



**Mains Marathon**  
**Compilation**

**20<sup>th</sup> to 25<sup>th</sup> February, 2023**

## **Mains Marathon Compilation for the Month of February, (Fourth Week) 2023**

- 1. The changes to the organ transplant rules are small, but significant, steps towards giving a new lease of life to many people with failing organs. Elaborate the statement.**
- 2. The enduring solution to the menace of land degradation lies in evolving and meticulously enforcing, a judicious land use policy based on the capability classification of land. Discuss**
- 3. How Rooftop Solar Photovoltaics (RTPV) can be helpful in aiding poverty alleviation?**
- 4. Highlight the multiplier effect of expressways?**
- 5. What is Carbon trading and what are the rules released by the government for it? How does carbon trading operate?**
- 6. Highlight the initiatives that can be helpful in making India a biodiversity champion. Also, suggest further improvements to these programs.**
- 7. Highlight the need for new delivery mechanisms for genetic therapy.**
- 8. What are the challenges facing research and development (R&D) in India? Discuss the measures that can be taken to transform India's R&D.**
- 9. With cyber threats capable of undermining our critical infrastructure, industry, and security, a comprehensive cybersecurity policy is the need of the hour. Elaborate.**
- 10. The discovery of lithium in Jammu and Kashmir is significant for India's push toward electric vehicles but there are risks associated with it. Discuss.**

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**Q.1) The changes to the organ transplant rules are small, but significant, steps towards giving a new lease of life to many people with failing organs. Elaborate the statement.**

**Indian Express**

**Introduction:** Contextual introduction.

**Body:** Explain what changes are made to the organ transplant rules. Also explain more measures.

**Conclusion:** Write a way forward.

India conducts the third highest number of transplants in the world every year. Yet barely four per cent of the patients who require a liver, heart or kidney transplant manage to get one. Recently **National Organ & Tissue Transplant Organization (NOTTO)**, the country's apex organ donation agency has framed some guidelines in consultation with state governments.

**Changes to the organ transplant rules:**

- **Raising the age cap:** Senior citizens of age **65 above** can now register to receive donations from live donors.
- **No domicile requirement:** The Government has asked states to remove the domicile criterion for registering those seeking organs from deceased donors for transplant procedures. Now the needy person can go to any state of the country and register for getting organ and also get the transplant done.
- **No registration fee required:** States have been asked not to charge recipients for registration on waiting lists for organs. States such as Maharashtra, Kerala, Gujarat and Telangana charge between Rs 5,000 and Rs 10,000 to register recipients for organ donation.

**What more can be done?**

- Increasing the pool of organs will **require regulatory creativity** without compromising on ethical imperatives — including those related to showing sensitivity to the concerns of a prospective donor's relatives.
- **The opt-out system**- it assumes all citizens to be donors unless they “opt out” — adopted in some Western countries may not be apt for a country such as India, where awareness of organ donation is low.
- **Public awareness** is the most important step that can lead to improved rates of deceased organ donation.
- **Strengthening the role of NOTTO** for coordinating the organ distribution system.
- To ensure more effective sharing of organs a **zonalization** should be done (USA has such a provision). This would help in transporting and transplantation of organs which can be preserved only for shorter durations e.g. hearts.

The public hospitals need to increase the infrastructural capacity to carry out transplantation and provide affordable proper treatment to the poor.

**Q.2) The enduring solution to the menace of land degradation lies in evolving and meticulously enforcing, a judicious land use policy based on the capability classification of land. Discuss**

**Business Standard**

**Introduction:** Contextual introduction.

**Body:** Explain some Causes of land degradation. Also write some measures to tackle this.

**Conclusion:** Write a way forward.

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Land degradation is defined as the **temporary or permanent decline in the productive capacity** of the land. Rajasthan is the most land degradation-prone state, followed by Maharashtra and Gujarat. India has to support 18 per cent of the world's population on only 2.4 per cent land. India is among the 123 countries that have committed themselves to achieve **land degradation neutrality by 2030**.

