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PIONEER ACADEMY's
PATHFINDER
CURRENT AFFAIRS FOR CIVIL SERVICES

Topic 1. FSSAI IS EXPECTED TO ISSUE A DRAFT REGULATION FOR LABELS ON FRONT OF FOOD PACKETS

Importance for prelims: Governance

The Food Safety and the Standards Authority of India (FSSAI) is expected to issue a draft regulation for the labels on front of food packets that will inform consumers if a product is high in salt, sugar and fat.

- Need for front-of-package labelling
- In the past 3 decades, the country's disease patterns have shifted. while mortality because of communicable, maternal, neonatal, and nutritional diseases has declined and India's population is living longer, non-communicable diseases (NCDs) and injuries are increasingly contributing to the overall disease burden.
- In 2016, NCDs accounted for 55% of premature death and disability in the country.
- Indians even have a disposition for excessive fat around the stomach and abdomen which ends up in increased risk of cardiovascular disease and type two diabetes.
- According to the National Family Health Survey-5 (2019-2021), 47.7% of men and 56.7% of women have a high risk waist-to-hip ratio.
- An increased consumption of packaged and junk food has also led to a double burden of under nutrition and over nutrition among children.
- Over half of the children and adolescents, whether or not under-nourished or with normal weight, are in danger of cardiovascular diseases, according to an analysis by the comprehensive National Nutrition Survey in India (2016-2018).
- Reducing sugar, salt, and fat is among the best ways to prevent and control noncommunicable diseases.
- Whereas the FSSAI needs mandatory disclosure of nutrition information

on food packets, this is located on the back of a packet and is difficult to interpret.

What decision has FSSAI taken?

- At a stakeholder's meeting on February 15, 2022, 3 important decisions were taken on what would be the content of the draft regulations on front-of-package labelling.
- • These included threshold levels to be used to determine whether or not a food product was high in sugar, salt and fat; that the implementation are voluntary for a period of 4 years before it's made mandatory; which the health-star rating system would be used as labels on the basis of a study commissioned by the FSSAI and conducted by IIM-Ahmedabad. Response to draft regulation.
- The food industry agreed with the FSSAI's decision on the issue of mandatory implementation and use of ratings, and sought more time to study the issue of thresholds.
- The World Health Organization representative said the threshold levels were lenient, while the consumer organisations opposed all three decisions.
- The biggest contention is over the use of a health-star rating system that uses a star to five stars to indicate the overall nutrition profile of a product.
- Health experts are demanding that the FSSAI instead recommend the "warning label" system that has proven to have altered consumer behaviour.
- Why is there opposition to the rating system and what are global practices related to labels on food items: In a health-star rating system, introduced in 2014 in Australia and New zealand, a product is assigned a particular number of stars using a calculator designed to assess positive (e.g., fruit,

nuts, protein content, etc) and risk nutrients in food (calories, saturated fat, total sugar, sodium).

- Scientists have aforesaid that such a system misrepresents nutrition science and therefore the presence of fruit in a fruit drink juice doesn't offset the impact of added sugar.
- Experts say that thus far there's no evidence of the rating system impacting consumer behaviour.
- The stars can also lead to a 'health halo' because of their positive connotation making it harder to identify harmful products.
- Over forty global experts have also referred to as the IIM-Ahmedabad study flawed in design and interpretation.
- There are other alternative labelling systems in the world, like "warning labels" in Chile (which uses black octagonal or stop symbols) and Israel (a red label) for products high in sugar, salt and fat.
- The 'NutriScore', used in France, presents a coloured scale of A to E, and the Multiple Traffic Light (MTL), used in the U.K. and other countries depict red (high), amber (medium) or the green (low) lights to indicate the risk factors.
- Global studies have shown a warning label is the only format that has led to a positive impact on food and beverage purchases forcing the industry, for example in Chile, to reformulate their products to get rid of major amounts of sugar and salt.
- **FSSAI:** its role and functions: It is an autonomous statutory body that maintains the food safety and standards in India.
- FSSAI is administered by the Ministry of Health & Family Welfare.
- The Body is functional as per the Food Safety and Standards Act, 2006. The FSSAI has it's headquarters at the New Delhi.
- The authority also has six regional offices located in the Delhi,

Guwahati, Mumbai, Kolkata, Cochin, and Chennai.

- The FSSAI comprises a Chairperson and twenty two members out of which one – third are to be women.
- The chairperson of FSSAI is appointed by the Central Government.
- **Food Safety and Standards Rule, 2011 provides for:** The Food Safety Appellate Tribunal and the Registrar of the Appellate Tribunal, for adjudication of food safety cases.
- It covers Licensing and Registration, Packaging and Labelling of Food Businesses, Food Product Standards and Food Additives Regulation.
- It prohibits and restricts on sales or approval for Non-Specified Food and Food Ingredients, such ingredients may cause harm to human health. It provides for Food Safety and Standards on Organic Food and regulates Food Advertising.
- Important Initiatives by FSSAI Eat Right India – It is a Pan-India cycle movement called 'Swasth Bharat Yatra' aimed to create consumer awareness about eating safe and nutritious food.
- Clean Street Food –This involves training the street food vendors and the making them aware of the violations as per the FSS Act 2006.
- Diet4Life –This is another initiative taken by FSSAI, to spread awareness about metabolic disorders.
- Save Food, Share Food, Share Joy –Encouraging people to avoid the food wastage and promote food donation.
- Through this, FSSAI intends to connect food-collecting agencies with the food-producing companies and share the food with the ones in need.
- Heart attack Rewind – it's the first mass media campaign of FSSAI.
- It's aimed to support FSSAI's target of eliminating trans fat in India by the year 2022.
- **FSSAI-CHIFSS –** it's collaboration between FSSAI and CII-HUL

Initiative on Food Safety Sciences to promote collaborations between industry, Scientific Community, academia for food safety.

