



Theaterisation of Armed Forces



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What is Theaterisation?

It is a concept that **seeks to integrate the capabilities of the three services** – army, air force and navy – and **optimally utilise their resources** for wars and operations.

There will be **specific theatre commands – or units – could be geographical** – like looking at a border with a particular country – **or thematic**, like a command for all maritime threats.

The **Chief of Defence Staff (CDS)** has been given task of establishment of joint/ theatre commands.

Several nations have theatre commands, **including the US and China.**



What are the Advantages?

- Synergy among all branches of Indian Armed Forces
- Cohesive and Compact Fighting Force
- Utilising the Logistics of all three Services
- Improved Troop Acclimatisation
- Theatre-Specific Resource Optimization
- Speedy Mobilisation and Intel Sharing



What are the Challenges?

- Budgetary Allocations and the Distribution of Finances
- Assets becoming dispersed by multiplication of theatre commands
- Nomenclature and Jurisdiction of Commands
- Leadership of Theatre commands
- Dilution of powers of Armed Services Chiefs

What is the Current Command Structure?

17 single-service commands

- ▶ Army- 7
- ▶ Navy- 7
- ▶ Air Force- 3

Two tri-Service Commands [Strategic Forces Command] and the Andaman and Nicobar Command

Shekatkar Committee Recommendation (2015)

Creation of 3 integrated theatre commands

- ▶ Northern - China border
- ▶ Western - Pakistan border
- ▶ Southern- Maritime Security



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Delimitation

For Prelims: Delimitation Commission, Supreme Court, Article 82, Article 170, Lok Sabha, Rajya Sabha

For Mains: Indian Constitution, Elections, Statutory Bodies, Delimitation Process

Why in News?

The Assam state Cabinet recently approved the merger of four districts with their constituent districts.

- On 27th December, the **EC announced the process of delimitation of Assembly and Parliamentary constituencies in Assam**, saying it would be based on Census data from 2001. Assam currently has 14 Lok Sabha constituencies and 126 Assembly constituencies.

What is Delimitation?

- **About:**
 - [Delimitation](#) literally means the act or process of fixing limits or boundaries of territorial constituencies in a country to represent changes in population.
 - The Delimitation Commission is to **work without any executive influence**.
 - The Constitution **mandates that the Commission's orders are final and cannot be questioned before any court** as it would hold up an election indefinitely.
 - When the orders of the Delimitation Commission are laid before the Lok Sabha or State Legislative Assembly, they cannot effect any modification in the orders.
- **Need:**
 - To provide equal representation to equal segments of a population.
 - **Fair division of geographical areas** so that one political party doesn't have an advantage over others in an election.
 - To follow the principle of **"One Vote One Value"**.
- **Composition:**
 - The Delimitation Commission is appointed by the [President of India](#) and works in collaboration with the [Election Commission of India](#).
 - Retired [Supreme Court judge](#)
 - Chief Election Commissioner
 - Respective State Election Commissioners

What is the Process of Delimitation?

- **Under Article 82**, the Parliament enacts a Delimitation Act after every Census.
- **Under Article 170**, States also get divided into territorial constituencies as per Delimitation Act after every Census.
- Once the Act is in force, the Union government sets up a Delimitation Commission.
- The **first delimitation exercise** was carried out by the President (with the help of the Election Commission) in 1950-51.
- The **Delimitation Commission Act was enacted in 1952**.
- Delimitation Commissions have been set up four times — 1952, 1963, 1973 and 2002 under the Acts of 1952, 1962, 1972 and 2002.
- There was no delimitation after the 1981 and 1991 Censuses.

What are the Issues with Delimitation?

- States that take **little interest in population control** could end up with a greater number of

seats in Parliament. The southern states that promoted family planning faced the possibility of having their seats reduced.

- In 2002-08, **Delimitation was done based on the 2001 census**, but the total number of seats in the Assemblies and Parliament decided as per the 1971 Census was not changed.
 - The **87th Amendment Act of 2003** provided for the delimitation of constituencies on the basis of 2001 census and not 1991 census. However, this can be done without altering the number of seats allotted to each state in the Lok Sabha.
- The Constitution has also **capped the number of Lok Shaba & Rajya Sabha seats to a maximum of 550 & 250 respectively** and increasing populations are being represented by a single representative.

UPSC Civil Services Examination Previous Year Questions (PYQs)

Q. With reference to the Delimitation Commission consider the following statements: (2012)

1. The orders of the Delimitation Commission cannot be challenged in a Court of Law.
2. When the orders of the Delimitation Commission are laid before the Lok Sabha or State Legislative Assembly, they cannot effect any modification in the orders.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans: (c)

Source: IE

The Future of Metaverse and AI

For Prelims: Chatbot and Types, Artificial Intelligence, Metaverse, Social Media.

For Mains: Outlook of Meta and artificial Intelligence 2023.