### Causes of land degradation:

- **Growing Demand:** for food, fodder, fuel and raw materials is increasing the pressure on land and the competition for natural resources. This has led to over-exploitation of land resources like **overgrazing**, and conversion to other land uses.
- **Unsustainable agricultural practices:** Faulty land and water management practices in agriculture have significantly contributed to land degradation. **Intensive irrigation and high chemical use** (fertilisers, pesticides, etc.) adds to degradation.
- **Increasing population:** With rise in population, stress on natural resources is increasing. People are looking to move into new areas and are invading new land in order to make houses.
- **Unplanned urbanisation:** Economic development has led to expansion of urban and industrial land. The expansion of cities has resulted in the **encroachment of forest areas and wetlands**. For example, rapid urbanisation triggered by a population increase in coastal areas has caused coastal land degradation.
- **Climate Change:** As the days get warmer and periods of drought become more frequent, desertification becomes more and more eminent. Further rise in incidents like forest fires are destroying forests and leading to rise in desertification.

### Measures:

- **Using alternative fuels:** A major focus for reducing forest degradation is encouraging rural households dependent on forests to switch to alternative fuel sources or at the minimum utilise fuel-efficient devices.
- **Preventing overgrazing:** Farmers should be discouraged from overgrazing activities. They must be made aware of the harm of overgrazing to land productivity.
- **Sustainable agriculture: Climate resistant crops** need to be developed and used. Efforts must be made to make farmers aware of overuse of chemical fertilisers. Subsidy may be removed for the same and replaced by cash transfer. **Drip and sprinkle irrigation** methods should be promoted.
- **Afforestation and planting of shelter belts**, and stabilization of sand dunes will reduce land degradation. Strategy to reduce forest dependence for fuelwood, fodder and non-timber forest products should be made.

India should take steps to safeguard the physical, chemical, and biological health of the existing normal land.

### Q.3) How Rooftop Solar Photovoltaics (RTPV) can be helpful in aiding poverty alleviation?

#### Business Standard

**Introduction: Contextual introduction.**

**Body: Explain how Rooftop Solar Photovoltaics (RTPV) can be helpful in aiding poverty alleviation.**

**Conclusion: Write a way forward.**

Rooftop solar installations can be installed on the roofs of buildings. They fall under two brackets: commercial and residential. To generate solar power by installing solar panels on the roof of the houses, the Ministry of New and Renewable Energy is implementing **Grid-connected Rooftop Solar Scheme (Phase II)**.

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Rooftop Solar Photovoltaics (RTPV) can be helpful in aiding poverty alleviation in following manner:

- It has the potential to be a hugely impactful intervention to aid poverty alleviation by converting free sunlight falling on rooftops and courtyards into income for households. For instance, in China, RTPV is one of the identified 10 initiatives rolled out by the government to lift rural households out of poverty.
- Rooftop solar has the great benefit of being able to provide electricity to those areas that are not yet connected to the grid like remote locations and areas where the terrain makes it difficult to set up power stations and lay power lines.
- They offer **cost savings**. The tariff rates for rooftop solar in comparison to industrial and commercial tariff rates are cheaper by 17% and 27% respectively. For building owners, rooftop solar installations can even help in cutting down electricity bills. Rooftop panels supply electricity to buildings, so they need to buy less electricity from the grid thereby saving on energy costs.
- **Low-income household** with limited roof space may receive a benefit from the “free” sunlight.
- **Local farmers** could also earn additional income by leasing out non-arable lands or maintaining the solar farms.
- Each household will use the solar electricity generated for their own purposes. This will reduce energy bills and any surplus electricity will be sold back to the grid.

The Rooftop Solar Scheme needs easy financing, unrestricted net metering, and an easy regulatory process. Public Financial Institutions and other key lenders could be mandated to lend to the segment.

### Q.4) Highlight the multiplier effect of expressways?

#### Live mint

**Introduction: Contextual introduction.**

**Body: Explain some multiplier effects of expressways.**

**Conclusion: Write a way forward.**

The road transport has emerged as a dominant segment with a **share of 4.8 per cent in India's GDP**. India has the **second-largest road network** globally, spanning a total of 5.89 million km. **Bharatmala Pariyojana** aims to develop 34,800 km of NH corridors. As of now, 11,789 km has been completed in the project.