Topic 2. REPRODUCTIVE RIGHTS

Importance for prelims: Polity

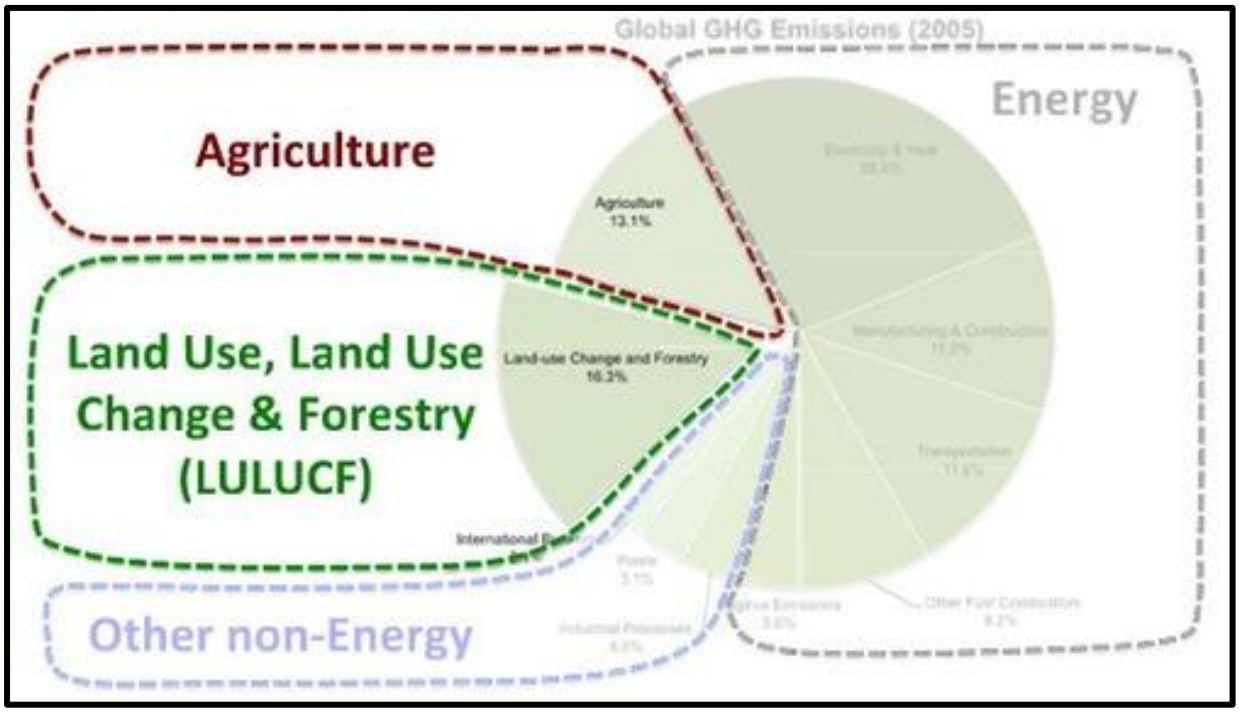
Supreme Court of the US (SCOTUS) has privately voted to strike down the constitutional right to abortion as determined by the landmark Roe vs Wade case in 1973, according to a leaked draft opinion from February 2022.

What is the Roe vs Wade case?

- Roe woman named Norma McCorvey who in 1970 sought-after to have an abortion when she was 5 months pregnant.
- 7-2 majority opinion paved way for the recognition of the abortion as a constitutional right in the U.S., effectively striking down a wide range of state-level abortion limitations.
- Based on the Roe vs Wade case, the framework of regulations that applied towards the right to abortion Impact of overturning the Roe judgement If the Supreme Court rules to overturn the Roe judgement, the power to decide on the abortion would rest with the elective leaders of every state.
- With the ban on abortion in their states, women may travel out of state for the procedure and also look to use illicit pills because the ban restricts their access to safe abortions further affecting their health and wellness.
- The removal of the constitutional right to abortion mostly affects low-income people, people of colour and rural communities across the country.
- Legality of abortions in India India's Medical Termination of Pregnancy Act, 1971 allowed abortion until 20 weeks of pregnancy.
- Through an amendment act passed in 2021, the ceiling for abortions was raised to 24 weeks for special categories of women.
- Medical Termination of Pregnancy Act 2021

Topic 3. LAND USE, LAND-USE CHANGE AND FORESTRY (LULUCF)

Importance for prelims: Environment



Climate Change Background the rate of build-up of CO2 in the atmosphere will be reduced by taking advantage of the actual fact that atmospheric CO2 will accumulate as carbon in vegetation and soils in terrestrial ecosystems.