Why in News?

The year 2022 was not the best for tech firms, yet we may innovative technologies emerge in future related to **Metaverse** and **AI (Artificial Intelligence)**, which may raise concerns and present Opportunities.

- The year 2022 saw **a lot of the shift in demand during and post the Covid-induced lockdowns.**
- The year 2022 ended with near **mayhem across most Silicon Valley companies**, especially those in the Internet business.

What will be the Future Challenges and Opportunities of Meta-AI?

▪ More Pervasive AI:

- **ChatGPT** has shown the world that **conversational artificial intelligence is an idea whose time has come.**
- The ChatGPT can answer “follow-up questions”, and can also “admit its mistakes, challenge incorrect premises, and reject inappropriate requests.” but most such AI elements are now in standalone products, which is more play than work.
- In 2023, this intelligence will be seen coming into **more products that we use every day** —for instance Gmail that will not just auto-suggest but also write next mail to the boss.

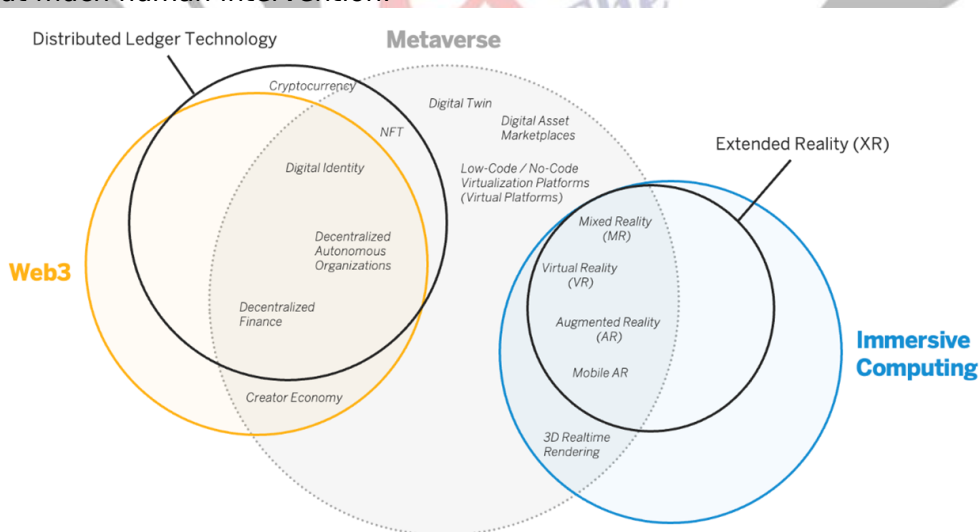
▪ Beyond Social Media:

- Twitter and **Facebook are struggling to remain relevant amid** an increasingly younger and digital native audience. Their concepts of social engagement are very **different, often sans text and notice-board behaviors.**
- Meta, for instance, knows that it will have to **think beyond its present social media platforms** and wants to be the social link when users move to the Metaverse, if at all.
- But that might not be something that will shift soon. Till then, there seems to be a vacuum emerging in the social media space, **for now plugged by users sticking to short videos.** But that fad too shall pass and not all platforms are good in that segment.

▪ More Regional, Darker Social Bubbles:

- As the Internet spreads to new users, especially in countries like India, it is also becoming more localized and multilingual.
- Across the world, the English language internet seems to have plateaued, making platforms like **Google focus more on opportunities to serve smaller, regional languages.**
- This is a tech challenge in more ways than one, but also **presents an opportunity to test out new technologies that can convert the content of the internet for these new users** without much human intervention.

▪ Future of Metaverse:



- As hybrid workforces become the norm and with travel still not as easy as earlier, **extended reality (XR)** could become the answer to collaborate and communicate virtually.
 - XR is an emerging umbrella term **for all the immersive technologies, including augmented reality (AR), virtual reality (VR), and mixed reality (MR)** plus those that are still to be created.
 - All immersive technologies extend the reality we experience by either blending the virtual and “real” worlds or by creating a fully immersive experience.
- Since the headsets and other paraphernalia to facilitate these virtual interactions are still very expensive, it **might be up to companies to make these available to their employees for regular XR meetings.** The first experience of this could end up looking like an upgraded version of video conferencing, but with the ability to interact with objects

in the virtual space.

- A few more commercial versions of the Metaverse is expected to be accessible to regular users during the year. However, the **challenge will be with the hardware that lets people access these virtual worlds without making people bankrupt in the real world**. The big disruptor could be an affordable device that logs users into the Metaverse easily — maybe it will just be a smartphone.

What are the Ethical Concerns related to AI?