#### **Multiplier effects of expressways:**

- It reduces the commute time. The longer the commute time in a city, the smaller will be its effective labour market.
- The research has shown the immediate positive effects that transit networks in India have had **on employment, especially in rural India** and the country's **manufacturing growth**. Over the long term, even regions farther away from major roads develop in line with the development witnessed by areas along national highways. Such a spillover of growth is essential to **reduce the inequities** in regional development in a country like India.
- **Capital expenditure** is known to have a powerful multiplier effect of approx. 2.95 times.
- It will **boost domestic tourism**. Tourism has a multiplier impact e.g. **Gramin Haats** along the expressway can provide local farmers and craftsman a new window of opportunity.
- It facilitates increased **productivity and efficiency**, improves basic services' access as well as **attracts investment** and promotes socio-economic development for people living

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around highways, including education, healthcare, buildings for public use, shopping complexes etc.

- It results in annual **fuel savings, reducing CO2 emissions** and creates **employment** for thousands.
- Connectivity to unconnected hinterland hamlets can ensure Agri produce reaches main markets and hubs. This can ensure **inclusive development** as well as promote the food processing industry.

A robust road network will be one important pillar in India's speedy economic recovery. The government should also revisit its PPP models to attract more private sector investment in new asset development.

### Q.5) What is Carbon trading and what are the rules released by the government for it?

#### How does carbon trading operate?

#### The Hindu

**Introduction: Explain Carbon trading.**

**Body: Explain some rules released by the government for Carbon trading. Also explain how carbon trading operates.**

**Conclusion: Write a way forward.**

Carbon trade is the **buying and selling of credits that permits a company or other entity to emit a certain amount of carbon dioxide or other greenhouse gases**. It is authorized by the government with the goal of gradually reducing overall carbon emissions and mitigating their contribution to climate change. It is mentioned under the **Clean Development Mechanism**.

The objective of carbon markets is to incentivise investments in renewable energy sources. The carbon trading mechanism will mobilise domestic finance and accelerate the shift away from fossil fuels.

#### Rules released by the government for Carbon trading:

- **Two types of tradeable certificates** are already issued in India- Renewable Energy Certificates (RECs) and Energy Savings Certificates (ESCs). These are issued when companies use renewable energy or save energy, which is also activities which reduces carbon emissions.
- Parliament passed the **Energy Conservation (Amendment) Bill, 2022** which amends the Energy Conservation Act, 2001 to empower the Government to establish carbon markets in India and specify a carbon credit trading scheme.
- Under the Bill, the central government or an authorized agency will issue carbon credit certificates to companies or even individuals registered and compliant with the scheme. These carbon credit certificates will be tradeable in nature. Other persons would be able to buy carbon credit certificates on a voluntary basis.
- A similar trading mechanism is implemented in **Perform, Achieve and Trade (PAT) scheme**. There are around 1,000 industries have been involved in procuring and trading energy-saving certificates (ESCerts).

#### How does carbon trading operate?

- **Carbon Markets and Carbon Credits** are a market-based approach to reduce the concentration of Greenhouse gases (GHG) in the atmosphere. It works by **providing economic incentives** for reducing the emissions of the designated pollutants.
- A carbon market allows investors and corporations to trade both carbon credits and carbon offsets simultaneously.

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- When a company buys a carbon credit, they gain **permission to generate more CO2 emissions**. One tradable carbon credit equals one tonne of carbon dioxide or the equivalent amount of a different greenhouse gas reduced, sequestered or avoided.
- If emissions are below the allowed limit, the emitter earns carbon credits. If emissions are above the allowed limit, the emitter must buy carbon credits from those who have excess credits.
- The idea is that this cost will force the emitters to be more efficient and reduce emission.
- There are **two types** of carbon markets: **(a)** One is a compliance market, set by “cap-and-trade” regulations at the regional and state levels; **(b)** The other is a voluntary market where businesses and individuals voluntarily buy credits (of their own accord) to offset their carbon emissions.

The government must intervene to bring pressure on the industry to participate in the market and also ignore proven non-market initiatives to achieve greenhouse gas reductions.