- Under the United Nations Framework Convention on Climate Change any process, activity or mechanism which removes a greenhouse gas from the atmosphere is referred to as a "sink".
- Human activities impact terrestrial sinks, through land use, land-use change and forestry (LULUCF) activities, consequently, the exchange of CO2 (carbon cycle) between the terrestrial biosphere system and therefore the atmosphere is altered.
- **Definition of LULUCF:** The LULUCF (Land Use, Land Use change and Forestry) sector is used to report the CO2 flows between different terrestrial reservoirs (biomass, soils, etc.) and therefore the atmosphere that take place on the managed surfaces of a territory.
- It can thus constitute a net source or a net sink of CO2.

- This sector, defined within the framework of national greenhouse gas emission inventories, reflects in particular emissions and absorptions linked to land use (growth, biomass mortality and wood removal in forests; impacts of changes in agricultural practices on cultivated soils, etc.) and to changes in land use (deforestation, afforestation, soil artificialisation, etc.).
- The methods for calculating these emissions and removals are defined by the Intergovernmental Panel on Climate Change (IPCC), under the United Nations Framework Convention on Climate Change (UNFCCC).
- **Role of LULUCF in mitigation of climate change:** The role of LULUCF activities in the mitigation of climate change has long been recognized.
- Human activities have an effect on changes in carbon stocks between the carbon pools of the terrestrial ecosystem and between the terrestrial ecosystem and also the atmosphere.
- Mitigation can be achieved through activities in the LULUCF sector that increase the removals of greenhouse gases (GHGs) from the atmosphere or decrease emissions by halting the loss of carbon stocks.
- In its Special Report on Climate Change and Land, the IPCC identifies many landrelated climate change mitigation options that have co-benefits for climate change adaptation.
- The IPCC report also recognizes that some activities can have adverse side-effects on other ecosystem services such as through increased competition for land and water if not implemented with due consideration to the native conditions as well as current use of the land.
- The IPCC identifies agriculture, forestry and other land use (AFOLU) as a significant net source of GHG emissions, contributing to about 23% of anthropogenic emissions of carbon dioxide (CO2), methane (CH4) and

nitrous oxide (N2O) combined as carbon dioxide equivalents in 2007–2016.

- Forests present a significant global carbon stock accumulated through growth of trees and an increase in soil carbon.
- Conversion of primary to managed forests, logging work and unsustainable forest management end in GHG emissions and might have additional physical effects on the regional climate as well as those arising from albedo shifts.
- Conversely, in areas of degraded forests, sustainable forest management can increase carbon stocks and biodiversity.
- In the long term, a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fibre or energy from the forest, can generate the largest sustained mitigation profit.
- Carbon storage in long-lived wood merchandise and reductions of emissions from use of wood merchandise to substitute for emissions-intensive materials also contribute to mitigation objectives.
- Other terrestrial systems also play an important role. Most of the carbon stocks of croplands and grasslands are found in the below-ground plant organic matter and soil.
- Consequently, soil carbon sequestration in croplands and grasslands has a mitigation potential of 0.4–8.6 CO2-eq/yr according to the IPCC.
- **Drawbacks of LULUCF:** The main drawback of LULUCF activities is their potential reversibility and nonpermanence of carbon stocks as a result of human activities, natural disturbances or a combination of the two with loss of carbon stocks and release of GHG into the atmosphere as a result.
- Global climate change is also predicted to have an effect on growth and

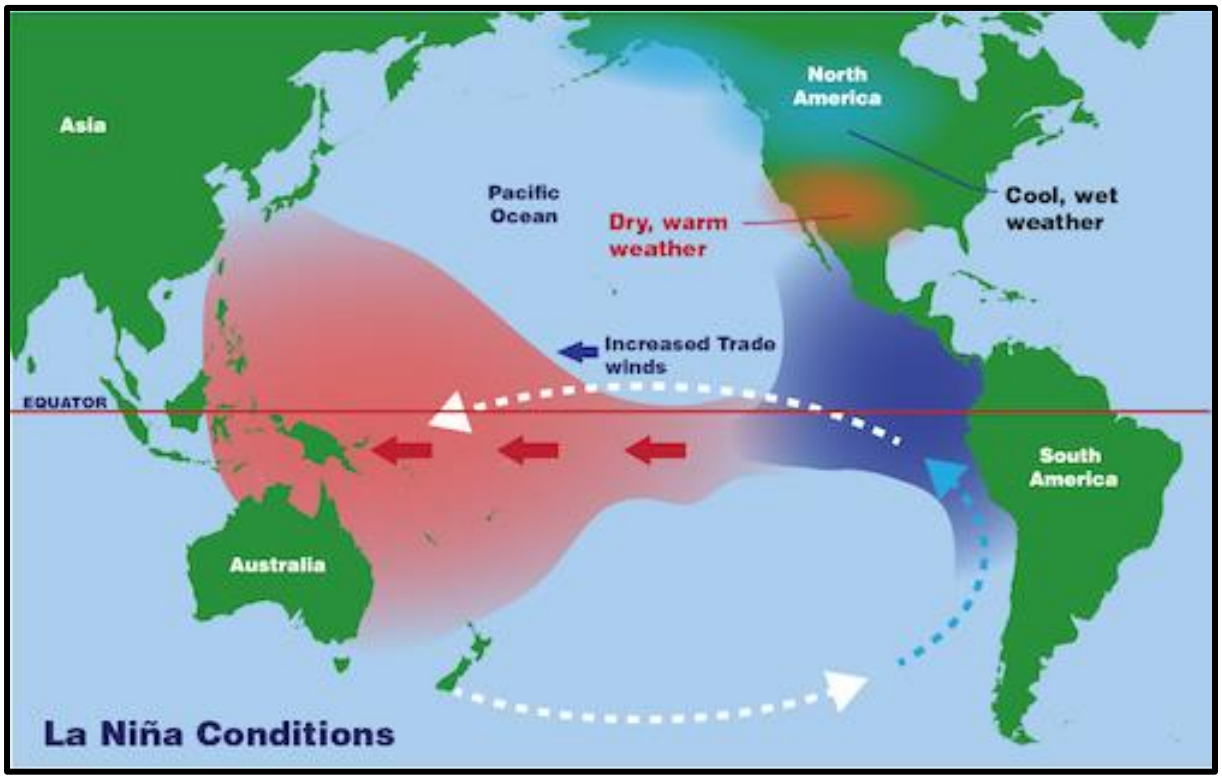
decay rates as well as the occurrence of natural disturbances with regional differences around the world.

