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MK Yadav Sir

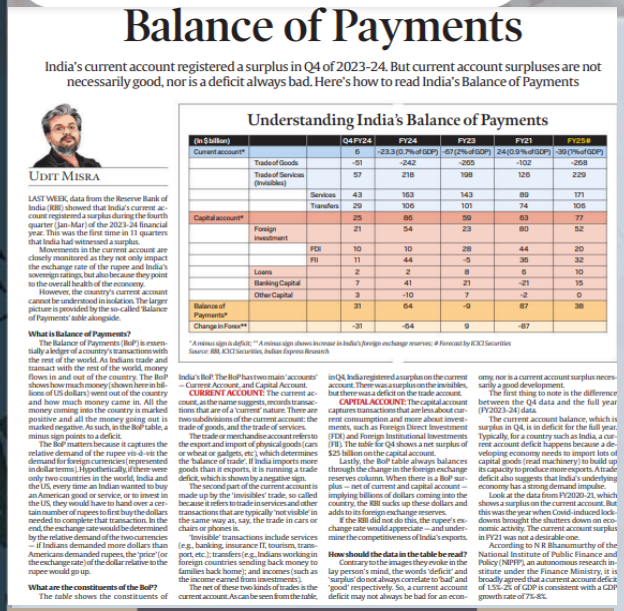
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INDIAN EXPRESS Page 11

BALANCE OF PAYMENTS

(Syllabus: GS Paper 3 – Economy)



Balance of Payments

India's current account registered a surplus in Q4 of 2023-24. But current account surpluses are not necessarily good, nor is a deficit always bad. Here's how to read India's Balance of Payments

UDIT MISRA

LAST WEEK, data from the Reserve Bank of India (RBI) showed that India's current account registered a surplus during the fourth quarter (Jan-Mar) of the 2023-24 financial year. This was the first time in 11 quarters that India had witnessed a surplus.

Movements in the current account are closely monitored as they not only impact the exchange rate of the rupee and India's sovereign ratings, but also because they point to the overall health of the economy.

However, the country's current account cannot be understood in isolation. The larger picture is provided by the so-called 'Balance of Payments' table alongside.

What is Balance of Payments?

The Balance of Payments (BoP) is essentially a ledger of a country's transactions with the rest of the world. As Indians trade and transact with the rest of the world, money flows in and out of the country. The BoP shows how much money (shown here in billions of US dollars) went out of the country and how much money came in. All the money coming into the country is marked positive and all the money going out is marked negative. As such, in the BoP table, a minus sign points to a deficit.

The BoP matters because it captures the relative demand of the rupee vis-à-vis the demand for foreign currencies (represented in dollar terms). Hypothetically, if there were only two countries in the world, India and the US, every time an Indian wanted to buy an American good or service, or to invest in the US, they would have to hand over a certain number of rupees to first buy the dollars needed to complete that transaction. In the end, the exchange rate would be determined by the relative demand of the two currencies — if Indians demanded more dollars than Americans demanded rupees, the 'price' (or the exchange rate) of the dollar relative to the rupee would go up.

What are the constituents of the BoP?

The table shows the constituents of India's BoP. The BoP has two main 'accounts' — Current Account, and Capital Account.

CURRENT ACCOUNT: The current account, as the name suggests, records transactions that are of a 'current' nature. There are two subdivisions of the current account; the trade of goods, and the trade of services.

The trade or merchandise account refers to the export and import of physical goods (cars or wheat or gadgets, etc), which determines the 'balance of trade'. If India imports more goods than it exports, it is running a trade deficit, which is shown by a negative sign.

The second part of the current account is made up by the 'invisibles' trade, so called because it refers to trade in services and other transactions that are typically 'not visible' in the same way as, say, the trade in cars or chairs or phones is.

'Invisible' transactions include services (e.g., banking, insurance IT, tourism, transport, etc.); transfers (e.g., Indians working in foreign countries sending back money to families back home); and incomes (such as the income earned from investments).

The net of these two kinds of trades is the current account. As can be seen from the table, in Q4, India registered a surplus on the current account. There was a surplus on the invisibles, but there was a deficit on the trade account.

