarnath***, located in the Garhwal region of the Himalayas in Uttarakhand.
- The railway line spans approximately 125.20 kilometers and will feature 12 stations, 35 bridges, and 17 tunnels.
- Notably, it includes a significant 15.1-kilometer tunnel connecting *Devprayag and Lachmoli.*
- Additionally, this rail project is part of a broader Indian geostrategic effort to develop infrastructure along the India-China border.
- The progress of the project is being tracked through the Government of India's ***PRAGATI (Pro-Active Governance and Timely Implementation)*** portal.

Reference

The Hindu | Rishikesh-Karnaprayag rail link project

Supreme Court on the Use of Urdu on the Signboard

Prelims (GS I) – *History and Culture of India.*

Mains (GS I) – *Indian heritage and culture.*

Why in news?

The Supreme Court recently upheld the use of Urdu on a municipal signboard in Maharashtra's Akola district, declaring that language should unite, not divide.

- **Origin of Urdu** – Urdu is an ***Indo-Aryan language*** emerged around the 12th century in Northern India.
- **Constitutional Status** – In India, it is an ***8th Schedule language*** and it has been adopted as the second official language by several states.

> *Article 345 of the Constitution of India states that a state's legislature can adopt one or more languages or Hindi as the official language of the state.*

Supreme court Judgement

- The Supreme Court *described Urdu as the finest specimen of Ganga-Jamuni Tehzeeb*, or the Hindustani Tehzeeb.

Ganga-Jamuni Tehzeeb (Hindustani tahzeeb)
• **Ganga-Jamuni Tehzeeb** – It refers to the syncretic Indo-Islamic cultural tradition that developed in plains of northern and central India. • The term is a metaphor derived from these two rivers the Ganga and the Yamuna (Jamuna), which flow separately but eventually meet and blend their waters. • **Ganga-Jamuni** – Hindi word, meaning mixed. • **Tehzeeb** – Urdu word, meaning civilization, culture, and development. • It represents the harmonious *blending of Hindu and Muslim* cultural elements, traditions, arts, architecture, music, cuisine and language.

- **Similarities with Hindi** – Supreme court noted *that Hindi and Urdu were fundamentally one language* with similarities in syntax, grammar and phonology.

  The main difference is that Urdu is mainly written in Nastaliq script and Hindi in Devanagari script.

- **Exchange of vocabularies** – The word Hindi itself comes from the *Persian word Hindavi*.
- Urdu also has many words borrowed from other Indian languages, including Sanskrit.
- **Hindi-Urdu controversy –** The separation of Hindi and Urdu was partly due to moralist on both sides where *Hindi became more Sanskritised* and *Urdu more Persian*.
- **Religious polarization –** The framing of Hindi is the language of the Hindus and Urdu of the Muslims undermines the principles of unity in diversity and universal brotherhood.
- Sc emphasized that *A language is only a means of communication and does not represent a religion*,
- Language is the yardstick to measure the civilizational march of a community and its people.

Reference

The Hindu| Supreme Court on the Use of Urdu on the Signboard

NITI Aayog report on India's Hand & Power Tools Sector

Prelims (GS I) – *Economic and Social Development.*

Mains (GS III) – *Employment | Growth & Development | Inclusive Growth.*

Why in news?

Recently, NITI Aayog released a report named, Unlocking $25+ Billion Export Potential - India's Hand & Power Tools Sector.

- **Objective** – To outline a strategic path for the sector to enhance its global competitiveness and capture a significantly larger share of the international market.

Findings of the report

- **Global market** – The worldwide tools market, which was estimated in 2022, is anticipated to be doubled to expand by 2035.
- Hand tools and Power tools sector are expected to experience steady growth.
- China dominates global exports, holding about **50%** of the hand tools market and **40%** of the power tools market
- **Indian market** – India has a smaller presence, 1.8% market share in hand tools and 0.7% market share in power tools.
- **India's potential** – India can reach 10% market share in power tools and 25% in hand tools in exports over the next decade.
- It could create approximately 35 lakh jobs.
- **Challenges in Indian tools market growth** – Cost disadvantage compared to China due to higher structural costs and smaller operational scale.
- This disadvantage stems from elevated raw material costs, such as steel, plastic, and motors and lower labour productivity.
- Higher interest rates and logistics costs for transporting goods from inland states to ports.

Suggested measures by the report

- India can solidify the nation's position as a reliable, high-quality global manufacturing hub by,
    - Fostering innovation
    - empowering our MSMEs
    - Strengthening India's industrial ecosystem
- Developing world-class hand tool clusters under a public-private partnership (PPP) with advanced infrastructure.
- Addressing structural cost disadvantages through market reforms such as reducing import duties and reducing penal provisions like interest on defaults.
- Providing bridge cost support to offset cost disadvantages to give impetus to growth of the sector.