- The legal and ethical issues **that confront society due to AI include privacy and surveillance**, bias or discrimination, and potentially the philosophical challenge is the role of human judgment. Concerns about newer digital technologies becoming a new source of inaccuracy and data breaches have arisen as a result of its use.
- The other side of this technological revolution is a growing apprehension on the **socio-political and economic implications of AI**, specifically, the concerns about co-existence of these emerging technologies and core principles of modern democracies.
- Consequently, **AI ethics and the safe and responsible application of AI** are becoming front and centre of the technology revolution.
- **Constitutional morality was envisioned as the cornerstone for AI ethics' principles** in India, thus, propelling our constitutional rights and ethos to the paramount consideration for deploying AI in a responsible manner.

What are the Principles of a Responsible AI?

- **Safety and Reliability:** AI systems must ensure **reliability regarding their intended functions** and must have **built-in safeguards** to ensure the **safety of stakeholders**.
- **Equality:** AI systems must be built keeping in mind that **similar people in similar circumstances are treated equally**.
- **Inclusivity and Non-Discrimination:** AI systems must be developed to be inclusive of all stakeholders, and must not discriminate through bias between stakeholders on **religion, race, caste, sex, descent, place of birth or residence in matters of education, employment, access to public spaces etc.**
- **Privacy and Security:** AI systems must ensure that the **personal data of data subjects must be safe** and secure, such that **only authorised persons must access personal data** for specified and necessary purposes, within a framework of sufficient safeguards to ensure this process.
- **Principle of Transparency:** The design and training of AI systems is key for its functioning. The **system must be audited and be capable of external scrutiny** to ensure that the **deployment of the AI system is impartial**, accountable and free from bias or inaccuracies.
- **Principle of Accountability:** Since there are various actors in the process of developing, deploying and operationalizing an AI system, the **accountability structures for any effects, harms or damages** by the AI system **must be clearly set out in a publicly accessible and understandable manner**.
- **Protection and Reinforcement of Positive Human Values:** This principle focuses on the **possible deleterious effects of AI systems** through collection of personal data for profiling, the **use of AI systems in manners contrary to fundamental rights** guaranteed by the Constitution of India.



UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q. With the present state of development, Artificial Intelligence can effectively do which of the following? (2020)

1. Bring down electricity consumption in industrial units
2. Create meaningful short stories and songs
3. Disease diagnosis
4. Text-to-Speech Conversion
5. Wireless transmission of electrical energy

Select the correct answer using the code given below:

- (a) 1, 2, 3 and 5 only
(b) 1, 3 and 4 only
(c) 2, 4 and 5 only
(d) 1, 2, 3, 4 and 5

Ans: (b)

Source: IE

Crypto Awareness Campaign

Prelims: Companies Act, 2013, Crypto Awareness Campaign, Cryptocurrencies, Online gaming, Money laundering, PMLA, IEPF.

Mains: Cryptocurrency & Related Issues, Government Policies & Interventions.

Why in News?

The [Investor Education and Protection Fund \(IEPF\)](#) will launch an outreach programme to create awareness of [Cryptocurrencies](#) and Online Gaming.

What is the Outreach Programme?

- The need for the outreach programme is based on the observation that **both crypto-assets and online gaming (that extends to gambling and betting) are still being promoted in a risky manner** despite the recent turmoil in the sector.
- The programme will help potential investors to thoroughly educate themselves before making any decision since cryptocurrency investing is a **complex and risky endeavour**.

What is the IEPF?

- It is managed by the IEPF Authority, **which was set up in 2016 under the provisions of Section 125 of the Companies Act, 2013.**
- The Authority is entrusted with the responsibility of administration of the IEPF, which, besides promoting awareness among investors, **makes refunds of shares, unclaimed dividends, matured deposits and debentures** and so on to rightful claimants.
- As for investment education, the idea is to reach out to household investors, housewives and professionals alike in rural and urban areas and teach them the basics.
- **Focus areas include primary and secondary capital markets**, various saving instruments, the instruments for investment (such as mutual funds, equity, among others), making investors **aware of dubious Ponzi and chit fund schemes and existing grievance redressal mechanisms**, among other things.

Why is there a Concern about Cryptocurrency?

- The crypto dilemma stems from concerns about the **unregulated currency having a destabilising effect** on the monetary and fiscal stability of a country.
- Further, crypto exchanges in India are being investigated for their alleged involvement in unlawful practices such as **drug trafficking, money laundering, violating foreign exchange legislation and evasion of GST (Goods and Services Tax).**
 - As on December 2022, Rs 907.48 crore have been attached/seized, three persons have been arrested and four prosecution complaints have been filed before the Special Court, **Prevention of Money Laundering Act (PMLA).**
- The immutable, public nature of the blockchain makes crypto a poor choice for money laundering because it allows law enforcement to uncover and trace money laundering far easier than cash transactions.”
- The **Reserve Bank of India (RBI)** has recommended framing legislation on the sector. It is of the view that **cryptocurrencies should be prohibited.**

What about Online Gaming?