CAPITAL ACCOUNT: The capital account captures transactions that are less about current consumption and more about investments, such as Foreign Direct Investment (FDI) and Foreign Institutional Investments (FII). The table for Q4 shows a net surplus of $25 billion on the capital account.

Lastly, the BoP table always balances through the change in the foreign exchange reserves column. When there is a BoP surplus — net of current and capital account — implying billions of dollars coming into the country, the RBI sucks up these dollars and adds to its foreign exchange reserves.

If the RBI did not do this, the rupee's exchange rate would appreciate — and undermine the competitiveness of India's exports.

How should the data in the table be read?

Contrary to the images they evoke in the lay person's mind, the words 'deficit' and 'surplus' do not always correlate to 'bad' and 'good' respectively. So, a current account deficit may not always be bad for an economy, nor is a current account surplus necessarily a good development.

The first thing to note is the difference between the Q4 data and the full year (FY2023-24) data.

The current account balance, which is surplus in Q4, is in deficit for the full year. Typically, for a country such as India, a current account deficit happens because a developing economy needs to import lots of capital goods ('real machinery') to build up its capacity to produce more exports. A trade deficit also suggests that India's underlying economy has a strong demand impulse.

Look at the data from FY2020-21, which shows a surplus on the current account. But this was the year when Covid-induced lockdowns brought the shutters down on economic activity. The current account surplus in FY21 was not a desirable one.

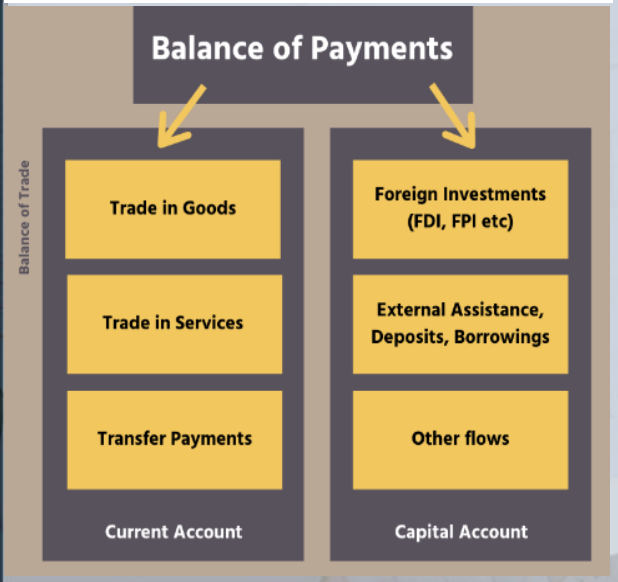
According to N R Bhanumurthy of the National Institute of Public Finance and Policy (NIPFP), an autonomous research institute under the Finance Ministry, it is broadly agreed that a current account deficit of 1.5%-2% of GDP is consistent with a GDP growth rate of 7%-8%.

Understanding India's Balance of Payments

(In $ billion)			Q4FY24	FY24	FY23	FY21	FY23#
Current account*			-2	-23.3 (0.7% of GDP)	-67 (2% of GDP)	24 (0.9% of GDP)	-39 (1% of GDP)
	Trade of Goods		-51	-242	-265	-102	-268
	Trade of Services (Invisibles)		57	218	198	126	229
		Services	43	163	143	89	171
		Transfers	29	106	101	74	106
Capital account*			25	86	59	63	77
	Foreign investment		21	54	23	80	52
		FDI	10	10	28	44	20
		FII	11	44	-5	36	32
	Loans		2	2	8	6	10
	Banking Capital		7	41	21	-21	15
	Other Capital		3	-10	7	-2	0
Balance of Payments*			31	64	-9	87	38
Change in Forex**			-31	-64	9	-87	

*A minus sign is deficit; **A minus sign shows increase in India's foreign exchange reserves; # Forecast by ICICI Securities

Source: RBI, ICICI Securities, Indian Express Research



Context: Data from the Reserve Bank of India (RBI) revealed a current account surplus for India in the fourth quarter (Jan-Mar) of the 2023-24 financial year, marking the first surplus in 11 quarters. This must be viewed within the broader context of the 'Balance of Payments' table.