**Q.6) Highlight the initiatives that can be helpful in making India a biodiversity champion. Also, suggest further improvements to these programs.**

### The Hindu

**Introduction: Contextual introduction.**

**Body: Write some initiatives that can be helpful in making India a biodiversity champion. Also, suggest further improvements to these programs.**

**Conclusion: Write a way forward.**

Biodiversity can be defined as a community of all the living organisms on the earth and the diversity among them from all the ecosystems. At the United Nations Biodiversity Conference, countries adopted a major biodiversity pact called **Kunming-Montreal Global Biodiversity Framework**, to take urgent action to protect and restore the world’s biodiversity.

The following initiatives can be helpful in making India a biodiversity champion:

- **National Mission for a Green India:** It is one of the eight Missions under the National Action Plan on Climate Change (NAPCC). It aims to increase forest cover on degraded lands and protect existing forested lands.
- **Green Credit Programme:** the government will incentivise the companies, individuals and local bodies that adhere to sustainable practises under the Environment (Protection) Act and help mobilize additional resources for such activities.
- **Mangrove Initiative for Shoreline Habitats & Tangible Incomes (MISHTI):** It will facilitate mangrove plantation along India's coastline and on salt pan lands, wherever feasible, through convergence between MGNREGS, CAMPA Fund and other sources.
- **PM Programme for Restoration, Awareness, Nourishment, and Amelioration of Mother Earth (PMPANAM):** to incentivize States and Union Territories to promote alternative fertilizers and balanced use of chemical fertilizers.
- **Amrit Dharohar scheme:** to encourage optimal use of wetlands, and enhance biodiversity, carbon stock, ecotourism opportunities and income generation for local communities.

The following improvements to these programs are required:

- **Use modern concepts of sustainability:** The focus should be on valuation of ecosystems that consider ecological, cultural, and sociological aspects of our biological wealth.
- **Careful site selection:** There is need for greater emphasis on **diversity of mangrove species** with retention of the integrity of coastal mud flats and salt pans. Traditional Knowledge and practices of **local and nomadic communities** should be integrated into the implementation plans.

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- **Ecological restoration rather than tree plantation:** For the Green India Mission, there is a need to choose sites where it can contribute to ecological connectivity in landscapes fragmented by **linear infrastructure**.
- There is a need to sustain ecological flows through **reduction in water use in key sectors**. E.g. by encouraging changes to less water intensive crops such as millets and investments in water recycling in urban areas.
- Each programme should include significant **educational and research funding** to bring awareness to India's biological wealth.
- The **National Mission on Biodiversity and Human Well Being** should be immediately launched by the government to harness the power of **interdisciplinary knowledge** for greening India and its economy.

Any effort at conserving and enhancing biodiversity can only succeed if we tackle the challenge of global warming. Global warming has to be urgently brought under control.

### Q.7) Highlight the need for new delivery mechanisms for genetic therapy.

#### Live Mint

**Introduction:** Contextual introduction.

**Body:** Explain why there is need for new delivery mechanisms for genetic therapy.

**Conclusion:** Write a way forward.

Gene therapy is the **introduction, removal or change in genetic material** (typically means DNA and RNA) in the cells of a patient to treat an inherited or developed disease. Gene therapy holds promise for treating a wide range of diseases, such as cancer, cystic fibrosis, heart disease, diabetes, hemophilia and AIDS etc. Gene Editing, Gene Silencing, CAR T Cell Therapy etc. are the various approaches to Gene Therapy.

#### **Need for new delivery mechanisms for genetic therapy:**

- The present technologies can **only fix the genome in reachable parts** of the body, and right now, reach is very limited. The liver, eyes and blood are the main places where cures might be possible.
- These technologies **largely rely on viral vectors and lipid nanoparticles**. But they can only efficiently deliver to certain Zip codes. Lipid nanoparticles' routes are largely limited to the liver and eyes.
- These have other limitations, for example how much cargo they can hold. Some genes for fixing the diseases are too big to fit inside a virus. It can be tough to **squeeze the instructions** for making Crispr tools into a usable lipid nanoparticle.
- Some methods avoid the delivery problem altogether by taking cells out of the body, editing them in a lab, and giving them back to patient. But that strategy is **lengthy, expensive and tough** on patients.
- The fundamental issue with genetic medicines is that our bodies have evolved to keep bad things out of our cells. That's great for staving off viruses or other pathogens, but also makes it incredibly hard to sneak a medicine in.
- It is also **crucial to prevent the gene from being introduced into the wrong cells**. It would be inefficient and **potentially harmful** to deliver a gene to the wrong tissue.