Quick Facts
• **Hand tools** – These are non-motorized tools that rely on manual effort. • Common examples include screwdrivers, hammers and handsaws. • **Power tools** – Power tools use external source such as electricity or batteries to work faster and stronger. • Both types are essential in construction, woodworking, automotive repair, and other industries. • **Hand and Power tools sector** – The tools industry serves as a foundational pillar of the global manufacturing ecosystem. • The Hand and Power Tools sector represents a significant opportunity to realise India's ambition of becoming a global manufacturing hub.

Reference

PIB| NITI Aayog report on India’s Hand & Power Tools Sector

One Liners 18-04-2025

History, Art and Culture

Fourth Anglo-Mysore War

The Fourth Anglo-Mysore War commenced on April 17, 1799, and concluded swiftly with the fall of Seringapatam on May 4, 1799.

• **Initial British Military Successes** – Early in the conflict, Tipu Sultan faced significant defeats at the hands of English Generals Stuart and subsequently Harris, weakening his forces.

• **Tipu Sultan's Final Stand** – The war culminated in Tipu Sultan's courageous defense of his capital, Seringapatam, where he ultimately met his death while valiantly fighting the British forces.

• **Consequences for Tipu's Family** – Following Tipu Sultan's demise, the British took his family into custody, detaining them at Vellore, and seized his considerable wealth and treasures.

Geography

Devastation on Tuti Island

In recent times, Tuti Island has suffered immense devastation due to Sundanese Civil war which erupted on April 15, 2023.

• **Located in** – Khartoum, Sudan, at the confluence of the Blue Nile and White Nile rivers.

• **Historical significance** – As one of Khartoum's oldest settlements, Tuti Island is deeply rooted in history. The Mahas community, who settled there in the 15th century, consider it a vital symbol of their indigenous identity.

• **Traditional livelihoods** – The 8-square-kilometer island was traditionally known as "Khartoum's garden" due to its fertile land, supporting the livelihoods of its inhabitants through farming and fishing.

• **Impact of the Sudanese conflict** – The ongoing civil war has had a catastrophic impact on Tuti Island, contributing to the wider crisis in Khartoum, where UN estimates indicate mass displacement, casualties, and severe famine conditions.

Polity & Governance

First Onboard ATM on Panchavati Express

The Mumbai-Manmad Panchavati Express has become the first train in India to feature an onboard ATM, installed in an air-conditioned coach. The trial run was successful, allowing passengers to withdraw cash during travel.

• **Innovative Revenue Scheme** – This initiative is part of Indian Railways' Innovative and Non-Fare Revenue Ideas Scheme (INFRIS).

• **Aim** – To enhance passenger convenience and generate non-ticket revenue.

• **Collaboration and trial success** – The ATM is a result of collaboration between the Bhusawal division of Indian Railways and the Bank of Maharashtra.

Booth Level Agents (BLAs)

In a first, ECI trains Booth Level Agents (BLAs) to strengthen grassroot participation by political parties.

• **Appointed by** – Recognised political parties.
• **Role** – To ensure error-free electoral rolls as per the provisions of the RP act, 1950.
• **Training programme** – To familiarise them with various aspects of the election processes including the preparation, updation and revision of electoral rolls.
• They were also trained in the use of the provision of first and second appeals under,
- Sections 24(a) and 24(b) of the Representation of People Acts, 1950 in case they are aggrieved of the final electoral rolls as published.

Economy

GI Tag for Banaras Shehnai

Recently, the Banaras Shehnai has been granted the Geographical Indication (GI) tag, recognizing its significant intangible cultural heritage.

• **Symbolic and cultural value** – Beyond being a musical instrument, the shehnai symbolizes sacred and ceremonial music in Varanasi (Kashi). It is traditionally played in temples, weddings, on ghats, and in classical performances.
• **Artisan recognition** – For the traditional artisans of Varanasi, this GI tag is more than official recognition. It's a deeply felt cultural validation of their generational legacy, unwavering commitment, and exceptional craftsmanship.
• **Ustad bismillah khan's legacy** – Ustad Bismillah Khan, a native of Varanasi, played a pivotal role in elevating the Banaras Shehnai to global prominence, becoming its iconic face and bringing it classical acclaim.

Security

CENJOWS Hosts Defence Literature Festival

Recently, Centre for Joint Warfare Studies (CENJOWS), organized the 2nd Defence Literature Festival 'Kalam & Kavach 2.0' in New Delhi.

• **Theme** – Securing India's Rise through Defence Reforms.
• **Expert participation and focus areas** – The festival brought together armed forces experts, policymakers, industry leaders, and specialists to discuss crucial aspects of India's national security. Key focus areas included Defence Technology and Future Warfare, Defence Manufacturing, and Procurement Reforms.
• **Defence technology and modern warfare** – Discussions highlighted the critical role of integrating emerging technologies such as AI, cyber technologies, quantum computing, drones, space technology, and semiconductors into contemporary military operations.
• **Future warfare dynamics** – Central deliberations revolved around the evolving nature of warfare, emphasizing the increasing convergence of multiple domains – land, air, sea, cyber, and space – in shaping modern defence strategies.
• **AI and cyber capabilities** – The increasing significance of Artificial Intelligence and cyber capabilities in bolstering operational efficiency and strengthening cybersecurity within military operations was particularly emphasized during the discussions.

