APPROACH – ANSWER: G. S. MAINS MOCK TEST - 1524 (2020)

1. *Tenancy reforms are much needed to give a boost to the Indian agricultural sector. Comment. In this context, also discuss the significance of the Model Land Leasing Act, 2016.*

(150 words) 10

Approach:

- Briefly highlight the problems of the agriculture sector in general.
- Discuss the need for tenancy reforms in Indian agriculture.
- Mention the significance of the Model Land Leasing Act, 2016.
- Conclude appropriately.

Answer:

Tenancy reforms aim at redistributing ownership over the land holding to ensure **social justice** and reorganize operational holdings for **optimum utilization of land.** Fragmentation of land holdings leaves nuclear families with small plots that barely meet their food requirements while lowering the overall **farm productivity**.

Therefore, tenancy reforms are suggested to induce growth and productivity of the agriculture sector in India:

- **Land Consolidation:** The average land holding size in India is 1.08 hectare. Tenancy reforms will open doors for consolidation of lands.
- **Commercialization:** Presently, most states either ban tenancy or permit it strictly in certain circumstances, hindering progressive revenue models like that of contract farming.
- **Legal status**: Tenancy rights will give legal status to land leasing giving greater sense of security to both the owner and the tenant. Legal documents can also facilitate access to credit and other social security benefits for tenants incentivising them to improvise and make long term investments.
- **More land under cultivation**: Significant tracts of land remain barren and uncultivated even after fragmentation of the land among nuclear families as they are hesitant to lease out for the fear of losing ownership.

In this context, **NITI Aayog came up with Model Land Leasing Act, 2016** to help states enact tenancy reforms act. **The significance of this Act is as follows**:

- **Productivity:** It will promote agricultural efficiency and equity. This will also help in occupational mobility of the people and rapid rural change.
- **Legal status:** Through this act, the landlord can legally lease the land with mutual consent for agriculture and allied activities. In this act, it has been taken care that in any circumstances the leased holders' claim on land will not be valid.
- **Access to formal credit:** Lease holders/tillers may receive institutional loan, insurance and disaster relief so that they may invest more and more in agriculture.
- **Security to owners:** It allows automatic resumption of land after the agreed lease period without requiring any minimum area of land to be left with the tenant even after termination of tenancy, as laws of some states require.
- **Incentive for investments:** It will incentivize tenants to make investment in land improvement and also entitle them to get back the unused value of investment at the time of termination of tenancy.

- **Dispute redressal:** In order to resolve the dispute between the landlord and leaseholder, the provision of "Special Land Tribunal" has been made in the Civil Court.

Thus, tenancy reforms are a **much needed step** and the Model Land Leasing Act, 2016 has presented a framework where needs of landlord as well as leaseholder are protected opening the doors for making agriculture profitable and remunerative.

2. *Identify the various challenges that have restricted the entry of Indian MSMEs into the foreign market. Also mention some government initiatives that have been taken to facilitate MSME exports.* *(150 words) 10*

Approach:
- Briefly mention some statistics regarding MSME sector's contribution to India's economy.
- Discuss the challenges faced by MSMEs in making inroads in foreign markets.
- Enumerate the governmental efforts to improve their export competitiveness
- Conclude accordingly.

Answer:

The MSME sector is the growth engine of Indian economy - contributing 3**0% to its GDP and employing about 110 million people**. However, from the aspect of exporting goods and services in the international market, the sector is faced with several challenges, which include:

- **Lack of market awareness**: They have limited information about products and services in demand; working of the foreign markets; legal and regulatory frameworks of the importing countries; and accessing export distribution channels and connecting with overseas customers.
- **Lack of formal credit:** Over 90 percent of MSMEs are outside the formal credit system, unable to access funds to improve capabilities and grow. They remain uncompetitive and survive only by remaining outside the formal tax structure. This perpetuates the cycle of being sub-scale and poor productivity.
- **Poor adoption of technology:** They are characterized by a lack of innovation, low value addition and poor packaging due to low level of technology adoption, thereby, unable to meet quality standards and establish suitable design and image for the export market.
- **Inadequate infrastructure and human resources:** Procurement of raw materials at competitive cost, inadequate infrastructure facilities including power, connectivity issues, etc. are challenges which affect their overall performance. They do not have trained export staff for trade facilitation.

Realising the huge potential of the MSMEs in the global market, following initiatives have been undertaken by the government:

- **Credit and Finance:** Schemes such as **the Credit Guarantee Trust Fund for Micro & Small Enterprises**, **Interest Subsidy Eligibility Certificate** have been introduced to fill the gap between the actual fund requirements and availability of funds from budgetary sources.
- **Competition and Innovation:** Under the **National Manufacturing Competitiveness Programme,** activities such as visiting of MSME delegations to other countries for exploring new areas of technology, participating in international exhibitions, trade fairs and buyer-seller meets in foreign countries are promoted. Similarly, the **Scheme for Promoting Innovation, Rural Industry & Entrepreneurship (ASPIRE)** aims to create new jobs, promote entrepreneurship**,** facilitate innovative business solutions, and promote innovation to further strengthen the competitiveness
- **Marketing and Procurement**: Procurement and Marketing Support Scheme aims to encourage MSMEs to promote new market access initiatives, and educate MSMEs on various facets of business development.
- **MSME cluster development**: It provides for financial assistance for establishment of Common Facility Centres (CFCs) for testing, training centres and other R&D and to create/ upgrade infrastructural facilities (IDs) in the new/ existing industrial areas/ clusters of MSE's

MSMEs play a crucial role in supporting large enterprises as ancillary units and even help in promoting industry in **rural and backward areas and thus the sector must be promoted to truly harness the potential of Make in India campaign of the government**.

3. **India's march towards inclusive growth and it achieving the Sustainable Development Goals are intricately linked. Discuss.** *(150 words) 10*

Approach:

- Define the term inclusive growth.
- Mention some key issues faced in India and elaborate the importance of inclusive growth to address the same.
- Establish the relationship between inclusive growth & SDGs.
- Conclude with a way forward.

Answer:

Inclusive growth is an economic growth that "creates opportunity for all segments of the population and distributes the dividends of increased prosperity, both in monetary and non-monetary terms, fairly across the society". It implies that everyone should be able to participate in the growth process and the benefits should be shared equally.

Although poverty rates have fallen drastically over the years, India still hosts one of the **largest numbers of poor people** in the world. There is large scale **income inequality** as per the Oxfam report, which highlights that India's richest 1% of the population holds 42.5% of national wealth while the bottom 50% owns a mere 2.8%. Inequity in India is often aggravated because it is often **gendered and rides social fault lines** like caste, ethnicity etc.

To address these issues, inclusive growth holds **importance** as:

- It focuses on **economic empowerment** through financial inclusion, quality employment opportunities and resilience to external financial shocks.
- It encompasses **social justice** through affordable education, quality healthcare, gender parity and regional parity.
- It includes a clear commitment to pursue a development process which is **environmentally sustainable**.
- It implies **good governance** by ensuring no discrimination in service delivery, zero tolerance for corruption and increased citizen participation in governance.

There is an intricate relationship between inclusive growth and Sustainable Development Goals (SDGs). Although UN SDGs do not directly mention inclusive growth, in a quest towards inclusive growth, some of the SDGs will automatically be achieved in India, such as-

- **Goal 1:** End poverty in all its form and everywhere.
- **Goal 2:** End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
- **Goal 3:** Ensure healthy lives and promote healthy well-being for all and at all ages. Reducing maternal mortality rates and infant mortality rates to fixed targets by 2030.
- **Goal 4:** Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
- **Goal 8:** Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
- **Goal 9:** Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.

Thus, inclusive growth is an instrument for achieving the Sustainable Development Goals also. It will enhance access to public goods and services and natural resources. Consequently, India's development strategy must strive with renewed focus on achieving the twin objectives of raising economic growth and making growth more inclusive.