- The Ministry of Electronics and Information Technology (MeitY) has been appointed the nodal industry for **online gaming in India; for e-sports, the nodal agency is the Department of Sports**, under the Ministry of Youth Affairs and Sports.
- A proposed framework for Central regulation by MeitY is **expected to address issues faced by the sector.**
- For instance, there is confusion about the **definitions of a ‘game of chance’ like fantasy games, and a ‘game of skill’**, a term which has been used in the Public Gaming Act (1867) but has not been spelt out. There are risks from cybercrimes as well.
- In a ‘game of skill’, while the element of chance cannot be entirely ruled out, it is the ‘element of skill’ (mental or physical skill of the user) that **plays a dominant role in determining the outcome of the game** rather than pure chance.
- As per several rulings of the **Supreme Court** and several **High Courts** clearly establish **‘Games of Skill’ as legitimate business activities protected under Article 19(1)(g)** of the Indian

Constitution.

- These rulings have also emphasized a clear distinction between 'Games of Skill' and 'Games of Chance'.
- Despite these court rulings, **online skill games have faced restrictions in a few States due to addiction**, financial losses and the thin line between skill and chance.

Way Forward

- Apart from the outreach programme, **there has to be a regulatory mechanism for the crypto sector.**
- If the government takes a heavy-handed approach and starts saying things like virtual currency is not legal in India, that will not be entirely true. People **may presume incorrectly that it is illegal**, and One may be indulging in unlawful transactions like money laundering using crypto assets. But unlawful transactions **can also be executed using legal banking channels as well.**

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q.1 With reference to "Blockchain Technology", consider the following statements: (2020)

1. It is a public ledger that everyone can inspect, but which no single user controls.
2. The structure and design of blockchain is such that all the data in it are about cryptocurrency only.
3. Applications that depend on basic features of blockchain can be developed without anybody's permission.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 1 and 2 only
- (c) 2 only
- (d) 1 and 3 only

Ans: (d)

Q.2 The terms 'WannaCry, Petya and EternalBlue' sometimes mentioned in the news recently are related to (2018)

- (a) Exoplanets
- (b) Cryptocurrency
- (c) Cyber attacks
- (d) Mini satellites

Ans: (c)

Mains

Q.1 What is Cryptocurrency? How does it affect the global society? Has it been affecting Indian society also? (2021)

Source: TH

Draft Rules for Online Gaming

Prelims: Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021, Online Gaming Sector.

Mains: Draft Rules for Online Gaming.

Why in News?

Recently, the Ministry of Electronics and IT (MeitY) has released the Draft Rules for Online Gaming.

- The proposed rules have been introduced as an amendment to the [Information Technology \(Intermediary Guidelines and Digital Media Ethics Code\) Rules, 2021](#).

What are the Draft Rules?

- **Self Regulatory Body:**
 - Online games will have to register with a self-regulatory body, and only games cleared by the body will be allowed to legally operate in India.
 - The self-regulatory body will have a board of directors with **five members from diverse fields**, including online gaming, public policy, IT, psychology and medicine.
 - There could be more than one self-regulatory body and all of them will have to inform the Centre about the games they have registered along with a report detailing the criteria for registering.
- **Due Diligence:**
 - Online gaming firms **will be required to undertake additional due diligence, including KYC of users**, transparent withdrawal and refund of money, and a fair distribution of winnings.
 - For KYC, they will have to **follow norms laid down for entities regulated by the Reserve Bank of India (RBI)**.
- **Random Number Generation Certificate:**
 - Gaming companies will also have to secure a Random Number Generation Certificate, which is typically **used by platforms that offer card games to ensure that game outputs are statistically random and unpredictable**.
 - They will also have to get a **“no bot certificate”** from a reputed certifying body.
- **Restrictions on Betting:**
 - Online gaming companies **will not be allowed to engage in betting on the outcome of games**.
- **Compliance:**
 - Similar to social media and e-commerce companies, **online gaming platforms will also have to appoint a compliance officer** who will ensure that the platform is following norms, a nodal officer who will act as a liaison official with the government and **assist law enforcement agencies, and a grievance officer who will resolve user complaints**.

What is the Need for the Rules?

- Around 40 to 45 % of the gamers in India are women, and therefore it was all the more important to keep the gaming ecosystem safe.
- It is believed to be a great first step for comprehensive regulation for online gaming and will reduce the **state-wise regulatory fragmentation that was a big challenge for the industry**.

- The revenue of the Indian mobile gaming industry is expected to reach USD 5 billion in 2025.
- The industry grew at a **compound annual growth rate (CAGR) of 38%** in India between 2017-2020, as opposed to 8 % in China and 10% in the US.
- It is expected to grow at a CAGR of 15 % to reach Rs 153 billion in revenue by 2024, as per a report by VC firm Sequoia and management consulting company BCG.