Balance of Payments (BoP)

- **About:** It is essentially a ledger of a country's transactions with the rest of the world.
- **Money Flows**: As Indians trade and transact with the rest of the world, money flows in and out of the country.
- **Measuring Financial Transactions:** The BoP shows how much money (shown here in billions of US dollars) went out of the country and how much money came in.
- **Flows**: All the money coming into the country is marked positive and all the money going out is marked negative.
- **The BoP has two main accounts**: Current Account, and Capital Account.
    - The current account, as the name suggests, records transactions that are of a 'current' nature. There are two subdivisions of the current account: the trade of goods, and the trade of services.
    - The capital account captures transactions that are less about current consumption and more about investments, such as Foreign Direct Investment (FDI) and Foreign Institutional Investments (FII).
- **Importance**: The BoP matters because it captures the relative demand of the rupee vis-a-vis the demand for foreign currencies (represented in dollar terms).
- **Balance of trade (BOT)**: It is the difference between the value of a country's exports and the value of a country's imports for a given period.

PIB

July 5

AUSTRALIA-INDIA STRATEGIC RESEARCH FUND

(Syllabus GS Paper 2 – IR)

Union Minister Dr. Jitendra Singh announces results of Australia-India Strategic Research Fund

Context: Recently, India unveiled the results of the 15th round of the Australia-India Strategic Research Fund (AISRF).

Australia-India Strategic Research Fund

- **About:** The fund facilitates collaborative research projects between Australia and India, enhancing scientific ties.
- **Jointly Managed Platform**: Managed and funded jointly by the governments of India and Australia, it serves as a platform for bilateral collaboration in science.
- **Objectives**:
  - **Promotion of Leading-edge S&T**: Increase the uptake of leading-edge science and technology by fostering collaboration between Australian and Indian researchers in strategic areas.
  - **Enhancing Strategic Alliances:** Strengthen strategic alliances between researchers from both countries through collaborative scientific research and technology projects.
  - **Global S&T System Access**: Facilitate India's and Australia's integration into the global science and technology system through shared research initiatives.
- **Priority Areas:** Focus on collaborative research in AI and machine learning to harness cutting-edge technologies, Emphasis on ultra-low-cost solar and clean hydrogen technologies to address energy challenges sustainably, Research projects aimed at developing solutions for urban mining and recycling of electronic waste, contributing to environmental sustainability.
- **Focus Areas for 2024-25:**
  - Creating an AI-driven platform for monitoring soil carbon sequestration.
  - Eco-friendly recovery of essential metals from obsolete mobile devices.
  - Cost-effective solar thermal desalination by systems design with nanomaterials.
  - Harnessing the immune system's power to combat antimicrobial resistance.
  - Advanced diagnostics and innovative therapeutics to detect and combat microbial infections.

DTE

July 5

XENOPHRYS APATANI

(Syllabus: GS Paper 3 – Env and Eco)

Scientists discover new horned frog species in Arunachal Pradesh mistakenly identified as Vietnamese reptile earlier

Context: A groundbreaking discovery has emerged from the forests of Arunachal Pradesh, where a team of researchers from the Zoological Survey of India (ZSI) has identified a new species of horned frog.



Xenophrys apatani

- **Discovery**: The species, Xenophrys apatani, was discovered in the Talle Wildlife Sanctuary in Lower Subansiri district.
- They found that the frog species in Arunachal Pradesh exhibited a genetic disparity of 4.4 per cent to 5.5 per cent compared to its counterpart in Vietnam.
- **Naming**: Itis named after the Apatani community, prominent in the region.
    - The naming honors their commitment to conserving local flora and fauna.
    - Its discovery is significant within the Eastern Himalayan and Indo-Burma biodiversity hotspots.

Talle Wildlife Sanctuary

- **Geographical Location**: Located in Lower Subansiri district, Arunachal Pradesh, Talle Wildlife Sanctuary is surrounded by Subansiri, Sipu, and Pange rivers.
- It boasts undisturbed climax vegetation, providing habitat to rare species like the clouded leopard.
- **Fauna**: Clouded leopard, Indian elephant, flying squirrel, and others.