4. **Highlight the need for evolving an appropriate system of Rules Of Origin in regional trading arrangements. What steps have been taken by India recently in this regard?** *(150 words) 10*

Approach:

- Introduce by briefly explaining Rules of Origin and its types.
- Mention the need for evolving an appropriate system of Rules of Origin in regional trading arrangements.
- Highlight the recent steps taken by India in this regard and conclude briefly.

Answer:

Rules of Origin are the **criteria prescribed to determine the national origin of an imported product** in a country. They are primarily of two types:

- **Non-preferential rules of origin**: These apply in the **absence of any trade preference**, where certain trade policy measures such as **quotas, anti-dumping or "made in"** labels may require a determination of origin.
- **Preferential rules of origin**: These apply in **reciprocal trade preferences** (i.e. regional trade agreements or customs unions) or in non-reciprocal trade preferences (i.e. preferences in favour of developing countries or least-developed countries (LDCs).

The **WTO's General Agreement on Tariffs and Trade (GATT**) has no specific rules governing the determination of the country of origin of goods in international commerce. Each contracting party of a trade agreement is free to determine its own origin rules. The need for evolving an appropriate system of Rules of Origin in regional trading arrangements stems from the following:

- **Addressing trade distorting practices**: Determination of product origin is essential to implement trade policy measures in a country for **purposes such as protecting local industry and correcting "unfair trade".** For example, imposition of anti-dumping or countervailing duties against imported products causing material injury to domestic industry.
- **Ensuring effectiveness of trade agreements**: Stringent rules of origin can check the **wrongful practice of availing concessional customs duty** by routing exports through preferential trade countries.
- **Transparency in customs procedures**: Rules of origin make it clear for the businesses **to know the exact procedures** that would be adopted **for custom clearance**.
- **Implementing environmental or sanitary measures**: They help in **preventing the import of contaminated foodstuff or plants** from a specific country or import of nuclear and hazardous material and their waste.
- **Administering "buy national" policies**: This aids in adjusting balance of payment with specific countries.
- **Ensuring national security or political policy**: This can be done by **controlling trade in strategic weapons or specific products** to which sanctions are applied.

India has several measures in this regard, including:

- The Department of Revenue has recently notified the *'Customs (Administration of Rules of Origin under Trade Agreements) Rules, 2020'*, which came into force in September, 2020.
    - These rules will be **applicable on import of goods into India where the importer makes a claim of preferential rate of duty** in terms of a trade agreement (TA). They are meant to curb duty evasion.
    - The rules also aim to **supplement the operational certification procedures** related to implementation of the Rules of Origin, as prescribed under the respective TAs of India viz. Free Trade Agreement (FTA), Preferential Trade Agreement (PTA), Comprehensive Economic Cooperation Agreement (CECA), Comprehensive Economic Partnership Agreement (CEPA) etc.
- The Indian government has mandated that **all e-commerce entities, including Amazon, Flipkart etc. declare the country of origin** of imported products sold on their sites.In 2019, **lack of consensus on Rules of Origin** was one of the factors which **led India to opt out of** the Regional Comprehensive Economic Partnership **(RCEP)** trade pact.

Rules of origin enable the preferential trade agreements to be correctly implemented, which promotes the development of trade and encourages investment. Further, it is increasingly becoming a key component of India's forthcoming trade deals.

5. *MSP regime is a creation of an era of scarcity in the 1960s. Discuss its relevance in the current era of surplus agricultural production.*   *(150 words) 10*

Approach:

- Elaborate upon the context in which the MSP regime was started.
- Address the relevance of the policy current context especially in light of surplus production.
- Highlight the issues in the changed context.
- Conclude appropriately.

Answer:

The emergence of agricultural price policy (MSP) in India was in the backdrop of food scarcity and price fluctuations provoked by drought, floods and high international prices for exports and imports. Even prior to the mid 1960's, it was recognized that for the acceleration of agricultural growth, farmers need to be motivated to adopt better technology and to invest more in their farm enterprises, for the acceleration of agricultural growth. This objective, however, was difficult to achieve without ensuring reasonable prices to the farmers. Consequently, the Government initiated MSP, a price support policy with the primary objective of assuring remunerative and relatively stable price environment for the farmers to augment foodgrain production.

Although price support policy brings certainty and confidence and provides an assurance to the farmers to confidently invest in the crops, there are several fallouts from this regime, especially in the current era of surplus production:

- **High Food Subsidy Burden:** A perusal of the MSP dominated system of rice and wheat shows that the stocks with the government are way above the buffer stock norms. This imposes a **heavy financial and operational burden on the FCI for its maintenance and storage** (to the tunes of Rs. 3 lakh crores).
- **Inflationary trend:** There has been a continuous hike in MSP over the years that translates to higher prices for the consumers.
- **Adverse impact on investment:** Extra expenditure in food procurement, leaves little space for **investments in capital infrastructure**. It has been observed that a 10% increase in MSP of wheat and rice leads to a decline in investment by 1.9% and in overall GDP by 0.33%.
- **Distorted incentives for some crops** at the neglect of others has adversely impacted the cropping pattern, diversification and soil health over the years.

Despite these issues, the MSP policy of the government still holds relevance to the domestic producers:

- In a **fragmented social security policy framework**, leaving farmers at the mercy of the market without a cushion can cause more harm than good. MSP guarantees assured pay to the groups with very low risk appetite.
- It also provides the **backbone for other key government initiatives** like PDS and buffer stocks for **food security**.
- It provides **certainty for the investment decisions** of the farmers who seek growth in production and incomes in the long term.
- With globalization resulting in free trade in agricultural commodities, MSP becomes an important tool to protect farmers from the **unwarranted fluctuation in prices, provoked by the international level price variations**.
- It also provides **psychological support to farmers** as it insulates them from the possibility of low prices.
- The policy can also be **deployed to correct the cropping pattern** in favor of pulses and oilseeds.

However, in a surplus economy, neither market nor the MSP regime alone can offer a solution to the current woes of the agricultural sector. Unless we allow a greater role to markets and be demand-driven, the MSP route alone can spell financial problems. It needs to be understood that this transition is not a 'zero-one' game, it is about changing only the mix of how much of pricing should be state-supported and how much market-driven. Hence, there is a need for a right balance between the two.

6.   Examine the link between the recent locust attack and climate change.   *(150 words) 10*

Approach:

- Give a brief introduction about recent locust attack and its spread.
- Bring out the linkage between the recent locust attack and climate change.
- Conclude with other reasons.

Answer:

Locust swarms as large as entire cities swept across countries in Central and Eastern Africa, the Middle East and parts of Asia including India and Pakistan in 2020. This was the largest outbreak observed in the last 25 years in Ethiopia and Somalia and in 70 years in Kenya. This locust attack is expected to threaten food security of many poor regions in the world. Among other reasons, climate change has been identified as one of the reasons behind the recent locust attack.