- Rapid reductions in anthropogenic greenhouse gas emissions that restrict warming to "well-below" 2°C would greatly reduce the negative impacts of climate change on land ecosystems according to the IPCC.
- **Cooperation with other organizations:** The emergence of and the continued significance of issues related to LULUCF has stimulated cooperation with many organizations and institutions with forestry and agriculture experiences.
- The Food and Agriculture Organization of the United Nations (FAO).
- The forestry Department of Food and Agriculture Organization has considerable experience in, among others, building capability in developing countries and in assessing the global status of forests.
- Its work includes the publication of the Global Forest Resources Assessment as a contribution to knowledge on the state of the world's forests.
- The Collaborative Partnership on Forests (CPF).
- The CPF is s an innovative interagency partnership on forests comprising fourteen international organizations, institutions and secretariats that have substantial programmes on forests.
- The mission of the Collaborative Partnership on Forests is to promote sustainable management of all types of forests and to strengthen long-term political commitment to this end.
- The United Nations Forum on Forests (UNFF).
- The UNFF is an intergovernmental method with the objective of promoting the management, conservation and sustainable development of every type of forests.
- It allows forest policy dialogue facilitated by the Intergovernmental Panel

on Forests (IPF) and therefore the Intergovernmental Forum on Forests (IFF).

Topic 4. LA-NINA

Importance for prelims: Geography



This year, the La Nina is being blamed for worsening perhaps the longest spell of heat waves from March to April in north, west and Central India. About La-Nina: La Nina is a climate pattern that describes the cooling of surface ocean waters along the tropical west coast of South America.

- La Nina means Little Girl in Spanish. La Nina is also sometimes called El Viejo (in Spanish), anti-El Niño, or simply "a cold event." La Nina has the opposite effect of El Nino.
- La Niña is caused by a build-up of cooler-than-normal waters in the tropical eastern Pacific due to stronger south-east trade winds than usual And pushing more warm water towards Asia from the west coast of the South Americas.
- La Nina events are indicated by sea-surface temperature decreases of more than 0.5 for at least five successive three-month seasons.
- Upwelling increases, bringing cold, nutrient-rich water to the surface in

off the coast of peru Atmospheric stability and cold and dry conditions prevail over West Coast of South America and instability and low pressure conditions in tropical western pacific La Nina brings greater than normal rainfall over northern Australia, Indonesia, New-guinea and India during monsoon La Nina events may lastbetween one and three years, unlike El Niño, which usually lasts no more than a year La- Nina is a cold phase of EnSo(El-Nino Southern Oscillation)