Apatani Tribe

- **About:** These are a prominent tribal group in Arunachal Pradesh, known for their unique fish-paddy culture.
- **Historical Context:** First encountered by the British in the 12th Century A.D., the Apatanis have a long history in the region.
- **Festivals**: Marun, Myako, Dree, and Yapung, reflecting their cultural diversity.

NEW INDIAN EXPRESS

July 5

COMMON GRASS YELLOW

(Syllabus: GS Paper 3 – Env and Eco)

Large migration of Common Grass Yellow butterfly seen in Mudumalai Tiger Reserve

Context: For the first time, a large-scale migration of **Common Grass Yellow** was observed during the three-day butterfly survey which concluded at the Mudumalai Tiger Reserve (MTR) recently.

Common Grass Yellow

- **Distribution**: The Common Grass Yellow butterfly, known scientifically as Eurema hecabe, is widely distributed across Asia, North America, Africa, and Australia.
- **Habitat**: They prefer flying close to the ground in open grassy or bushy terrains, which is reflected in their common name.
- **Features:**
  - **Coloration**: Their wings display vibrant yellow hues ranging from sultry sulfur shades to lush lemon yellows, exhibiting 'seasonal polyphenism' influenced by seasons and location.
  - **Wing Markings**: The forewings feature broad, irregular black outer markings, while the underside displays various black marks with a yellow center.
  - **Behavior:** Often observed in large groups, females typically forage alone for nectar from a wide array of flowering plants.
  - **Migration**: Exhibiting migratory behavior, these butterflies are known to migrate in significant numbers across Africa and much of Asia south of the Himalayas.
- **Conservation Status:**
  - **IUCN Red List**: Listed as Least Concern on the IUCN Red List, indicating a stable population trend.
  - **Legal Protection**: Not legally protected in India under any schedules of the Wildlife (Protection) Act, 1972.

Mudumalai Tiger Reserve (MTR)

- **Location**: Nilgiris District of Tamil Nadu, spanning 321 sq. km. at the tri-junction of Karnataka, Kerala, and Tamil Nadu.
- An integral part of the Nilgiris Biosphere Reserve, India's first Biosphere Reserve.
- **Border Shared With**: Wayanad Wildlife Sanctuary (Kerala) to the West, Bandipur Tiger Reserve (Karnataka) to the North, Nilgiris North Division to the South and East, and Gudalur Forest Division to the South West.

EAST COAST RAIL LINK (ECRL)

(Syllabus: GS Paper 2 – IR)

Why China wants to build a rail network to Singapore, via Southeast Asia

RISHIKA SINGH
NEW DELHI, JULY 5

EXPLAINED STRATEGY

DURING HIS visit to Malaysia last month, Chinese Premier Li Qiang said that China was willing to study a plan to connect its railway projects in the Southeast Asian countries of Malaysia, Laos, and Thailand for "enhancing regional connectivity". Li was at the ground-breaking ceremony for a terminal station of Malaysia's East Coast Rail Link (ECRL).

China has made major investments in the region under its Belt and Road Initiative (BRI), billed as an attempt to enhance infrastructure development in Asia, Africa, and South America.

What is the ECRL?

The nearly $10 billion project is sometimes linked to a China-led "pan-Asian" railway network that would connect the southern Chinese city and transportation hub of Kunming to Singapore, through lines across multiple Southeast Asian countries.

The 665km-long ECRL will connect Kota Bharu in the east with Port Klang, located on the strategically important Strait of Malacca on Malaysia's west coast. It is expected to bring economic benefits through improved connectivity and tourism. Although work began in 2017, it was stalled amid funding constraints. It is now expected to be completed by 2027.

In 2018, then-Malaysian Prime Minister Mahathir Mohamad said the project would be frozen due to high costs. "I believe China itself does not want to see Malaysia become a bankrupt country," he said. Work resumed in 2020, after a lower-cost deal was negotiated with China.

What is the pan-Asian rail network?

Infrastructure projects to link Southeast Asian countries have been proposed in the past, including during European colonial rule in the region.

More recently, the pan-Asian rail network was conceptualised in the form of three links – a western line from Kunming via Myanmar and Thailand; a central line via Laos and Thailand; and an eastern line via Vietnam, Cambodia, and Thailand.