[Source: IE](#)

Forest (Conservation) Rules 2022

For Prelims: Forests and Jurisdictions, 42nd Amendment Act, 1976, Fundamental Duty, Forest Conservation Act, 1980, Directive Principles of State policy.

For Mains: Forests and Related Laws.

Why in News?

Recently, the [National Commission for Scheduled Tribes \(NCST\)](#) Chairperson said that the ST body's position on the [Forest \(Conservation\) Rules 2022](#) being **violative of the Forest Rights Act, 2006** "will be the same" even as the Environment Ministry has dismissed these concerns.

What is the Issue?

- **Consent Clause for Diversion of Forest Land:**
 - In September 2022, flagging concerns over the **provision in the new rules that proposes to do away with the consent clause** for diversion of forest land for other purposes, the Commission had **recommended that these rules should be put on hold immediately.**
 - In response, the ministry has insisted that the **rules were framed under the Forest (Conservation) Act, 1980** and that the NCST's apprehension of these rules being in violation of the [Forest Rights Act \(FRA\), 2006](#) was "not legally tenable".
 - The Minister added that the two statutory processes were parallel and not dependent on each other.
- **Consent of Gram Sabhas:**
 - The NCST had **pointed out that the FCR 2022 has done away with the provisions to mandatorily seek consent of Gram Sabhas** before the Stage 1 clearance, leaving this process to be done later and even after Stage 2 clearance.
 - According to the government, **FCR 2022 already provides for diversion of forest land "only after fulfilment** and compliance of all provisions, including settlement of rights under the **Forest Rights Act"** and also **does not bar or infringe upon the operation of other laws** mandating consent of **Gram Sabhas.**

What are the Provisions of Forest (Conservation) Rules, 2022?

- **Formation of Committees:**
 - It constituted an **Advisory Committee, a regional empowered committee** at each of the integrated regional offices and a screening committee at State/Union Territory (UT)

government-level.

▪ **Compensatory Afforestation:**

- The applicants for **diverting forest land in a hilly or mountainous state with green cover** covering more than two-thirds of its geographical area, or in a state/UT with forest cover covering more than one-third of its geographical area, will be able to take up compensatory afforestation in other states/UTs where the cover is less than 20%.

▪ **Allows Private Plantations:**

- The rules **make a provision for private parties to cultivate plantations** and sell them as land to companies who need to meet compensatory afforestation targets.
 - Prior to the updated rules, state bodies would forward documents to the FAC that would also include information on the status of whether the forest rights of locals in the area were settled.

▪ **No consent of Gram Sabha needed:**

- The new rules state that a project, once approved by the FAC, will then be passed on to the State authorities who will collect the compensatory fund and land, and process it for final approval.
 - Previously consent of gram sabha, or the governing body in villages in the area, was required to give written consent to the diversion of the forest.

▪ **Allows building in Forests:**

- Right to construct structures for bonafide purposes including forest protection measures and residential units (up to an area of 250 sq meters as one-time relaxation).

What is the State of Forest in India?

▪ **About:**

- According to [India State of Forest Report, 2021](#), the Total Forest and Tree cover is now 7,13,789 square kilometres, 21.71% of the country's geographical area, an increase from 21.67% in 2019.
- Forest Cover (Area-wise): Madhya Pradesh > Arunachal Pradesh > Chhattisgarh > Odisha > Maharashtra.

▪ **Category:**

◦ **Reserved Forests:**

- Reserve forests are the **most restricted forests and are constituted by the State Government** on any forest land or wasteland which is the property of the Government.
- In reserved forests, **local people are prohibited**, unless specifically allowed by a Forest Officer in the course of the settlement.

◦ **Protected Forests:**

- The **State Government is empowered to constitute any land other than reserved forests as protected forests** over which the Government has proprietary rights and the power to issue rules regarding the use of such forests.
- This power has been used to establish State control over trees, whose timber, fruit or other non-wood products have revenue-raising potential.

◦ **Village forest:**

- Village forests are the one in which the **State Government may assign to 'any village community the rights of Government to or over any land** which has been constituted a reserved forest'.

◦ **Degree of Protection:**

- Reserved forests > Protected forests > Village forests.

▪ **Constitutional Provisions:**

- Through the **42nd Amendment Act, 1976 Forests and Protection of Wild Animals and Birds** were transferred from State to Concurrent List along with Education, Weights & Measures and Administration of Justice.
- **Article 48 A in the Directive Principles of State policy**, mandates that the State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country.
- **Article 51 A (g)** of the Constitution states that it shall be the **Fundamental Duty** of every citizen to protect and improve the natural environment including forests and Wildlife.

What are the Related Initiatives?