DUSTLIK-VI Military Exercise

Recently, the 6th edition of the India-Uzbekistan Joint Military Exercise, DUSTLIK-VI, commenced at the Foreign Training Node in Aundh, Pune.

• **Aim** – To significantly enhance the interoperability and foster greater cooperation between the armed forces of India and Uzbekistan.

• **Participating contingents** – The Indian contingent comprises 60 personnel from a battalion of the JAT Regiment and units of the Indian Air Force. Uzbekistan is represented by personnel from its army.

• **Focus of the current edition** – DUSTLIK-VI will concentrate on Joint Multi-Domain Sub-Conventional Operations within a semi-urban environment, simulating various counter-terrorism scenarios.

• **Simulated operations** – It will involve territory capture, establishing a joint operations center, population control, raids, search-and-destroy missions, and the coordinated utilization of air assets.

• **Technology and Strategic Elements** – It will also include the deployment of drones, counter-UAS systems, Air Force logistics support, heliborne operations, and special forces missions, promoting tactical and technical exchange.

Science

Ironwood Tensor Processing Unit (TPU)

Recently, Google has introduced Ironwood, its 7th-generation TPU, specifically designed to accelerate the processing of artificial intelligence models.

• Ironwood is the latest TPU, engineered exclusively for high-performance AI workloads.

• **Developed by** – Google Cloud's AI Infrastructure team.

• **AI-specific architecture** – As an ASIC chip, Ironwood is built to efficiently process tensors, the fundamental data structures in machine learning, making it highly specialized for matrix operations and neural networks.

• **Enhanced processing capabilities** – Ironwood significantly reduces the time required for AI model training, potentially cutting down processes that previously took weeks to mere hours.

• **Integration and scalability** – Serving as a crucial component of the Google ecosystem, Ironwood powers AI in services like Google Search, YouTube, and DeepMind. Its full integration with Google Cloud enables cloud-ready scalability for large-scale AI applications.

Etalin Hydroelectric Project (EHEP)

The Arunachal Pradesh government has recently allocated ₹269.97 Crore for the development of EHEP, located in the Dibang Valley.

• It is a significant 3,097 MW hydropower initiative planned in the Dibang Valley of Arunachal Pradesh, making it one of India's largest proposed hydropower projects by installed capacity.

• **Project structure** – It is designed as a combination of two run-of-the-river schemes. It involves the construction of two concrete gravity dams, with heights of 101.5 metres and 80 metres, on the Dri and Tangon rivers, which are tributaries of the Dibang River.

• **Ecological significance** – The project area is situated within a region recognized as the "richest bio-geographical province of the Himalayan zone" and is part of a global "mega biodiversity hotspot," highlighting its ecological importance.

• **Local communities** – The project area is primarily inhabited by indigenous populations belonging to the Idu-Mishmi tribes, whose way of life and environment are directly linked to the region.

• **Project execution** – The Etalin Hydro Electric Power Company Limited, a joint venture between Jindal Power Limited (74% stake) and Hydro Power Development Corporation of Arunachal Pradesh Limited (26% stake), is responsible for executing the project._

Gaganyaan Mission : Astronaut Safety

The recent return of NASA astronauts Sunita Williams and Barry Wilmore highlights the critical role of safety protocols in human spaceflight. ISRO is now prioritizing similar measures for its Gaganyaan mission.

• **3 Phases of Human Spaceflight** – Launch, Orbit, and Re-entry.
• Each phase necessitates specific and stringent safety protocols to ensure astronaut well-being.
• **Launchpad emergency measures** – Drawing lessons from tragedies like the Apollo-1 fire, ISRO has implemented launchpad safety measures, including ziplines and fireproof lifts for rapid evacuation.
• **Crucial emergency exit system** – A key safety feature during launch is the emergency exit device. The human-rated launch vehicle incorporates a tower-like Crew Escape System for quick detachment of the crew module during emergencies.
• **Crew escape system functionality** – The Crew Escape System utilizes two motors: the Low-altitude Escape Motor (LEM) and the High-altitude Escape Motor (HEM), activating based on the altitude of the emergency. Pad aborts involve both motors for swift evacuation.
• **Historical precedents** – Incidents like the Soyuz T-10 launch abort and Blue Origin's NS-23 mission underscore the proven effectiveness and vital importance of robust crew escape systems in safeguarding astronauts during launch emergencies.

SHANKAR IAS PARLIAMENT
Information is Empowering