Another line would connect Thailand's capital Bangkok with Malaysia and Singapore, which sits at the mouth of the Malacca Strait. Around 30% of global trade passes through this strait.



What is the rail network's current status?

The project has faced roadblocks for multiple reasons. Only the Laos-China section has been operational since 2021. Like Malaysia, Thailand has also faced problems of high costs and been wary of taking assistance from China. The Thailand-China project is expected to be completed in 2028, but may be delayed.

Doubts have been expressed over the projected economic gains as well. Jonathan E Hillman, a political economist with the Center for Strategic and International Studies (CSIS), argued in his book, *The Emperor's New Road: China and the Project of the Century* (2020), that the width of the railway tracks across these countries vary, making seamless cargo transportation challenging.

There are concerns over demand as well. "Most people travelling from Kunming to Singapore would still prefer to fly, which will remain cheaper, and faster. Likewise, cargo shuttled between the two destinations would be cheaper if transported first to the coast, and then by boat to Singapore. Most studies have found that a pan-Asian rail system would complement maritime shipping rather than compete with it," Hillman wrote.

What are China's interests here?

Hillman noted that plans for the rail link project predate President Xi Jinping's BRI. Chinese Premier Wen Jiabao mentioned it at the ASEAN summit in 2007. But "despite missing... deadlines, China has made the pan-Asian railway an even more central part of its regional engagement," he wrote.

China has direct influence in Southeast Asia on account of geography and strong economic and cultural ties. According to the Chinese government, "In 2023, the trade volume between China and ASEAN (Association of Southeast Asian Nations) reached USD 911.7 billion." This made them each other's largest trading partners for the fourth year.

With the BRI, these ties can be further strengthened. China has emerged as a provider of loans for infrastructure projects in countries historically lacking them, despite apprehensions about their financing.

China's aggressive moves, and territorial claims in the South China Sea have also made many countries in the region nervous, and Beijing hopes to leverage economic ties to develop goodwill and trust. It has rejected accusations of practising "debt trap diplomacy", which involves providing loans at high interest rates, and then seizing control of strategic assets when the debtor countries fail to pay back.

Current Status of the Railway Project

- **Implementation Challenges:** Despite its potential economic benefits, the pan-Asian rail network has encountered obstacles, stalling progress in various segments.
- **Operational Section**: The Laos-China section stands as the only operational segment since 2021, connecting Kunming to northern and southern Laos.



Context: China expressed openness to exploring a proposal linking Malaysia's $10-billion East Coast Rail Link (ECRL) with China-backed railway ventures in Laos and Thailand, potentially extending its Belt and Road initiative throughout Southeast Asia.

East Coast Rail Link (ECRL)

- **About**: It spans 665 kilometers, connecting Kota Bharu on Malaysia's northeast coast with Port Klang on the west coast via the Strait of Malacca.
- **Project Timeline**: Originally slated for earlier completion, the ECRL is now expected to be finished by 2027.
- **Plan of pan-Asian rail network**
- **Historical Context:** Proposed as early as during European colonial rule, efforts to link Southeast Asian countries gained recent momentum.
- **Network Structure**: Conceptualized with three main lines: western via Myanmar and Thailand, central via Laos and Thailand, and eastern via Vietnam, Cambodia, and Thailand. Additional links include Bangkok to Malaysia and Singapore.
- **Strategic Importance**: These routes aim to facilitate regional trade, with Singapore's significant role as a global trade hub emphasized.
- **Economic Impact**: Massive investment aims to enhance economic benefits by boosting connectivity for freight transport and tourism.

PIB July 5

SWAMI VIVEKANANDA
(Syllabus: GS Paper 1 – History)

PM pays homage to Swami Vivekananda on his Punya Tithi

Context: Recently, the Prime Minister of India paid homage to Swami Vivekananda on his Punya Tithi.