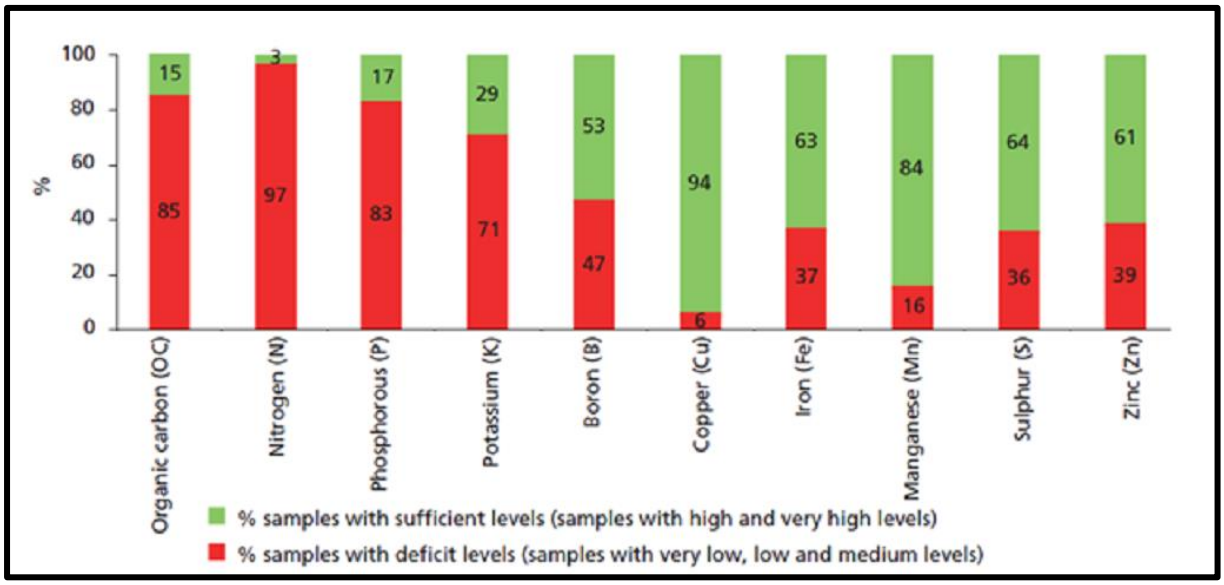
- La-Nina affects the position and intensity of jet streams and storms outside of the tropics La-Nina and heat waves: IMD defines a heat wave as a condition when the average maximum temperature exceeds 45°C, or if the temperature is higher than normal by 4.5°-6.4°C on at least two consecutive days While heat waves are expected to peak in May, the on -going heat wave first occurred early in March and the spring season felt like summer.
- Heat waves in mountain states of Himachal Pradesh, Uttarakhand and UT of J&K are unprecedented this year.
- Persistence of La-Nina is believed to be an early and prolonged heat waves in India this year How La-Nina induces Heat waves? Every summer, the formation of a low pressure over India pulls in the high-pressure winds from the Arabian Sea, causing the monsoon.
- However, the formation of a ridge in the subtropical jet stream over India resulted in a high-pressure zone that trapped heat within the subcontinent, creating a persistent heat wave.
- The hot air over land is being boxed in from all sides by the jet stream's high pressure, resulting in the formation of a 'heat dome'.
- The resultant overall high-pressure region prevents other winds from the being pulled into the subcontinent.
- Within the heat dome, the jet stream moves air from west to east, but this

air sinks back hot, leading to a heat wave.

- This anomaly was likely triggered by persistent La Nina conditions furthermore, the La Nina produced a north-south pressure pattern over India as expected throughout the winter that normally influences trade winds that bring monsoon rains to India.
- However, because of persistence of La-Nina, drove hot westerly winds and blasts of hot air from the Middle East into Pakistan and India. Western disturbances, or moisture from the Mediterranean region that fall as rain over north-western India brings rainfall in march during rise in temperature.
- Temperature difference between Europe and India causes this Western disturbance partly because of La Nina, the temperature difference was week and resulted in weak western disturbances with hardly any rain The similar effect has been seen even during 1998-2000 when La Nina had persisted for three years,

Topic 5. INDIAN SOILS ARE NUTRIENT DEFICIENCY

Importance for prelims: Geography



State of Biofertilizers and Organic fertilizers in India' report by Centre for Science and environment highlights the soil nutrient deficiency in India

About Soil Nutrients: Plants require a steady supply of macronutrients and micronutrients.

- Macronutrients are required in larger quantities than micronutrients.
- The names of the 2 categories don't imply that one type of nutrient is additional important than another; it just means that more macronutrients should be present in the soil than micronutrients.
- Plants obtain nearly all of the nutrients they need from the soil, although some are obtained via photosynthesis.

Macronutrients are divided into two groups:

1. **Primary: Needed in the highest concentration:** Nitrogen (N), Phosphorus (P), and Potassium (K)
2. **Secondary:** Required for sustained plant health, but in lower quantities than the primary macronutrients.

- Calcium (Ca), Magnesium (Mg), and Sulfur (S) Micronutrients: Essential to plant development and growth but are needed only in trace amounts,

compared to their macro-counterparts. 1. Boron (B) 2. Zinc (Zn) 3. Iron (Fe) 4. Manganese (Mn) 5. Copper (Cu) 6. Molybdenum (Mo) 7. Chlorine (Cl)

- **Status of Indian Soil nutrients as per the study:** More than 50 million soil samples from across India were tested during 2015-16 to 2018-19 in the government-approved laboratories to understand the state of the country's soils.