Locust swarm locations
Source: UN Food and Agriculture Organization (FAO)
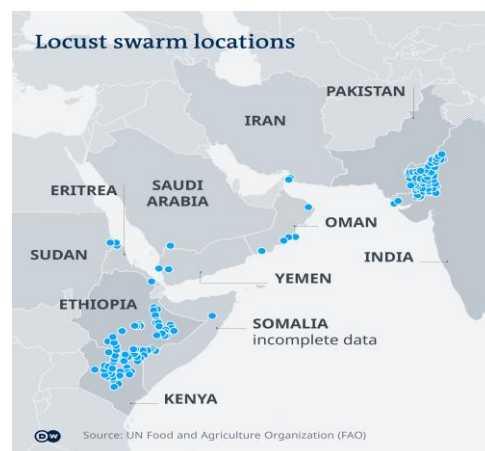
Linkage of recent locust attacks and climate change:

- **Warmer Seas/Oceans:** Because of climate change, the oceans have got warmer and therefore the frequency of cyclones has increased. The Arabian Peninsula was struck by several unusually severe cyclones between 2018 and 2019. The moisture caused lush vegetation to grow in a usually barren environment, attracting desert locusts hunting for food into the area thus providing optimal breeding ground for the locusts. Spurred on by the ample food supply provided by the cyclonic rains, the locust multiplied rapidly, increasing their number 8000-fold in just a few months.
- **Mild winter:** The unusually rainy period was then followed by a particularly mild winter, which allowed the locusts to survive in large numbers.
- **Positive Indian Ocean Dipole:** When the insects migrated from Arab Peninsula into the horn of Africa, they found favourable conditions for their growth here as well because the region was hit by unusually wet conditions and more cyclones. This unusual wet weather in East Africa is linked to a wider climate system known as Indian Ocean Dipole. It is said that global warming intensified the Indian Ocean Dipole (IOD). A more intense IOD caused more frequent tropical storms and heavy rains in the coastal areas of Somalia, Yemen, and some regions bordering the Red Sea which provided ideal conditions for biomass as well as locusts to grow.
- **Strong North-Westerly Wind**: Climate change has also been linked to super cyclone Amphan. In its aftermath, strong northwesterly winds were established. This aided the movement of locusts into places as far as Chhattisgarh and Maharashtra in India. The early onset of monsoon in 2019 attributed to climate change also helped in their survival.

Thus, climate change is considered as the most important factor that led to this locust attack. Since, the whole region of Middle-East, East Africa, and North-West India is influenced by Indian Ocean Dipole and wind pattern, the changing climate and related rise in such insect attacks can threaten their food security and agricultural economy.

7.   Highlighting the properties of Carbon Nanotubes, discuss its applications.   *(150 words) 10*

Approach:

- Start with a brief explanation around Carbon Nanotubes.
- Mention their properties.
- Highlight their applications.
- Conclude accordingly.

Answer:

Carbon Nanotubes (CNTs) are cylindrical molecules that consist of rolled-up sheets of single-layer carbon atoms. They can be single-walled (SWCNT) with a diameter of less than 1 nanometer or multi-walled (MWCNT), consisting of several concentrically interlinked nanotubes.

Their unlimited potential stems from their one-dimensional structure and their unique properties like:

- **Electrical conductivity:** They can either be metallic or semi-conducting in their electrical behavior. The single walled carbon nanotubes (SWNTs) are the most conductive carbon fibers known.
- **Thermal Conductivity and Expansion:** CNTs are the best-known heat conducting material, even exhibiting superconductivity below 20 kelvin. They are exceptionally strong and stiff along the plane of the carbon bonds but show large inter-plane expansion.
- **High Aspect Ratio:** This means that a lower concentration of CNTs is needed compared to other conductive additives to achieve the same electrical conductivity. They have proven to be an excellent additive to impart electrical conductivity in plastics.
- **Strength and Elasticity:** Because of the strong carbon bonds, the CNTs are the ultimate high-strength fibers, stiffer than steel and very resistant to damage from physical forces. They have a greater ability to withstand changes in length under tension or compression.

Their unique composition, geometry, and properties enable numerous potential applications like:

- **Energy Storage**: High surface area, good electrical conductivity and linear geometry make it the desired material for use as electrodes in batteries and capacitors.
- **Thermal Materials**: Their thermal conductivity is enabling many applications where heat needs to move from one place to another. Such an application is found in electronics, particularly advanced computing, where uncooled chips now routinely reach over 100 degree Celsius.
- **Structural materials:** Superior mechanical properties such as stiffness, toughness, and strength allows their usage in advanced composites requiring high values of one or more of these properties.
- **Fabrics and Fibers**: Super strong fibers have many applications including body and vehicle armor, transmission line cables, woven fabrics and textiles. CNTs are also being used to make textiles stain resistant.
- **Biomedical**: Since cells can grow on CNTs, it shows that they have no toxic effect. The cells also do not adhere to the CNTs, potentially giving rise to applications such as coatings for prosthetics, as well as anti-fouling coatings for ships.
- **Air and water filters**: CNT based air and water filtration devices not only block the smallest particles but also kill most bacteria.

However, some experts have shown concerns regarding hazards associated with the exposure of CNTs and its potential toxicity to human beings and the environment. Therefore, comprehensive assessment of the risks and hazards associated with CNTs production and usage must be undertaken before its large-scale commercialization.

8. *India's domestic patent regime privileges public health over pharmaceutical industry's interests. Comment.* *(150 words) 10*

Approach:

- Briefly write about the current patent regime in India.
- Bring out the patent regime's tilt towards public health over pharmaceutical industry's interests.
- Conclude the answer accordingly.

Answer:

Right to health versus patent protection is a long-standing debate because patent protection blocks competition and leads to monopolies that could price medicines beyond the reach of patients. In this context, Indian patent regime establishes certain principles - that the patents granted should not impede protection of public health; do not prohibit the central government from taking measures to protect public health; and make the benefit of the patented invention available at reasonably affordable prices to the public.

This along with the following special provisions of India's patent regime seem to privilege public health over pharmaceutical industry's interests:

- **Prevents ever-greening of patents**: Section 3(d) of the Indian Patent Act 1970 prevents the extension of patent protection through minor product modifications, unless a 'significant enhancement of efficacy' can be demonstrated.
- **Provision for compulsory licensing:** It enables a competent authority to license the use of a patented invention to a third party or government agency without the consent of the patent holder.
- **Short period of data exclusivity:** Under **the Drugs and Cosmetics Act 1940** it is required to protect undisclosed test data, submitted to drug regulatory authorities for the purposes of obtaining marketing approval, against unfair commercial use. But, the requirement may be waived for purposes of "public interest" or, if the new drug has been approved and marketed for several years in other countries.
- **Exemptions from patentability**: Indian law permits use of a patented invention for experimental purposes without infringing rights of the holder. Also, use of inventions for the purpose of government and acquisition of invention by government is permitted.
- **Parallel importation**: Importation of drugs without the consent of the patent-holder of a patented product marketed in another country either by the patent holder or with the patent-holder's consent.

However, it needs to be noted here that patent protection is also given due consideration by the existing patent regime. For example, there has been no grant of a compulsory licence in the last seven years in India and the IPO (Indian Patent Office) has maintained a judicious and cautious approach in its decisions on applications for compulsory licences.

There is a need to strike a balance between people's health and keeping trade healthy and on-going concerns between pharmaceutical industries and countries seeking to maintain public health should be adequately addressed to achieve the balance between innovation and welfare especially in the current pandemic situation.

9. *Bring out the arguments surrounding the idea of employing the principle of 'one border - one force' on Indian borders.* *(150 words) 10*

Approach:

- Briefly, write about the existing border management framework in India.
- Mention the arguments for employing the principle of 'one border – one force'.
- Mention the arguments on tactical challenges in implementing this principle.
- Conclude on the basis of above points.

Answer:

The principle of 'one border - one force' was recommended by the **Kargil Review Committee** after the 1999 India-Pakistan war. In line with this philosophy, BSF (Bangladesh and Pakistan border), ITBP (China border), SSB (Nepal and Bhutan border) and Assam Rifles (Myanmar border) have been deployed. The Indian Army protects LoC (India-Pakistan border) and the LAC (India-China border), while the security of the coastal borders lies with the Indian Navy and Coast Guard, with the State (Marine) Police acting as the second line of defence.

The arguments **for employing this principle are**:

- **Unity of command and better accountability:** It eliminates the issue of multiple forces on the same border reporting to different ministries of the Union government therefore improves **synergy and coordination** among forces. It will also eliminate adhocism in force deployment and therefore establish accountability.
- **Enhanced specialisation:** Border guarding forces deployed on a specific border would be strengthened in terms of equipment and manpower as per the requirement of the region. This would enhance specialisation and operational capability of the forces.