Swami Vivekananda

- **Birth and Background:** Born as Narendranath Datta on January 12, 1863, in an aristocratic Bengali Kayastha family in Calcutta (now Kolkata), India.
- **Disciple:** Became a disciple of the revered 19th-century mystic, **Ramakrishna Paramahamsa**, and served as his chief disciple.
- **Monastic Life:** Embraced monastic life and renounced worldly pursuits, adopting the name **Swami Vivekananda.**
- **Introduction of Vedanta to the West:** Played a pivotal role in introducing Vedanta and Yoga philosophies to the Western world through his speeches and writings.
- **Parliament of the World's Religions:** Delivered a historic speech at the Parliament of the World's Religions in Chicago in 1893, where he introduced Hinduism and its principles of tolerance and universal acceptance.
- **Ramakrishna Math and Mission:** Founded the **Ramakrishna Math and Ramakrishna Mission in 1897**, with the mission of self-perfection and service to humanity.
- **Adaptation of Vedantic Ideals:** Adapted and modernized the highest ideals of Vedantic philosophy to suit the needs of the 20th century, emphasizing practical spirituality and social welfare.
- **Vivekananda Rock Memorial:** Situated in Kanyakumari, India's southernmost tip, the Vivekananda Rock Memorial stands atop one of two rocks located approximately 500 meters off the Vavathurai mainland.
- **Legacy and Influence:**
  - Hailed as a **Dhyana Sidha, a meditation expert,** by his guru Ramakrishna Paramhamsa
  - Considered a patriotic saint in India, and **his birthday is celebrated as National Youth Day.**
  - Died on July 4, 1902, when he was just 39 at Belur Math in West Bengal.

PALM TREE
(Syllabus: GS Paper 3 – Agriculture)

Curbs on palm tree felling to 'reduce lightning deaths'

Context: Odisha restricts palm tree cutting and aims to plant 1.9 million more to mitigate lightning strike casualties.

Palm Trees

- **About**: It belong to the family Arecaceae, characterized by monocotyledonous flowering plants within the order Arecales.
- **Forms and Growth**: These evergreen plants can grow as shrubs, trees, or long, woody vines known as lianas.
- **Distribution**: America, Asia (from India to Japan and south to Australia), Africa, Madagascar, and the islands of the Pacific and Indian oceans.
- **Conservation Concerns**: Despite the resilience of many species, approximately 100 palm species are endangered due to deforestation and unsustainable cultivation practices, such as harvesting the heart of palm, which cannot be regrown.
- **Economic Importance**: Key commercial palm species include the coconut palm and the African oil palm (Elaeis guineensis), which are significant sources of vegetable oil and fat.
- **Rarity**: The rarest palm tree known is the Hyophorbe amaricaulis, with only one surviving specimen located at the Botanic Gardens of Curepipe in Mauritius.

Palm Oil

- **About**: It is also known as palm fruit oil. Palm oil is produced from the fruit of the oil palm tree (Scientific name: Elaeis guineensis).
- **Production**: Indonesia> Malaysia - 84% of the worlds palm production.

DTE July 5

PINK BOLLWORM

(Syllabus: GS Paper 3 – Env and Eco)

Pink Bollworms thrive in higher temperatures, need for better pest management amidst climate change: Study

Context: A new study has found that the total developmental period of Pink Bollworm shortens with an increase in temperature and survival rate of the larvae also increases.

Pink Bollworm (PBW)

- **About**: It is one of the major pests of American bollworm complex. It is known to occur during later stages of cotton crop growth.
- **Also Known as:** Pectinophora gossypiella
- **Distribution**: Originally native to India, it is now recorded in nearly all the cotton-growing countries of the world.
- **Adult PBW Characteristics**: Small, thin, gray moth with fringed wings.
- The female moth lays eggs in a cotton ball, and when the larvae emerge from the eggs, they inflict damage through feeding.
- **In parts of India, the pink bollworm is now resistant** to first generation transgenic Bt cotton.

Key Findings of Study

- **Title of Study:** Effect of temperature on the biological parameters of pink bollworm, Pectinophora gossypiella Saunders (Lepidoptera: Gelechiidae).
- **Shortened Generation Time:** P. gossypiella completes a generation significantly faster at 40°C compared to 20°C, indicating accelerated development under high thermal regimes.
- **Impact on Egg Hatchability**: It rates peak at 30°C, declining at both lower and higher temperatures, underscoring temperature sensitivity in developmental processes.
- **Temperature's Role in Incubation Period**: The incubation period decreases across a range of temperatures from 20°C to 40°C, reflecting temperature-dependent developmental rates.
- **Impact on Agriculture in India:**
  - Reports from Indian regions highlight significant yield losses due to P. gossypiella infestations, emphasizing the pest's economic impact and regional susceptibility.
  - The study underscores the need for further research on transgenerational effects and adaptive responses of P. gossypiella to evolving climatic conditions in India.