Topic 6. THIRTY YEARS OF RIO SUMMIT

Importance for prelims: Environment

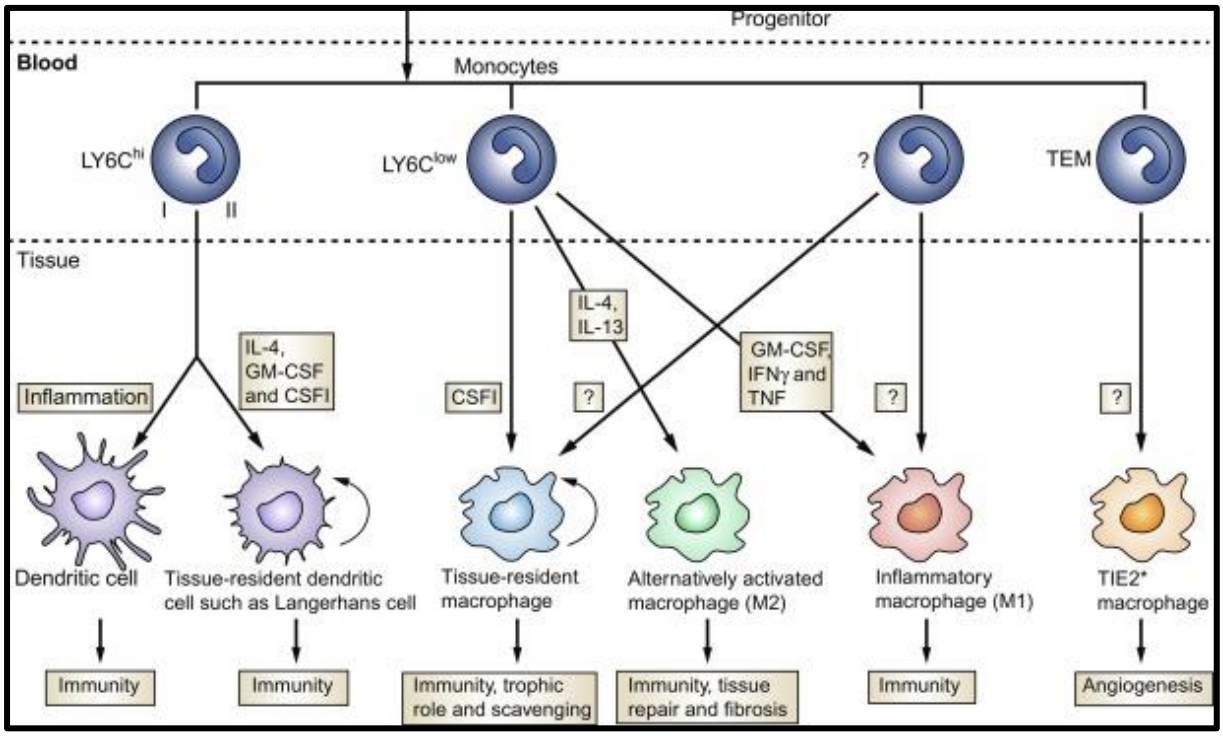
While this June marks the 30 anniversary of the Rio Summit, the United Nations is not organising an event to mark it. Concept: India and China were considered developing countries when the Rio Summit, or the United Nations Conference on Environment and Development, was organised in They were not included in the list of countries that needed to have greenhouse gas emission reduction targets in the Climate Change Convention.

- The United Nations Conference on Environment and Development (UNCED), also known as the 'Earth Summit', was held in Rio de Janeiro, Brazil, from 3-14 June 1992.
- This global conference, held on the occasion of the 20th anniversary of the first Human Environment Conference in Stockholm, Sweden, in 1972, brought together political leaders, diplomats, scientists, representatives of the media and non-governmental organizations (NGOs) from 179 countries for a massive effort to focus on the impact of human socio-economic activities on the environment.
- A 'Global Forum' of NGOs was also held in Rio de Janeiro at the same time, bringing together an unprecedented number of nongovernmental organization representatives, who given their own vision of the world's future in relation to the environment and socio-economic development. One of the major results of the UNCED Conference was Agenda twenty one, a daring program of action calling for brand spanking new methods to invest in the future to achieve overall sustainable development in the 21st century.
- Its recommendations ranged from new methods of education, to new ways of preserving natural resources and new ways of participating in a sustainable economy.

- The 'Earth Summit' had many great achievements: the Rio Declaration and its twenty seven universal principles, the UN Framework Convention on climate change (UNFCCC), the Convention on Biological Diversity; and also the Declaration on the principles of forest management.
- The 'Earth Summit' also led to the creation of the Commission on Sustainable Development, the holding of first world conference on the sustainable development of small island developing States in 1994, and negotiations for the establishment of the agreement on straddling stocks and extremely migratory fish stocks.
- **The Earth Summit resulted in the following documents:** Rio Declaration on environment and Development Agenda twenty one Forest Principles furthermore, important legally binding agreements (Rio Convention) were opened for signature: Convention on Biological Diversity Framework Convention on Climate Change (UNFCCC) India's Effort: PM's council on Climate Change was constituted in 2008 which was followed by NAPCC with its 8 constituent missions. India was one of the earliest countries to develop a legislation to implement the commitments under the Biodiversity Convention.
- Biological Diversity Act 2002 came into force and also the National biodiversity Authority was established in chennai under the Act, and until date there are twenty eight state biodiversity boards, eight biodiversity councils and nearly 2 lakh biodiversity management committees attached to the panchayat level institutions.

Topic 7. IMMUNITY SUBJECT: SCIENCE

Importance for prelims: Disease



'Omicron infection narrowing the gap between unvaccinated and vaccinated individuals Immunity'

- The SARS-CoV-2 virus continues to adapt to the human host, it has been transmuting itself which can escape the immune protection Immunity to a disease is achieved through the presence of antibodies to that disease during a person's system.
- Antibodies are proteins produced by the body to neutralize or destroy toxins or disease-carrying organisms.
- Antibodies are disease-specific. For example, a antibody can protect a person who is exposed to measles disease however can have no effect if he or she is exposed to mumps.