- **Optimization of forces:** Non-deployment of border guarding forces for internal security duties and assigning one force one border would prevent cannibalization of battalions and companies therefore optimizing their performance.
- **Synchronized institutional arrangement:** Presently, lack of institutionalized arrangements for sharing and **coordination of intelligence** at the field level is a primary weakness in proper management of borders. Putting a single force in charge of a particular border would eliminate these issues.

However, there are some **arguments on tactical challenges** in implementing this principle:

- Some forces like Assam Rifles are under dual control of Ministries of Home and Defence (MoD). Efforts on restructuring of Assam Rifles has **invited opposition from MoD** since 90 per cent of its officer cadre strength is drawn from the Army.
- Replacing the existing structure could lead to **non-utilisation of experience gained over the years**, therefore, it would be a sub-optimal option to ensure security in a region.
- Further, all the CAPFs including BSF, ITBP, SSB lack the **depth of training and wartime leadership** (headed by IPS officers) required to carry out all modern-day border offensive tasks, such as hot pursuit and targeted strikes. Currently, only the Army and special forces are fully equipped for such modern warfare.
- Analysts point out that some forces like, the BSF are **not even fully equipped to face a military attack**, rather more suited for peacetime tasks like preventing smuggling and any other illegal activities.

In the backdrop of India's long unresolved land borders with Pakistan and China along with continuous threat of a military conflict, it is important that these tactical challenges are resolved. While abiding by this principle is crucial, capacity building of all the forces guarding their respective borders is equally important.

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10. **Assess the need to create a new cadre of Indian Frontier Administrative Service to undertake the vital tasks at Indian frontiers.** *(150 words) 10*

Approach:

- Give a brief background on Indian Frontier Administrative Service (IFAS).
- Highlight the need for the specialised service.
- Conclude with a way forward.

Answer:

The **Indian Frontier Administrative Service (IFAS)**, a separate cadre created in 1954 to administer the North-East Frontier Agency (NEFA i.e., present-day Arunachal Pradesh and at that time, a part of Assam) was the military-governance mechanism mooted by the first PM of India. It emphasised on the socio-economic development of the various tribes in the protected region.

The IFAS cadre mainly functioned as Political Officers (and thereafter as Deputy Commissioners) in charge of a frontier district vested with the powers of a District Magistrate and were the ultimate authority in their district to examine and implement development schemes.

With the changing scenario and increased acts of hostility on the frontier areas; the IFAS can be re-established with a new mandate. It can help in different ways such as:

- A set **of highly specialised officers, superior in merit and in strategic thinking**, would **entail that the development of Himalayan frontier regions** remains at par with the rest of the country.
- It can **fill the administration gap** since towns, hamlets and villages in border areas are neglected and often complain of virtually no administration.
- It can **form the first line of defence countering the Chinese incursions** through various means like using the tribes' traditional ways of guerrilla tactics, on the same lines as used by Vietnam to thwart Chinese advances in 1979.

- Presently, there are a lot of departments overlapping each other, tending to develop inter-department rivalry. IFAS can help solve this issue as it would be **-one head of the jurisdiction, managing all activities** — from tourism to trade being at the beck and call of the citizens.
- It can also **provide intelligence support on the frontier areas**. An organised support of a strong espionage circle and locals from both sides of the border will propel Indian gains to new **heights of strategic advantage**.
- IFAS officers can be **a bridge between the defence personnel and the local population**. Indian defence can gain additional armour with a cooperative population on the frontline.

To perform their functions effectively, the IFAS needs to have a clear hierarchy and clearly defined roles. The new service would help to not only thwart the Five Finger Strategy, but even make frontier regions staunch supporters of Indian administration.

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11. ***The main objective of Union Budget 2020-21 is to provide "Ease of Living" to all citizens. Analyse the framework proposed in the Budget 2020-21 to achieve this objective.***
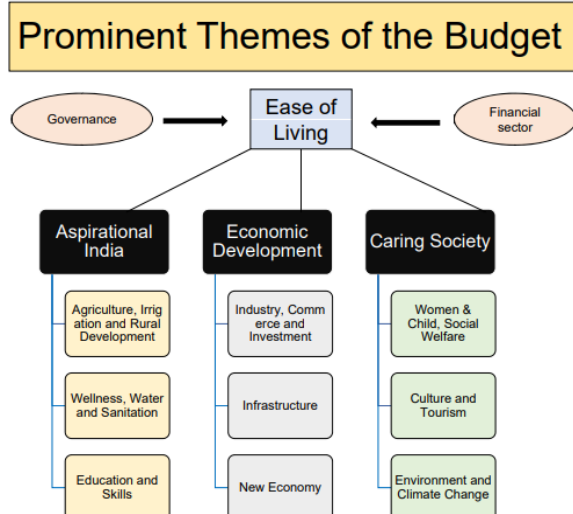
(250 words) 15

Approach:

- Introduce the three themes of 'Aspirational India, Economic Development, and Caring Society' under the main objective of 'Ease of Living' in Union Budget 2020-21.
- List the schemes to support this vision and explain how they will aid in providing "Ease of Living" to all citizens. Use budgetary data, wherever necessary.
- Conclude accordingly.

Answer:

The Union Budget 2020-21 with the central tenet of **"Ease of Living" for all citizens**, is woven around three prominent themes:

I. Aspirational India: All sections of the society to have better standards of living, with access to **health, education,** and **better jobs**.

1. **Agriculture, Irrigation, and Rural Development: 16-action points** which cover almost all aspects of the agriculture and allied activities sector and **address supply bottlenecks**. This includes focus on **Blue Economy**, Jaivik Kheti Portal, Zero-Budget Natural Farming, Deen Dayal Antyodaya Yojana, along with
   - **Kisan Rail**, **Krishi Udaan** for a seamless national cold supply chain for perishables,
   - **One Product One-District** for better marketing and export in the Horticulture sector,
   - **PM-KUSUM** for 20 lakh farmers for setting up standalone solar pumps, another 15 lakh for grid-connected pump sets,
   - **Village storage Scheme** to be run by the SHGs to provide farmers a good holding capacity and to reduce logistics cost.
2. **Wellness, Water and Sanitation:** More than 20,000 empanelled hospitals under PM Jan Arogya Yojana, FIT India movement launched to fight NCDs, "TB Harega Desh Jeetega" campaign launched to end TB by 2025, viability gap funding proposed for setting up hospitals in the PPP mode, Expansion of Jan Aushadhi Kendra Scheme to all districts by 2024, ODF Plus to sustain ODF behaviour, liquid and grey water management along with waste management.

Prominent Themes of the Budget

Governance → Ease of Living ← Financial sector

Aspirational India
- Agriculture, Irrigation and Rural Development
- Wellness, Water and Sanitation
- Education and Skills

Economic Development
- Industry, Commerce and Investment
- Infrastructure
- New Economy

Caring Society
- Women & Child, Social Welfare
- Culture and Tourism
- Environment and Climate Change

3. **Education and Skills:** About 150 higher educational institutions will start apprenticeship embedded courses, enabling sourcing of ECBs and FDIs for education, special bridge courses to improve skill sets of those seeking employment abroad.

II. Economic Development for all: This would entail **economic reforms**, yielding more space for the private sector to ensure higher productivity and greater efficiency.

1. **Industry, Commerce, and Investment:**
   - Focus on **encouraging manufacturing** of mobile phones, electronic equipment, and semiconductor packaging
   - **National Technical Textiles Mission** to be implemented from 2020-21 to 2023-24
   - **Investment Clearance Cell** to be set up to provide "end to end" facilitation
   - Extension of invoice financing to **MSMEs** through **TReDs**.
2. **Infrastructure: National Logistics Policy** and single window e-logistics market, 6500 projects under **National Infrastructure Pipeline** including housing, safe drinking water, and healthcare, smart cities developed in PPP mode, expanding **National Gas Grid**, corporatizing at least one major port.
3. **New Economy**: Based on innovations that disrupt established business models including **artificial intelligence, Internet-of-Things (IoT), 3D printing, drones, DNA data storage, quantum computing**, etc.