SAMPOORNATA ABHIYAN
(Syllabus: GS Paper 2 – Governance)

'Sampoornata Abhiyan' launched by NITI Aayog

Context: Recently, NITI Aayog launched the 'Sampoornata Abhiyan' witnessing significant participation from citizens across the country.

Sampoornata Abhiyan

- **About:** It is a three-month initiative aimed at making sustained efforts to achieve full coverage of six key indicators in Aspirational Districts and six key indicators in Aspirational Blocks nationwide.
- **Objective**: To achieve saturation in 6 key indicators within Aspirational Districts and Aspirational Blocks nationwide.
- **Target Areas**: It focuses on 112 Aspirational Districts and 500 Aspirational Blocks designated under specific government programs.

Focus Areas of 'Sampoornata Abhiyan

- **Aspirational Blocks Key Performance Indicators (KPIs):**
  - Percentage of pregnant women registered for Antenatal Care (ANC) within the first trimester;
  - Percentage of persons screened for Diabetes against the targeted population in the Block;
  - Percentage of persons screened for Hypertension against the targeted population in the Block;
  - Percentage of pregnant women taking Supplementary Nutrition under the ICDS Programme regularly;
  - Percentage of Soil Health Cards generated against the soil sample collection target; and
  - Percentage of SHGs that have received a Revolving Fund against the total SHGs in the block
- **Aspirational Districts KPIs:**
  - Percentage of pregnant women registered for Antenatal Care (ANC) within the first trimester;
  - Percentage of pregnant women taking Supplementary Nutrition under the ICDS Programme regularly;
  - Percentage of children fully immunized (9-11 months) (BCG+DPT3+OPV3+Measles 1);
  - Number of Soil Health Cards distributed;
  - Percentage of schools with functional electricity at the secondary level; and
  - Percentage of schools providing textbooks to children within 1 month of the start of the academic session

INDIAN EXPRESS Page 11

APHELION

(Syllabus: GS Paper 1 – Geography)



APHELION

The point farthest from the sun in the path of an orbiting celestial body such as a planet or asteroid

EARTH REACHES aphelion every July. This year it did so on Friday.

That Earth has an aphelion is a result of its orbit being elliptical, rather than circular. According to Kirby Runyon, a geologist at the Planetary Science Institute, all planets in the solar system travel in elongated circles around the Sun, rather than perfect ones. This is most likely true for worlds around other stars, too.

Behind elliptical orbits lies gravity. "All the planets tend to jostle each other around," pulling their orbits from perfect circles, Runyon said. "It's literally this chaotic tug of war between small amounts of gravitational influence that the planets have on each other."

Jupiter exerts the most influence because it is the most massive planet in our solar system, he added.

How much an orbit deviates from a perfect circle is measured by its eccentricity. The higher the eccentricity, the more elliptical the orbit. For some bodies in the solar system, eccentricity is quite pronounced: Mars has an eccentricity of 0.094. Pluto is even more eccentric at 0.244. On the other hand, Earth's eccentricity is 0.017.

How far is the Earth from the Sun at aphelion?

At aphelion, Earth's distance from the Sun is about 152.1 million km.

Six months later, in early January, Earth reaches perihelion — the point at which it is closest to the Sun. At perihelion, the distance between Earth and the Sun is roughly 147.1 million km (*see illustration*).

Does aphelion affect temperatures on Earth?

A common misconception is that Earth's varying distance from the Sun is what gives rise to the seasons.

We get 7% less sunlight at aphelion compared to what we are exposed to at perihelion, leading to slightly milder summers and winters in the Northern Hemisphere. But this effect is offset by Earth's tilt on its axis — at different points along its orbit the hemispheres slant either toward or away from the Sun.

What would happen if there were no aphelion?

If our planetary orbit were a perfect circle, the seasons' lengths would be exactly the same — right now, spring and summer are a few days longer than fall and winter in the Northern Hemisphere. But not much else would change.