There are two types of immunity: Active and Passive.

1. **Active Immunity:** When exposure to a disease organism triggers the immune system to produce antibodies to that disease. Active immunity can be acquired through natural immunity or vaccine-induced immunity.

2. **Natural immunity** is acquired from exposure to the disease organism through infection with the actual disease. A mild case of an illness might not lead to strong natural immunity.

What is vaccine-induced immunity for COVID-19?

- Vaccine-induced immunity is being fully vaccinated with an approved or authorized COVID-19 vaccine.
- The protection from the vaccines may wane over time so additional doses (boosters) are now authorized for certain populations.
- These boosters will extend the powerful protection offered by the COVID-19 vaccines.

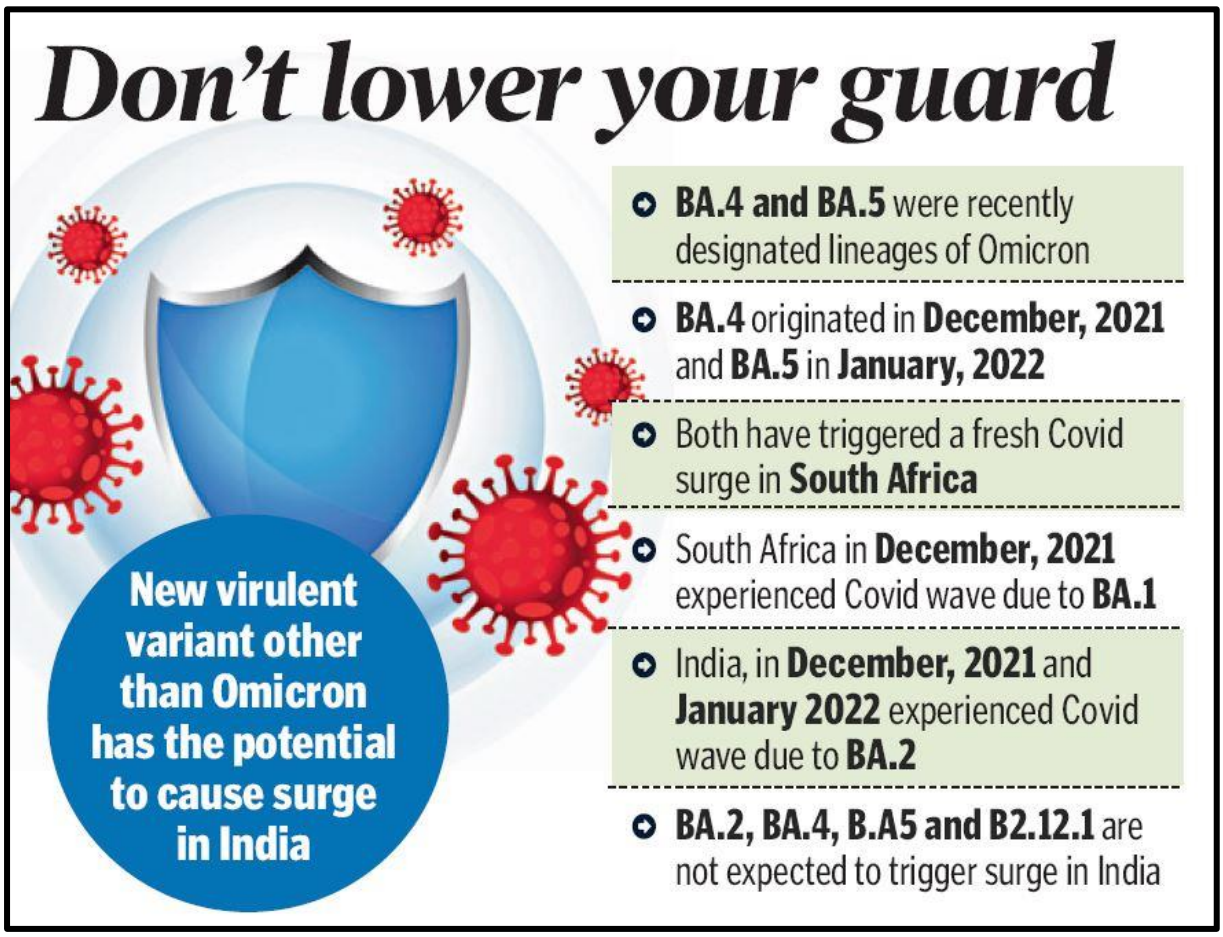
If natural immunity is present, do you still need a COVID vaccine?

- Yes, the COVID-19 vaccines are recommended, even if one had COVID-19. The recent research studies support getting vaccinated even if you have already had COVID-19: Vaccines add protection.
- The U.S. Centers for disease control and prevention (CDC) released a report on October. 29, 2021, that says getting vaccinated for the coronavirus once you've already had COVID-19 significantly enhances your immune protection and more reduces your risk of reinfection.
- A study published in August 2021 indicates that if you had COVID-19 before and aren't vaccinated, your risk of getting re-infected is over twice higher than for those who got vaccinated after having COVID-19.
- Another study published on Nov. 5, 2021, by the U.S. Centers for Disease Control and Prevention (CDC) looked at adults hospitalized for COVID-like sickness between January and September 2021.
- This study found that the chances of these adults testing positive for COVID-19 were 5.49 times higher in unvaccinated people who had COVID-19 in the past than they were for those who had been vaccinated for the COVID and had not had an infection before.