III. Caring Society: Such a society to be based on **Antyodaya**, which is both humane and compassionate and ensures upliftment of the weakest section of the society.

1. **Women and Child, Social Welfare:** Focus on MMR, anganwadi workers, no manual scavenging.
2. **Culture and Tourism:** Indian Institute of Heritage and Conservation proposed, selected archaeological sites to be developed as iconic sites, development of Maritime and Numismatics and Trade museums.
3. **Environment and Climate Change**: Enactment of Coalition for Disaster Resilient Infrastructure, and plans for pollution redressal.

This budget has been presented in the backdrop of two cross-cutting developments namely, proliferation of technologies like Machine Learning, Robotics, AI, Bioinformatics, etc., and India's demographic dividend.

Broadly the Government is trying to place the stepping stones to prepare the nation to make it resilient by discouraging inappropriate behaviour, invest in skill up-gradation, and focus on technological and infrastructure enhancement.

It is a step forward towards meeting the aspirations of New India, however one of the most critical parts will be the implementation of the measures to support growth along with proper fiscal consolidation. These three broad themes are held together by a corruption free, policy-driven good governance and a clean and sound financial sector.

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12. *Several challenges are needed to be addressed to realise the full benefits of the recent agricultural marketing reforms. Discuss.* *(250 words) 15*

Approach:

- Give a brief background on the importance of agricultural marketing system in India.
- Give an account of the reforms along with their intended benefits.
- Discuss the difficulties that need to be addressed to realise full benefits of the reforms.
- Conclude by suggesting some measures to address these difficulties.

Answer:

Agri-marketing reforms are key to harnessing the untapped potential of the farm sector. With enhanced agricultural production and a resultant 'marketable surplus' over the years, liberalising the existing marketing scenario has long been advocated. In this context, the government has brought following reforms in the agricultural marketing system:

- **The Essential Commodities (Amendment) Act, 2020**: It does away with the Centre's powers to impose stockholding limits on foodstuffs, except **under extraordinary circumstances.**
  - It will help attract private investment in building infrastructure, supply chains and inventory for farm produce without fear of penal action.
- **The Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act, 2020**: It allows intra-state and inter-state trade of farmers' produce **outside the physical premises of market under the state APMC Acts**. It permits the **electronic trading** of scheduled farmers' produce in the specified trade area. It also **prohibits state governments from levying any market fee, cess or levy** for trade of farmers' produce conducted in an 'outside trade area'.
  - It will reduce the role of intermediaries by providing farmers with freedom of choice of sale and purchase of agri-produce.
- **The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020:** It provides for a farming agreement between a farmer and a buyer, prior to the production or rearing of any farm produce.
  - It will ensure a ready market for growers for their produce, ready access to raw material for the entrepreneurs, reduces the risk of market unpredictability for farmers and provide access to high quality inputs.

However, there are several difficulties that need to be addressed before the full benefits of these policies are realized:

- **Inconsistencies in policy**: There have been frequent flip-flops with respect to agricultural market system policy - from a market-based e-NAM to a public funded PM-AASHA and now back to market-based measures. This needs to change to inspire confidence in the minds of private investors about the continuance of the present policies.
- **Lack of coordination between centre-state**: The states faced several problems in legislating and implementing the earlier Model Acts as can be seen by the fact that many states did not adopt them. So, the Centre needs to engage with the states in order to iron out the potential problems since implementation of Acts vest with the states.
- **Need of complementary reforms in other areas**: Reforms in the output market need to be supplemented and complemented with other required reforms.
  - Absence or failure of credit and insurance markets forces farmers to depend upon the local middleman to meet his/her farming needs, constraining his choice of output markets.
  - The widespread restrictions on land leasing in many states lead to inefficient scale of production.
  - There is a need to fix the problem of supply of uncertified and poor-quality seeds, overuse of chemical fertilizers, corruption in fertilizer subsidy regime, dwindling irrigation potential, lack of agro-based industries etc.
- **Fear and apprehensions amongst farmers:** Farmers fear that these reforms will end the MSP system and promote corporate farming. The government needs to reach an agreeable solution allaying concerns of farmers and making them aware about the benefits of these acts.

In this context, success of recent agricultural market reforms depends on measures such as promotion of agri-tech startups, incentivising states going for agricultural reforms as recommended by 15th Finance commission can be taken up.

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13. *Multimodal transport requires multiple integrations across different modes of transportation. Substantiate. What are the challenges and opportunities associated with multimodal transportation for India?* *(250 words) 15*

Approach:

- Briefly introduce multimodal transportation and explain the need for integration across different modes of transportation.
- Write various challenges associated with multi-modal transportation.
- Write opportunities that multi-modal transportation presents.
- Conclude appropriately.

Answer:

High cost, inefficiency and delays have plagued the Indian transportation sector for long. The transportation sector has failed to keep face with economic growth. In this context, **multimodal transport** – i.e. transportation across various modes- roads, railways, air and water- can prove very effective in providing end to end transportation facilities for the people.

Though numerous mass rapid transit (MRTS) systems like metro rails, bus rapid transit systems (BRTS) and monorails have emerged in Mumbai, Pune, Bengaluru etc., they lack network integration. Cities around the world with multi-modal transport facilities have shown that commuters prefer end-to-end destination transport facilities.

To facilitate multimodality of the type needed to encourage public transit usage, a number of different kinds of integration across modes of transport is required:

- **Physical Integration**: Facilitating direct, convenient, and safe access to public transport.
- **Fare Integration**: Enabling the user to pay once for a journey involving different transport.
- **Route Integration**: Facilitating logical interchange points where passengers are able to transfer from one vehicle or mode to another conveniently and safely.
- **Information Integration**: Enabling a 'one-stop-shop' for public transit users, cyclists, and walkers to gain information on any journey they wish to conduct using these modes
- **Institutional Integration**: Ensuring that different public transit providers see themselves as part of a network and provide links to other types of transit, walking, and cycling.

However, following challenges are associated with multi-modal transportation in India:

- Development of modern day multimodal terminals, jetties, ferry points and river information systems is **highly capital intensive** entailing a high cost of ancillary facilities.
- Bureaucratic hurdles **in coordination among various government agencies and ministries**. IMTS requires **coordinated planning at multiple levels and amongst various departments**.
- **Poor quality roads and hindrances in inter-state movement**.
- High **railway freight tariffs due to cross-subsidization** with passenger trains.
- Absence of **integrated cargo infrastructure in air freight**.
- Most of **national waterways are not fully operational** till date.
- **Inefficient and time-consuming loading-unloading** at ports and poor connectivity between ports and hinterland.
- **Delays in project completion** leading to subdued participation of private players, and rising NPAs of banks.

Opportunities associated with multi-modal transport:

- It **minimizes the burden of issuing multiple documentation and other formalities** connected with each segment of the transport chain.
- The faster transportation of goods made possible under multimodal transport also reduces the **disadvantages of distance from markets and provides last mile connectivity.**
- The inherent advantages of multimodal transport systems will help to reduce the cost of exports and **improve their competitiveness** in the international market segment.
- It helps to avoid over-burdening of any particular mode of transport and thus **saves space and cost associated with congestion**. Moreover, this would save fuel and lessen the pollution.
- The consignor/consignee needs to **deal with only the multimodal transport operator** in all matters relating to goods, or delay in delivery of goods at destination thus increasing ease of logistics.

In this context, the government has prepared a strategy which includes setting up 35 multi-modal logistics parks at an investment of Rs. 50,000 crore, development of 50 economic corridors and an investment template, which involves roping in the states and the private sector for setting up special vehicles for implementation. Schemes such as Bharatmala and Jal Marg Vikas project are also steps in the right direction.