- **Indian Forest Policy, 1952:**
 - It was a simple extension of colonial forest policy. However, it became conscious about the need to increase the forest cover to one-third of the total land area.
- **Forest Conservation Act, 1980:**
 - It stipulated that the central permission is necessary to practice sustainable agro-forestry in forest areas. Violation or lack of permit was treated as a criminal offence.
- **National Forest Policy, 1988:**
 - The ultimate objective of the **National Forest policy was to maintain environmental stability** and ecological balance through conservation of forests as a natural heritage.
- **National Afforestation Programme :**
 - It has been implemented by the Ministry of Environment, Forest and Climate Change since 2000 for the afforestation of degraded forest lands.
- **Other Related Acts:**
 - The Wildlife Protection Act of 1972, The Environment Protection Act of 1986, and The Biodiversity Diversity Act of 2002.
 - Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006:
 - It has been enacted to recognize and vest the forest rights and occupation of forest land in forest-dwelling Scheduled Tribes and other traditional forest dwellers, who have been residing in such forests for generations.

UPSC Civil Services Examination, Previous Year Questions (PYQ)

Q1. A particular State in India has the following characteristics: (2012)

1. It is located on the same latitude which passes through northern Rajasthan.
2. It has over 80% of its area under forest cover.
3. Over 12% of forest cover constitutes Protected Area Network in this State.

Which one among the following States has all the above characteristics?

- (a) Arunachal Pradesh
- (b) Assam
- (c) Himachal Pradesh
- (d) Uttarakhand

Ans: (a)

Q.2 At the national level, which ministry is the nodal agency to ensure effective implementation of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006? (2021)

- (a) Ministry of Environment, Forest and Climate Change
- (b) Ministry of Panchayati Raj
- (c) Ministry of Rural Development
- (d) Ministry of Tribal Affairs

Ans: (d)

Stem Cell-derived Mitochondrial Transplant

Why in News?

Recently, **six children with rare disorders** caused by deletion in the genomes of their **mitochondria** were **successfully treated for the first time by Stem-cell derived Mitochondria Transplantation**.

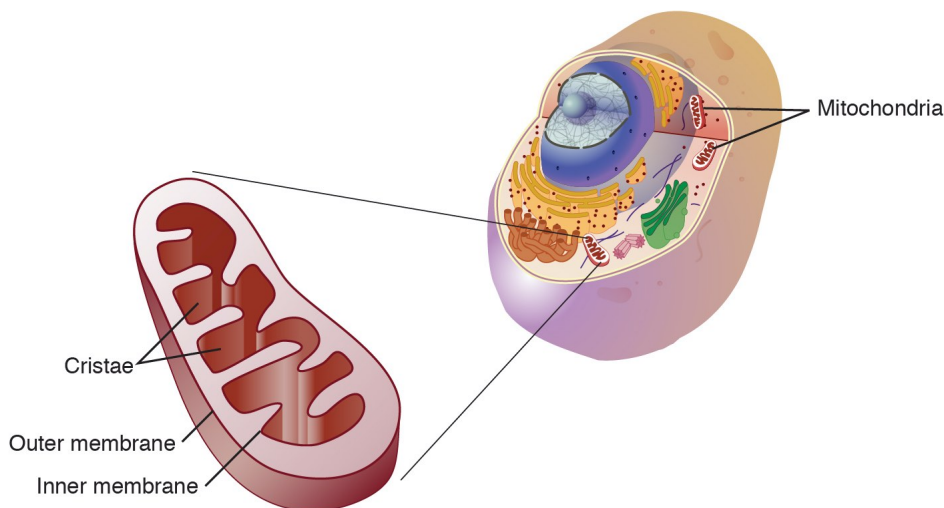
- The process involved the **mitochondrial transplant from donor mothers into children's haematopoietic stem cells**, which give rise to all types of blood cells.

What is the Stem Cell-derived Mitochondria Transplantation?

- It involves the **spontaneous mitochondrial transfer of the stem cell to rescue the injured cells** or the injection of stem cell isolated mitochondria into the injured area to repair the damage.
 - Stem cells are the **most primitive cells at the top of the origin of cell lines**, and they have a **high capacity for differentiation and self-renewal**.
 - In addition, stem cells **can differentiate into various tissues, organs, or functional cells of the human body**; therefore, stem cells hold **great promise for therapeutic tissue engineering and regenerative medicine**.

What are Mitochondria?

- Mitochondria are **membrane-bound semi-autonomous cell organelles** and are often referred to as **the powerhouses of the cell**.
 - They **generate most of the chemical energy needed** to power the cell's biochemical reactions.
 - Chemical energy produced by the mitochondria is stored **in the form of Adenosine Triphosphate (ATP)**.
- Mitochondria contain their own **Deoxyribonucleic Acid (DNA)**. Generally, mitochondria, and therefore mitochondrial DNA, are inherited only from the mother in almost all **multicellular organisms**.
 - Mitochondria in mammalian sperm are usually **destroyed by the egg cell after fertilization**.
 - **The mitochondria are present at the base of the sperm's tail**, which is used for propelling the sperm cells; sometimes the tail is **lost during fertilization**.



UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q1. In the context of hereditary diseases, consider the following statements: (2021)

1. Passing on mitochondrial diseases from parent to child can be prevented by mitochondria replacement therapy either before or after in vitro fertilization of the egg.
2. A child inherits mitochondrial diseases entirely from mother and not from father.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans: (c)

Exp:

- The technological development allows nearly complete replacement of the cytoplasm of egg/ embryo, eliminating the transmission of undesired defective mitochondria for patients with inherited mitochondrial diseases, which is called mitochondrial replacement therapy (MRT).
- Despite the fact that it is called mitochondrial replacement therapy, the treatment functionally works by transferring the mother's nuclear genetic material from an egg (oocyte) with diseased mitochondria into a donor egg that has healthy mitochondria and whose original nuclear genetic material has been removed. The healthy mitochondria in the donor egg can allow for normal development and stop the transmission of mitochondrial disease.
- These processes use assisted reproductive technology, including in vitro fertilization. The father's sperm can fertilize the patient egg before the maternal genetic material is removed or after the maternal genetic material has been transferred to the donor egg. **Hence, statement 1 is correct.**
- The energy-producing organelle mitochondria contains its own compact genome, which is separate from the nuclear genome. In nearly all mammals, this mitochondrial genome is inherited exclusively from the mother, and transmission of paternal mitochondria or mitochondrial DNA (mtDNA) has not been convincingly demonstrated in humans.
- Mitochondrial diseases are chronic (long-term), genetic, often inherited disorders that occur when

mitochondria fail to produce enough energy for the body to function properly. As the mitochondrial genome is inherited exclusively from the mother, the child inherits mitochondrial diseases entirely from mother and not from father. **Hence, statement 2 is correct.**

- **Therefore, option (c) is the correct answer.**

Q2. With reference to 'stem cells', frequently in the news, which of the following statements is/are correct? (2012)

1. Stem cells can be derived from mammals only
2. Stem cells can be used for screening new drugs
3. Stem cells can be used for medical therapies

Select the correct answer using the codes given below:

(a) 1 and 2 only

(b) 2 and 3 only

(c) 3 only

(d) 1, 2 and 3

Ans: (b)

Exp:

- Stem cells are undifferentiated or “blank,” cells capable of developing into cells that serve numerous functions in different parts of the body. Most cells in the body are differentiated cells. These cells can only serve a specific purpose in a particular organ. For example, red blood cells are specifically designed to carry oxygen through the blood.
- Stem cells are not only found in mammals, but also found in plants and other organisms. **Hence, statement 1 is not correct.**
- Since stem cells have the ability to turn into various other types of cells, scientists believe that they can be useful for treating and understanding diseases. According to the scientists, stem cells can be used to:
 - Grow new cells in a laboratory to replace damaged organs or tissues.
 - Correct parts of organs that do not work properly
 - Research causes of genetic defects in cells.
 - Research how diseases occur or why certain cells develop into cancer cells.
 - Test new drugs for safety and effectiveness. **Hence, statement 2 is correct.**
 - To carry out medical therapies. **Hence, statement 3 is correct.**
- **Therefore, option (b) is the correct answer.**

[Source: TH](#)

Purchasing Managers Index

Why in News?

As per the S&P Global India Manufacturing [Purchasing Managers' Index \(PMI\)](#), the manufacturing sector in India had its most significant production growth in 13 months in December 2022.

- For the **October to December quarter**, the **PMI averaged 56.3**, the highest in a year. It indicates that the manufacturing sector is performing well and may be contributing to job creation.

What is Purchasing Managers Index?

- It is a **survey-based measure** that asks the respondents about changes in their perception about key business variables as compared with the previous month.
- The **purpose** of the **PMI** is to provide information about current and future business conditions to company decision makers, analysts, and investors.
- It is **calculated** separately for the **manufacturing and services sectors** and then a composite index is also constructed.
- The **PMI** is a number from **0 to 100**.
 - A print above **50** means expansion, while a score below that denotes contraction.
 - A reading at **50** indicates no change.
- If PMI of the previous month is higher than the PMI of the current month, it represents that the economy is contracting.
- It is usually released at the start of every month. It is, therefore, considered a good leading indicator of economic activity.
- PMI is compiled by **IHS Markit for more than 40 economies worldwide**.
 - IHS Markit is a global leader in information, analytics and solutions for the major industries and markets that drive economies worldwide.
 - IHS Markit is part of S&P Global.

What is the Significance of PMI?

- The **PMI** is widely followed as an indicator of economic health because the manufacturing and services sector is a key driver of economic growth.
- In general, a **high PMI** reading is seen as a positive sign for the economy, as it indicates that the **manufacturing and services sectors** are performing well and contributing to **economic growth**.
- A **low PMI** reading is seen as a **negative sign**, as it indicates that the **manufacturing and services sectors** are **struggling** and may be **dragging down overall economic performance**.