Gene Therapy has a huge potential to cure rare and untreatable diseases. However, the approach to Gene Therapy requires extreme caution as it can have several long-terms unintended consequences. The field needs appropriate regulation to address the social, equity and ethical concerns.



**Q.8) What are the challenges facing research and development (R&D) in India? Discuss the measures that can be taken to transform India's R&D.**

**The Hindu**

**Introduction: Contextual introduction.**

**Body: Explain some challenges facing research and development (R&D) in India. Also write some measures that can be taken to transform India's R&D.**

**Conclusion: Write a way forward.**

Research and development (R&D) are at the core of economic growth. It leads to innovation and innovation in turn leads to economic growth. India's research and development (R&D) expenditure-GDP ratio of 0.7% is very low when compared to major economies and is much below the world average of 1.8%.

**Challenges facing research and development (R&D) in India:**

- **Low Funding:** The funding is less than 1% of the GDP. Further there are no extra provisions for R&D in the sunrise sectors.
- **High Dependence on Grants:** Many universities depend on the DST, DBT, ICMR and CSIR under their extramural support system. So, quality of research at doctoral level gets hampered when less funding is provided to the public institutions.
- **Lack of Skilled Personnel:** the best talent of our country migrates to foreign countries resulting in **brain drain**.
- **IPR violation:** poor IPR compliance discourages foreign investment flow into the field of R&D.
- **Outdated Curriculum and Pedagogy:** The curriculum in many universities is still focused on rote learning and oriented to getting jobs only. So many universities are unable to duly utilize the research grant provided to them.
- **Poor Private Sector Participation:** Private sector contributes 37% of the total R&D expenditure in the nation. It is way less than the average 68% expenditure by private players in developed countries.

The following measures can be taken to transform India's R&D:

- Focus on proper implementation of **schemes like Make in India and Atma Nirbhar Bharat**. Higher spending in R&D by the private sector will happen as the manufacturing sector expands in the country.
- The amount of Rs 50,000 crore committed to **establish NRF** could be immediately used to plug the deficits in the grants provided to the autonomous universities and Institutions by CSIR, DST and other agencies.
- The budgetary allocation towards R&D should be enhanced. **Economic Survey 2020-21 suggested** that the country needs to increase its GERD from around 0.7% to **over 2% of its GDP**.
- The **National IPR policy of 2016** should be duly adhered in order to gain investor confidence and attract more investment in R&D.
- The Government should **promote Government-Industry-Academia partnership** to support the R&D Ecosystem in India. The learning experience can be transferred to other sectors like green technologies, defense and electronics manufacturing etc.

To move from stagnation in R&D to a more dynamic ecosystem would require action on many fronts including greater allocation of funds. This would be the desired path to breed a culture of curiosity and inquisitiveness in the country.

**Q.9) With cyber threats capable of undermining our critical infrastructure, industry, and security, a comprehensive cybersecurity policy is the need of the hour. Elaborate.**

**The Hindu**

**Introduction: Contextual introduction.**

**Body: Explain some challenges associated with cyber threats. Also explain how a comprehensive cybersecurity policy can solve the issues.**

**Conclusion: Write a way forward.**

As India is moving towards digitisation, every critical infrastructure, from transportation, power and banking systems, would become extremely vulnerable to cyber-attacks. According to **CERT-In (India Ransomware Report)**, there has been a 51% year-on-year increase in ransomware incidents. A majority of attacks are on data centres. The attack on AIIMS and on the parent's company of Solar Industries Limited are some of the examples.