14. *Though COVID-19 pandemic exposes the vulnerability of Informal sector and associated labor force in India, it also presents an opportunity to rebalance formal-informal economy dynamics in the country. Discuss.* *(250 words) 15*

Approach:

- Briefly highlight the impact of Covid-19 on Indian economy.
- Mention the challenges it presents to the informal economy and its workforce.
- Discuss the opportunity it presents to the government to move towards formalization of Indian economy.
- Mention its benefits as well.
- Conclude accordingly.

Answer:

Informal Economy in India employs more than 90% of workforce and contributes about 50% of the gross national product (GNP). But Covid-19 Pandemic and resultant lockdown by the government has exposed the weak underbelly of this sector.

Covid-19 pandemic and India's Informal sector

- **Large Scale Closures:** Owing to limited savings and financial cushion, most owners of informal enterprises had to use their negligible business capital for consumption, forcing them to close their businesses.
- **Unemployment:** According to some estimates, more than 80 percent workers in the informal sector lost employment in India. About 75 percent of these workers were small traders & daily wage-labourers. Wages have also come down due to decreased working hours.
- **Increased Poverty:** According to an estimate by the International Labour Organisation (ILO), nearly 40 crore informal sector workers have delved deeper into poverty amidst this pandemic.
- **Food Insecurity:** Lack of employment, wages and closure of informal food markets in the rural areas (for buying as well as selling) would exacerbate the issue of hunger and malnutrition in the country.
- **Disproportionate impact on women:** Women workers are more vulnerable to informality and job loss. Also there have been increased instances of domestic violence in different parts of the country during lockdown.
- **Intensification of social issues:** The informal sector was already grappling with issues like child labour, exploitation of workers, bonded labour and human trafficking. The large-scale unemployment, resultant loss of income and increased informalization created by the crisis could intensify these issues.

However, the pandemic has also presented an opportunity to increase formalization of the economy to address the structural issues and vulnerabilities of the informal economy:

- In a situation of high liquidity crunch, the dependence of the informal enterprises on the economic stimulus package announced by the government increases disproportionately. However, to avail the benefits of these schemes, these enterprises will have to get registered by default. Thus, it will bring more of the unorganized sector in the formal fold while increasing the government's revenues from indirect taxes in the long-run.
- Workers in the informal sector were hit the hardest during lockdown. Though, the government intends to reach out to every migrant labour, it is handicapped by lack of a comprehensive database. The formalisation of the informal sector would also help building an accurate database of the informal workers which eventually would help them to get access to various government welfare schemes over time.

The government needs to ensure a smooth transition from informal to formal sector. A proper safety net for the informal labourers should be created as envisaged in the Code on Social Security Bill, 2020. In the meantime, the government should lay a long-term vision of increasing productivity of the informal sector by equipping them with technical and business skills, training, finance and enterprise support to compete in the markets. This will eventually help them graduate to the formal set up.

15. *Highlight the drivers and challenges facing India's ambition to become a gas-based economy. Mention the steps that have been taken by the government recently in this regard.*

(250 words) 15

Approach:

- Define gas-based economy.
- Enlist the drivers for India's ambition to become a gas-based economy.
- Discuss in brief the challenges for India's ambition to become a gas-based economy.
- Conclude by mentioning the steps taken by the government in this regard.

Answer:

Gas-based economy implies gas as the main commercial energy source in the energy mix of an economy. India envisions developing a gas-based economy and scaling up the share of natural gas in the energy mix to 15% by 2030.

Drivers for India's ambition to become a gas-based economy:

- **Environmental concerns:** According to the Environmental Protection Agency (EPA), natural gas produces roughly half as much CO2 as coal and 32% less than oil.
  - **International commitments:** Increased gas utilisation would help India meet its intended nationally determined contributions (INDC) commitments under the Paris Agreement and the SDG goals of Climate Action and Affordable and Clean energy.
- **Increasing demands due to a thriving economy and growing population:** CNG is 40% cheaper than LPG, 60% cheaper than gasoline and 45% cheaper than diesel. A 10% replacement of liquid fuel into gas will reduce India's import bill by nearly $3 billion every year.
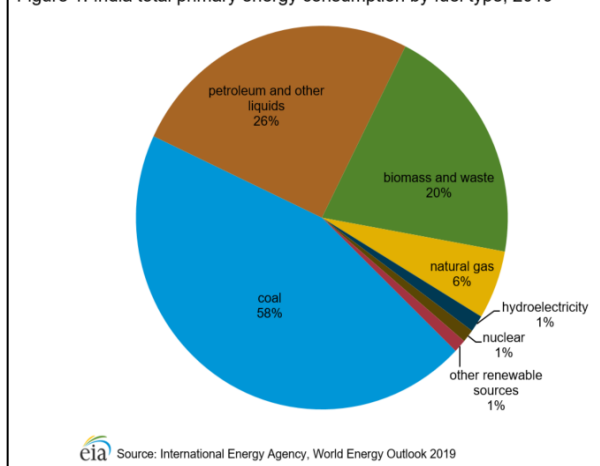
Challenges facing India's ambition to become a gas-based economy-

- **Gas distribution infrastructure:** A large part of the country except the northern and western regions lacks transmission infrastructure and access to natural gas.
- **Lack of coordination:** The presence of a number of regulatory bodies and their lack of coordination creates disconnect in policymaking and incoherence in implementation of policies. Presently, the Ministry of Petroleum and Natural Gas, the Directorate General of Hydrocarbons and the Petroleum and Natural Gas Regulatory Board are in charge of natural gas regulation.
- **Import dependence:** At present 52% of India's domestic consumption relies on imported LNG. A global disruption in the import supply-chain or deterioration of the oil and gas markets conditions as seen in the aftermath of the COVID-19 outbreak can have consequences upon India's economy.
- **Competition of low-priced coal:** The competition of low-priced coal, especially in the power sector, remains a major impediment for India to fulfil its gas target (energy mix to 15% by 2030). India does not restrict the utilisation of coal in its primary energy mix, as it is done in many other countries. The removal of coal green tax (i.e Coal Cess) also makes coal more competitive.

Figure 1. India total primary energy consumption by fuel type, 2019

petroleum and other liquids 26%
biomass and waste 20%
natural gas 6%
coal 58%
hydroelectricity 1%
nuclear 1%
other renewable sources 1%

eia Source: International Energy Agency, World Energy Outlook 2019

The steps undertaken by the government in this regard include

- **New Domestic Natural Gas Pricing Guidelines, 2014:** It provides a formula-based pricing mechanism that considers the volumes and prices prevailing in the international market.
- **Hydrocarbon Exploration and Licensing Policy (HELP), 2016:** It offers an Open Acreage Licensing regime and a Revenue sharing model to attract investors.
- **Pradhan Mantri Urja Ganga Project, 2016:** It will provide cheaper CNG and LNG fuels to cater the energy requirements of five states, namely Uttar Pradesh, Bihar, Jharkhand, Odisha and West Bengal.

- **Natural Gas Marketing Reforms, 2020:** It aims to provide standard procedure for sale of natural gas in a transparent and competitive manner to discover market price by issuing guidelines for sale by contractor through e-bidding.

India is planning to achieve a 'One Nation One Gas Grid'. This transition towards a gas-based economy can be instrumental in supporting the Indian ambition of transforming its energy system towards more efficiency and sustainability.

16. *Climate Change and the associated events endanger the marine and coastal ecosystems while increasing the vulnerability of coastal population. Examine.* *(250 words) 15*

Approach:

- Introduce by explaining climate change and the associated events.
- Explain how climate change endangers marine and coastal ecosystems.
- Highlight how it puts the coastal population at risk.
- Conclude accordingly.