"If, somehow, we snapped our magic fingers and Earth's orbit became more circular, it'd probably be fine," according to Runyon.

But if something made Earth's orbit grow more eccentric, the consequences could be catastrophic. Seasons in the Southern Hemisphere would become too extreme — summers would be unbearably hot, and winters would be intolerably cold. This could lead to crop failures and freezes.

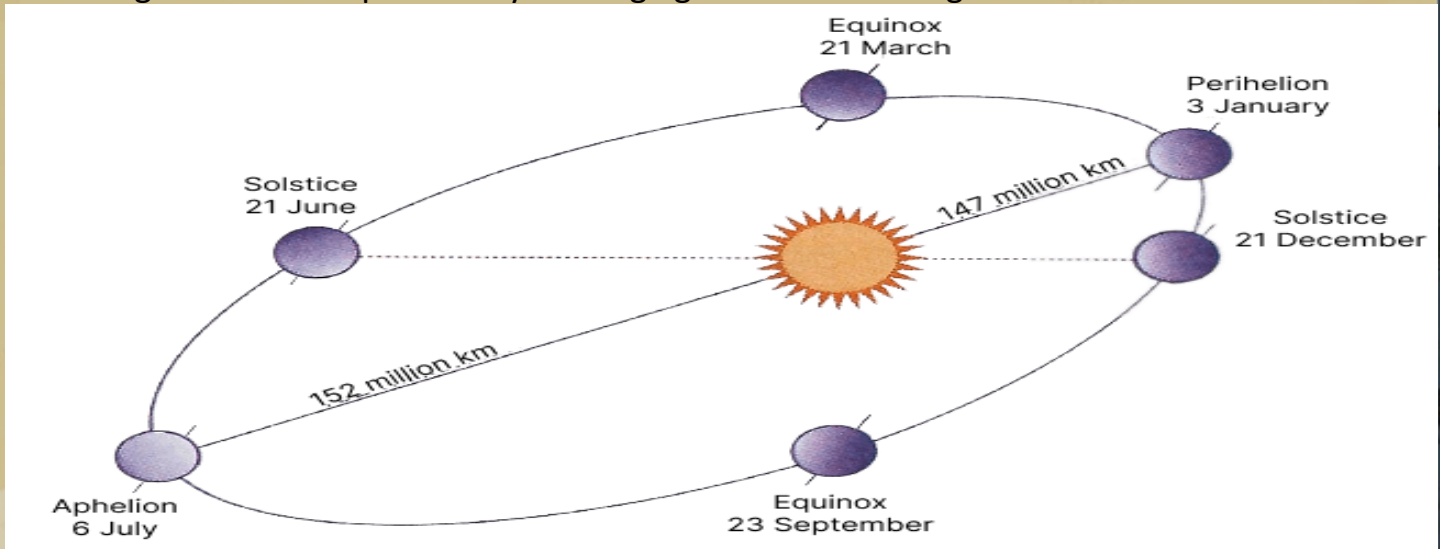
"If it got really bad," Dr Runyon said, "advanced civilisation would not be possible." For now, be thankful our planet is in a sweet spot.

THE NEW YORK TIMES

Context: This year, Earth reached aphelion, its farthest point from the Sun, on July 6th, marking its annual orbital milestone.

Aphelion

- **About**: It occurs around July 4 each year when Earth is farthest from the Sun, approximately 152.5 million kilometers away.
- **Perihelion**: It happens around January 3 annually, marking the closest point between Earth and the Sun at about 147.5 million kilometers.
- **Elliptical Orbit**: Earth's orbit around the Sun is elliptical due to gravitational interactions, causing varying distances between them.
- **Kepler's Laws**: Johannes Kepler's laws of planetary motion, formulated in the 17th century, describe how planets move in elliptical orbits with the Sun at one focus.
- **Aphelion Day 2023:** According to Kepler's laws, Earth's distance from the Sun fluctuates, culminating in Aphelion Day.
- **Circular Orbit Consequences:** If Earth's orbit were perfectly circular, seasons would be more uniform in length.
- **Eccentric Orbit Impact:** Increased eccentricity could lead to extreme seasonal variations, affecting climates and potentially causing agricultural challenges.



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