UPSC Civil Services Examination, Previous Year Questions (PYQ)

Q. What does S & P 500 relate to? (2008)

- (a) Supercomputer
- (b) A new technique in e-business
- (c) A new technique in bridge building
- (d) An index of stocks of large companies

Ans: (d)

Exp:

- S&P 500 or Standard & Poor's 500 is an American Stock index, which is widely regarded as the best gauge of large-capital US Equities.

[Source: TH](#)

SMART Program for Ayurveda

Why in News?

Recently, the National Commission for Indian System of Medicine (NCISM) and the Central Council for Research in Ayurvedic Sciences (CCRAS), the two prominent institutions under the Ministry of Ayush, have launched 'SMART' program.

- The **SMART (Scope for Mainstreaming Ayurveda Research in Teaching Professionals) program** aims to boost scientific research through Ayurveda colleges and hospitals.

What is the SMART Program?

- It was observed that the research potential of the large community of Ayurveda teachers remains underutilized mostly. Therefore, the 'SMART' program will **have a deep long term rejuvenating impact on research in the field of Ayurveda and it will be a great service to the nation.**
- It aims to **identify, support and promote innovative research ideas** in healthcare research areas including Osteoarthritis, Iron Deficiency Anaemia, Chronic Bronchitis, Dyslipidemia, Rheumatoid Arthritis, Obesity, Diabetes Mellitus, Psoriasis, Generalised Anxiety Disorder, Non-alcoholic fatty liver disease (NAFLD).
- The program will motivate teachers for taking up projects in designated areas of healthcare research and create a large database.

What is Ayush?

- Ayush is Traditional & Non-Conventional Systems of Health Care and Healing which includes **Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homoeopathy.**
- The positive features of the Indian systems of medicine namely **their diversity and flexibility; accessibility; affordability, a broad acceptance by a large section** of the general public; comparatively lesser cost and growing economic value, have great potential to make them providers of healthcare that the large sections of our people need.

What Initiatives has the Government taken for Development of Ayurveda?

- [National Ayush Mission](#)
- [Aahaar Kranti Mission](#)
- [New Portals on Ayush Sector](#)
- [ACCR Portal and Ayush Sanjivani App](#)

[Source: PIB](#)

Rapid Fire Current Affairs

Purification System to Filter Out Microplastics

Recently, Scientists from **South Korea have developed a new water purification system that can quickly and efficiently filter out [microplastics](#).** In an experiment, over 99.9% of contaminants were taken out of the water in just 10 seconds.

The **polymer used is relatively inexpensive with excellent adsorption performance** and good photothermal properties.

Microplastics are **defined as plastics less than five millimeters in diameter**—smaller in diameter than the standard pearl used in jewelry. It can be harmful to our ocean and aquatic life.

Read More: [Microplastics](#)

Mannathu Padmanabhan

The Prime Minister has paid tributes to Sri Mannathu Padmanabhan on his birth anniversary. He was **born on 2nd January 1878 in Kerala**. He was an Indian **social reformer and freedom fighter** from the southwestern state of Kerala.

He **took part in the Vaikom (1924) and Guruvayoor (1924) temple-entry Satyagrahas and the anti-untouchability agitations**. He is regarded as the reformer and **moral guide of the members of the Nair community**. He received **Padma Bhushan** in 1966. He died on 25th February 1970.

Read More: [Mannathu Padmanabhan](#)

Sari Festival VIRAASAT

The second phase of the Sari Festival “VIRAASAT”- **Celebrating 75 handwoven Saris of India organised by the Ministry of Textiles** will held from 3rd to 17th January 2023 in New Delhi.

Saris	State
Banarasi	Uttar Pradesh
Paithani	Maharashtra
Kanjeevaram	Tamil Nadu
Kasavu	Kerala
Jamdani	West Bengal
Bandhani	Gujarat
Muga	Assam
Phulkari	Punjab
Kalamkari	Rajasthan

Read More: [India's Textile Sector, GI Tagged Saris](#)

DRDO Foundation Day

Recently, **Defence Research and Development Organisation (DRDO) celebrated the 65th Foundation Day on 1st January 2023**.

DRDO was **formed in 1958** from the amalgamation of the Technical Development Establishment (TDEs) of the Indian Army and the Directorate of Technical Development & Production (DTDP) with the Defence Science Organisation (DSO).

It is a **network of more than 50 laboratories that are deeply engaged in developing defence technologies** covering various disciplines, like aeronautics, armaments, electronics, combat vehicles, engineering systems etc. **Recent Developments** - [Extreme Cold Weather Clothing System \(ECWCS\)](#), ['Pralay'](#), [Controlled Aerial Delivery System](#), etc.

Read More: [DRDO](#)