Answer:

Global warming led climate change has induced glacier meltdowns leading to rising sea levels, storms surges and coastal flooding. It is likely to reshape the coastlines and potentially inundate or even submerge many low-lying areas, thus posing imminent dangers to marine and coastal ecosystems. With the warming up of cooler areas, geographical shifts in biodiversity will occur. Changes in plankton activity due to increase in temperature will affect the ocean's ability to absorb or store carbon. This could further boost climate change.

Endangering the ecosystems

- **Coral reefs**: They are endangered due to increasing sea temperatures and higher levels of dissolved carbon dioxide. According to reports, 80-100% of coral reef deaths are due to bleaching, which is the expulsion of symbiotic, food producing algae by coral colonies and their discolouration. In 1998, one of the warmest years in India, massive bleaching of up to 90% of the coral reef occurred in the western Indian Ocean.
- **Wetlands:** Climate change events such as drought, warmer temperatures and changing precipitation patterns can all affect the health and beneficial functionality of wetlands. This may cause release of stored carbon in wetlands into the atmosphere.
- **Mangroves:** Increasing temperatures and sea level rise have direct implications for species composition and distribution of mangrove communities. Interim loss of mangrove habitat would have negative consequences for organisms that depend on them for habitat and a detrital food source. It would also influence their important functions in intercepting nutrients, pollutants and sediments, and in stabilising soils during intense weather events.
- **Estuaries:** Sea-level rise and rise in extreme sea-level events will have variable effects on tidal intrusion and salinity regimes. Potential rainfall reductions in the catchment may restrict estuary opening if flows are substantially reduced.

About 23% of the world's people live within 100 km of the coasts. About ten million of the world's population face coastal floods every year because of storm landfall typhoons. The climate change has caused changes in flooding, temperature and precipitation that increases vulnerability of coastal population in following ways:

- **Health and well-being:** Rising sea levels and associated events like coastal flooding make the population prone to water borne diseases like cholera and diarrhea. Water logging in the coastal regions along with increased temperature and precipitation provides suitable climatic conditions for the growth and spread of vector borne diseases like Malaria and Dengue.
- **Food insecurity:** The increasing salinity of the coastal farmland will severely affect agriculture and food production. It will lead to food and water scarcity and insecurity leading to malnutrition in the population.
- **Livelihood and economic loss:** Extreme weather events such as increased frequency of cyclones disrupt the life and livelihood of the coastal population. While farm and fishing

productivity goes down to deterioration of ecosystems, the services sector like tourism are also severely impacted, causing loss of jobs and employment.

The government is planning to set up a **National Coastal Mission** under the National Action Plan on Climate Change (NAPCC). It aims to address the impact of climate change on coastal and marine ecosystems, infrastructure and communities in coastal areas through a combination of adaptation and mitigation measures such as strengthening natural shields against extreme weather conditions to protect shorelines, improved employment generation opportunities for coastal communities etc.

17. *Using examples, highlight how natural ecosystems perform different hazard mitigation functions.* *(250 words) 15*

Approach:
- Start with a brief introduction around Natural Ecosystems.
- With examples, highlight how different ecosystems perform different hazard mitigation functions.
- Conclude accordingly.

Answer:

Natural ecosystems help in buffering and mitigating hazard impacts, reducing vulnerability by providing ecosystem services to reduce vulnerability and reducing exposure when natural infrastructure is established in highly exposed areas.

Hazard mitigation functions of different ecosystems:

1. **Mountain forests, vegetation on hillside:**
   - Vegetation cover and root structure protect against erosion and increase slope stability by binding soil together and preventing landslides.
   - Forests protect against rockfall and stabilise snow, reducing the risk of avalanches.
   - Catchment forests, especially primary forests, reduce risk of floods by increasing infiltration of rainfall and delaying peak flood water flows.
   - Forests in watersheds are important for water recharge and purification, drought mitigation and safeguarding drinking water supply.

2. **Wetlands and Floodplains:**
   - Wetlands and floodplains control floods in coastal areas, inland river basins and mountain areas subject to glacial melt.
   - Inland wetlands, peat lands store water and release it slowly, reducing the speed and volume of runoff. E.g. Foothills of Himalayas.
   - Marshes, lakes and floodplains release wet season flows slowly during drought periods.
   - Coastal wetlands, tidal flats, deltas and estuaries reduce the height and speed of storm surges and tidal waves.

3. **Coastal mangroves, salt marshes, coral reefs, barrier islands, sand dunes:**
   - Coastal ecosystems protect against hurricanes, storm surges, flooding and other coastal hazards- a combined protection from coral reefs, seagrass beds and sand dunes/ coastal wetlands/. For example, the Sundarbans with its thick mangrove forest acts like a shield.
   - Coastal wetlands buffer against saltwater intrusion and adapt to slow sea-level rise by trapping sediment and organic matter.
   - Non-porous natural barriers such as sand dunes and barrier islands dissipate wave energy and act as barriers against waves, currents, storms surges and tsunamis, depending on the magnitude.

4. **Dry lands:**
   - Natural vegetation management and restoration in dry lands contributes to control desertification as trees, grasses and shrubs conserve soil and retain moisture.
   - Shelterbelts, greenbelts and other types of living fences act as barriers against wind erosion and sand storms.
   - Maintaining vegetation cover in dry land areas and agricultural practices such as use of shadow crops, nutrient enriching plants and vegetation litter, increases resilience to drought.

However not all hazards can be effectively mitigated by ecosystems, which is for instance, the case for earthquakes, and that the magnitude of the hazard can be a limiting factor, such as in the case of the 2004 Indian Ocean Tsunami. But still natural barriers are the first protector to mitigate the effect of natural hazards.

18. Explain what genome sequencing is and state the challenges in scaling up genome sequencing projects. Also, throw some light on the recently launched IndiGen Project. (250 words) 15

Approach:
- Introduce by giving a brief account of genome and genome sequencing.
- State the significance of genome sequencing.
- Mention the challenges in scaling up genome sequencing projects.
- Discuss in brief the recently launched IndiGen Project.

Answer:

A genome is an organism's complete set of DNA. It contains all the data that is needed to describe the organism completely thereby acting essentially as a blueprint. The genome can be understood through a process known as genome sequencing. **Genome sequencing means deciphering the exact order of base pairs (building blocks) in an individual** i.e. adenine (A), thymine (T), cytosine (C) and guanine (G), which make up the DNA.

Genome sequencing data can be analysed to:

- Understand the function of various genes, identify genetic mutations and explore how the mutations impact gene functions. It helps scientists understand the kind of genetic information that is carried in a particular DNA segment. For example, scientists can use sequence information to determine which stretches of DNA contain genes and which stretches carry regulatory instructions, turning genes on or off.
- Highlight changes in a gene that may cause a disease. It will also help understand how the genome works as a whole i.e. how genes work together to direct the growth, development and maintenance of an entire organism.

Challenges in scaling up genome sequencing projects include:

- **Technological issues:** These include **selection** of analytical software tools, the **speedup** of the overall procedure using high-performance computing parallelization and acceleration technology, **development** of automation strategies, data storage solutions etc.
- **Financial issues:** Countries have limited financial resources and projects regarding genetics are not as big a priority as national security and social welfare.
- **Legal issues:** Anonymity of data and questions of its possible use and misuse would need to be addressed by countries. Further, many countries (including India) do not have adequate data protection laws.
- **Cyber security:** Genome sequences of citizens need to be protected with utmost priority. However, cyber security, data theft etc. are key threats that countries face.

IndiGen Project:

The IndiGen Project involves undertaking whole genome sequencing of more than 1,000 Indian individuals representing diverse ethnic groups. It aims to create a pilot dataset to enable genetic epidemiology of carrier genetic diseases towards enabling affordable carrier screening (determining chances of having a child with genetic disorders) approaches in India. It is funded by CSIR, India and its results were recently published.

The computational analysis led to the identification of 55,898,122 single nucleotide variants in the genome dataset of which around 32% of genetic variations in Indian genome sequences are unique as compared to global genomes.