**Challenges associated with cyber threats:**

- The most serious problem comes from **organized cyberattacks** on large data repositories and critical public infrastructure such as AIIMS.
- India is the **cheapest place** in the world in terms of data tariff. It is also the nation with the **highest per capita data consumption** which allows it to generate a huge amount of data.
- The data generation is **likely to rise further** after the launch of 5G and satellite broadband.
- Digital platforms such as the **Digital India initiative, the Unified Payments Interface and the Open Network for Digital Commerce** have all caused an increase of the data online.
- Although the government has set up National Critical Information Infrastructure Protection Centre (NCIIPC), it is yet to identify and implement measures to protect critical information infrastructure.
- Globally, India ranks 2<sup>nd</sup> in terms of the number of Internet users after China (Internet World Stats, 2017). However, India has a negligible base of cyber-security specialists, when compared to internet user base.

India has started several initiatives like **Indian Computer Emergency Response Team (CERT-In): Cyber Surakshit Bharat Initiative** etc. to address the issues. However, a comprehensive cybersecurity policy should include following points:

- **Personal data protection law:** offer the citizens both adequate protection and the chance of recompense for damaging data leaks.
- **Proper cyber risk management:** not only preventing breaches but also placing guidelines regarding the process to be followed once there is a cyberattack. This will help minimise financially and mitigate reputational damage when a breach occurs.
- **Human resource:** increase the number of experts who can effectively manage the cyber security of the country. Further, duties and responsibilities should be defined clearly for smooth functioning and better coordination among departments and stakeholders.
- **R&D:** Investments should be made on R&D to develop more innovative technologies to address increasing cyber security threats.
- **Strengthening Private Partnership:** It is important to strengthen the public- private partnership on cyber security.
- There is an urgent need to build capabilities and capacity for application, equipment and infrastructure testing.

Cyber-security is needed in the present era of increasing connectivity. It is important to bring a robust policy and effectively implement the same.

**Q.10) The discovery of lithium in Jammu and Kashmir is significant for India's push toward electric vehicles but there are risks associated with it. Discuss.**

**Live Mint**

**Introduction: Contextual introduction.**

**Body: Explain some benefits of lithium discovery. Also write some risks associated with it.**

**Conclusion: Write a way forward.**

The Geological Survey of India (GSI) has established **5.9 million tonnes of inferred lithium resources** in Jammu and Kashmir. Lithium is considered a **strategic element** because of its use on batteries used in Electric Vehicles (EVs). The finding of the reserves is being considered as a game-changer in India's transition towards green mobility.

**Benefits of lithium discovery:**

- **Reducing dependence on Imports:** In FY2021-2022, India imported lithium and lithium ion worth nearly Rs 14,000 crores. The demand is likely to rise multifold in the future.
- **Affordable Transition:** It will help the EV ecosystem reach the masses at reasonable and affordable costs, and make the transition to **green mobility** more economical.
- **Meet Government Objectives:** This will also help advance the Government's ambitious plan of 30% EV penetration in private cars, 70% for commercial vehicles, and 80% for two and three-wheelers by 2030 for the automobile industry.
- **Potential to become Major Producer:** The majority of the global reserve is located in regions with severe water stress makes this discovery even more important. India is a potential replacement because the mineral requires a large amount of water for extraction and the majority of the reserves are in nations with water scarcity.

**Associated Risks:**

- **Environmental issues:** Approximately 2.2 million litres of water are needed to produce one tonne of lithium. E.g. lithium mining in Chile, Argentina and Bolivia has led to concerns over soil degradation, water shortages and contamination, air pollution and biodiversity loss.
- **Geological Stability:** According to the seismic zonation map of India, the whole of Jammu and Kashmir, comes under seismologically active Zones IV and V and is also ecologically sensitive. Mining in geologically unstable region will be a major challenge.
- **Mining Policy:** The absence of an integrated mining policy for strategic metals and minerals and poor domestic capabilities could hinder exploitation of the recently discovered reserves.
- **Security Threat:** Certain terror groups have threatened against mining of lithium reserves. Security concerns can hamper development of mining industry, especially in attracting labour.
- **Availability of Technology:** India lacks technology to extract lithium and purify it. There is no prior experience in extracting Lithium, nor tested domestic technology. There is lack of established Lithium extraction industry.

Government can make rare earth minerals a part of the 'Make In India' campaign, similar to China's 'Made in China 2025' initiative that focuses on new materials, including permanent magnets that are made using rare earth minerals.