The Indigen Project is significant in understanding the genetic diversity on a large scale and will enable the identification of genetic markers for variations causing genetic diseases etc. Further, it is a blueprint to scale up India's genome data and map a larger swathe of the population, which can give a better understanding of India's anthropologically distinct population.

19. *India needs to avert radicalisation and societal dissention, as internal faultlines are a breeding ground for cyber and transnational terrorism. Discuss.*　*(250 words) 15*

Approach:

- Briefly explain what you understand by radicalisation and state the threats posed by radicalisation and societal dissention on a society.
- Highlight how cyber-space offers further challenges in this respect.
- Identify internal security threats like transnational terrorism that can misuse growing radicalisation & societal dissention.
- Conclude appropriately.

Answer:

Radicalisation is commonly understood as the **social and psychological process of incrementally experienced commitment to extremist political and religious ideologies**. Radicalisation and social dissention **breed contempt and animosity** amongst followers of one faith/community against others and justify the use of violence against those who oppose their belief or ideology.

Threats related to societal dissention and radicalisation become marked in the context of India owing to the **plurality of ethnicities, faith and beliefs**. *Internal faultlines* are getting widened due to events such as mob lynching, hate crimes against minority and socially disadvantaged groups, passing of laws that are perceived as discriminatory by minority groups, spread of left wing extremism etc. and are leading to

RADICALISATION AS A PROCESS

IDEOLOGICAL ENGAGEMENT — RADICALISTAION — "Catalyst Event" — VIOLENT EXTREMISM OR TERRORISM

further social dissention. Consequently, **internal security threats become manifold** due to the following reasons:
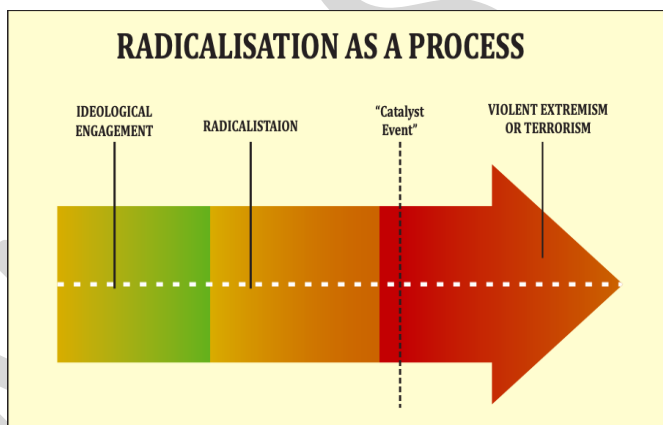
- **Terrorists and extremist groups identify growing divides among societies and use them to push their radical agenda**. They use the internet for purposes including disseminating **propaganda and dis-information to radicalise** individuals, operational planning and fundraising. For instance, Mehdi Masroor Biswas, from Bengaluru, handled a twitter account with 17,700 followers, which eventually became a source of incitement and information for the new recruits of the Islamic State (IS) in the Indian subcontinent.
- **The amount of radical material available online is growing rapidly by volume**. Additionally, in absence of real time scrutiny of information, incitement of people becomes easier. For instance, in 2012, the **circulation of threatening SMSs** and MMSs in Bengaluru, Pune, Chennai etc. alongside images related to violence by Bodo militants against Muslims in Assam, led to violence against people from the North-East.
- **Mediums like Twitter and Whatsapp which are brimming with anti-minority and sectarian statements, fuel social divide**. Further, despite the fact that these platforms are used as mediums to spread radicalisation, they evade scrutiny and regulation from government agencies.

These issues are compounded by the following trends related to **transnational organisations,** which have become a cause of concern for India:

- The **rapid rise in influence of ISIS and Al Qaeda in the Indian subcontinent** and its operations in India's neighbourhood including Sri Lanka, Maldives, Bangladesh, Myanmar etc. has the potential of having a spillover effect in India. Further, these organisations are taking advantage of rising traction amongst Indian youth and are attempting to recruit them to fulfill their agenda.
- Terrorist organisations are devising **new ways to expand their influence**. For instance, the official report of the crime wing of Jammu and Kashmir police reveals that the **network of overground workers (OGWs) has steadily increased** since 2017. Similarly, the danger of lone

wolf attacks by radicalised youth is increasing. Such attacks have been successfully carried out in different parts of the world.

In this context, for India to avoid cyber and transnational terrorism to penetrate its physical and cultural frontiers it must guard itself against deepening fault lines that feed radicalisation and societal dissention by **counselling vulnerable youth, monitoring radical activities on social media platform**s and real time sharing of information by intelligence agencies, increasing avenues for education and employment of youth etc.

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20. *Given the emerging security challenges, discuss why the establishment of Integrated Theatre Commands is being seen as an important defence reform.* *(250 words) 15*

Approach:

- Briefly explain the security challenges facing India.
- In that context, mention the intent of creating an Integrated Theatre Commands by India.
- Explain the economic and strategic benefits of such a command.
- Conclude appropriately.

Answer:

India faces a range **of intrastate and interstate security challenges**. Along its land frontiers, it faces disputed boundaries and competing territorial claims with both Pakistan and China. Both the **line of control, LoC (with Pakistan) and Line of Actual Control, LAC (with China)** have remained contentious for decades. Additionally, China is following a potentially offensive strategy in **the Indian Ocean Region**. Insurgencies in North-East as well as terrorist and suicidal attacks in different parts of India also impose a heavy security burden.

To resolve these challenges **India needs to develop its military capabilities further** and explore the option of **integrating its military services under unified command**. India is also planning to reorganize its military into **integrated theatre commands by 2022**. It is expected that Indian military would have theatre commands such as Northern Command (along China border), the Western Command (along Pakistan border), the Peninsular Command, the Air Defence Command, and the Maritime Command. This is being considered as one of the important defence reforms because of the two-fold benefits:

Economic Benefits

- Approximately **60% of the Defence budget in 2020-21 is allocated towards pension, salary and allowances.** Integrating the manpower within theatre commands has the potential of **redirecting a sizeable portion of the finances toward maintenance and modernization of equipment and capabilities**. For example, reduction in expenditure will take place through integration of medical services, hospitals and training facilities.
- It would be **easier to formulate the requirements of the military as a whole** which would further lead to **systematic planning in the acquisition of resources** and significant cuts in the cost of maintenance and management of assets. For example: Procurement of similar vehicles would facilitate **easier maintenance and spares management**; **joint contracts** for specialized equipment for the tri-services and bulk orders would get better rate for their purchases.
- The integrated command would look at **common contract management for the three service**s and be responsible for **common inventories** for maintaining reserves. **Synchronised transportation and logistics** would lead to **monetary savings as well as better inter-services coordination**.

Strategic Benefits:

- Training needs and administrative requirements of the troops can be better understood, which would allow **specialisation and suitable honing of battle drills** at all levels.
- **Quick mobilisation and apt application** of equipment is made possible during the envisaged, short duration, high intensity war.

- The allocation of military hardware, in terms of weapon systems, command, control and communication equipment and combat support elements will be theatre specific and result in **optimisation of the resources**.
- Unified command of the three Services under one designated commander will allow for **prompt and precise decision making and will remove unnecessary tri-services one-up-manship**.
- Theatre commands will afford **better coordination, intelligence sharing, apt advice and seamless conduct of operations** in a given theatre of operation.

However, creating synergy among the three forces would be **challenging**. At the strategic and tactical levels there could be some challenges, like **the distribution of certain specialised resources** which are held in limited numbers, e.g. multi-role combat aircrafts. Besides, **interoperability of troops and equipment** from dormant sectors to the active areas during war will be difficult and less effective. The challenge also lies in **formalising a chain of command**. Therefore, to facilitate this restructuring of military commands, government has created the post **of Chief of Defence Staff (CDS)** and a Department of Military Affairs in the Ministry of Defence.