- A study from the cdc in Sept 2021 showed that roughly one-third of those with COVID-19 cases in the study had no apparent natural immunity.
- Vaccine-induced immunity is acquired through the introduction of a killed or weakened form of the disease organism through vaccination.
- If an immune person comes into contact with that disease in the future, their immune system will recognize it and immediately produce the antibodies needed to fight it.
- Active immunity is long-lasting, and sometimes life-long.
- Passive immunity is provided when a person is given antibodies to a disease instead of producing them through his or her own immune system.
- Pregnant woman wearing protective face mask in blooming park A newborn baby acquires passive immunity from its mother through the placenta. People also can get passive immunity through antibody-containing blood merchandise like immune globulin, which can be given when immediate protection from a specific disease is required.
- The major advantage to passive immunity is that protection is immediate, whereas active immunity takes time (usually several weeks) to develop.
- However, passive immunity lasts only for a few weeks or months. Only active immunity is longlasting.

Topic 8. WILL BA.4, BA.5 OMICRON LINEAGES CAUSE THE NEXT WAVE?

Importance for prelims: Science



A group of variants with the similar genetic changes or group of lineages'

- World Health Organization (WHO) designated the B.1.1.529 lineage of SARSCoV-2 as Variant of Concern (VOC) Omicron in late Nov 2021.
- Omicron is more transmissible (e.g., more easily spread from person to person) and has the ability to infect people who had prior immunity to Delta or any previous lineages of the virus.
- **Lineage:** A lineage is a group of closely related viruses with a common ancestor. SARSCoV-2 has several lineages; all cause COVID-19.
- **Variant:** A variant may be a viral genome (genetic code) that will contain one or more mutations.

- In some cases, a group of variants with similar genetic changes, such as a lineage or group of lineages, may be designated by public health organizations as a Variant Being Monitored (VBM), Variant of Concern (VOC) or a Variant of Interest (VOI) because of shared attributes and characteristics that will need public health action.

What does it mean a virus mutates or changes?

- When a virus replicates or makes copies of itself, it sometimes changes a little bit.
- These changes are known as "mutations." a virus with one or many new mutations is referred to as a "variant" of the original virus.
- When more viruses circulate, the more they may change.
- These changes will occasionally result in a virus variant that's better adapted to its environment compared to the original virus.
- This process of changing and selecting successful variants are called "virus evolution."
- Some mutations can lead to changes in a virus's characteristics, such as altered transmission (for example, it may spread more easily) or severity (for example, it may cause a more severe disease).
- Some viruses change quickly and others more slowly. SARS-CoV-2, the virus which causes COVID-19, tends to change more slowly than others such as HIV or influenza viruses.
- This could in part be explained by the virus's internal "proofreading mechanism" which can correct "mistakes" when it makes copies of itself.
- Scientists continue to study this mechanism to better understand how it works.
- Concerning facts of SARS-CoV-2 changing
- It is normal for viruses to change, but it is still something scientists follow closely because there can be important implications.

- All viruses, including the SARS-CoV-2, the virus that causes COVID-19, change over time.
- Thus far hundreds of variations of this virus are known worldwide.
- Most changes have little to no impact on the virus' properties.
- However, depending on wherever the changes are located in the virus's genetic material, they will have an effect on the virus's properties, like transmission (for example, it's going to spread a lot of easily) or severity (for example, it's going to cause more severe disease).
- Genetic lineages of SARS-CoV-2 have been emerging and circulating around the world since the beginning of the COVID-19 pandemic. SARS-CoV-2 genetic lineages are routinely monitored through the epidemiological investigations, virus genetic sequence-based surveillance, and laboratory studies.
- The classification of SARS-CoV-2 genetic lineages was based on the following: Detection of cases attributed to Omicron in multiple countries, including among those without travel history.
- Transmission and replacement of the Delta variant in South Africa.
- The number and locations of substitutions in the spike protein.
- Available information for other variants with fewer substitutions in the spike protein that indicate a reduction in neutralization by sera from vaccinated or convalescent individuals.
- Available data for other variants with fewer substitutions in the spike protein that indicate reduced susceptibility to certain monoclonal antibody treatments.
- On April 14, 2022 SARS-CoV-2 Interagency Group (SIG) downgraded Delta from a Variant of Concern to a Variant Being Monitored.
- **This new classification was based on the following:** Significant and the sustained reduction in its national and regional proportions over time.

- Evidence suggesting that Delta does not currently pose a significant risk to public health in the United States.
- The SIG Variant classification scheme defines four classes of SARS-CoV-2 variants: o Variant Being Monitored (VBM) Alpha (B.1.1.7 and Q lineages) Beta (B.1.351 and descendent lineages) Gamma (P.1 and descendent lineages) Delta (B.1.617.2 and AY lineages) Epsilon (B.1.427 and B.1.429) Eta (B.1.525) Iota (B.1.526) Kappa (B.1.617.1) 617.3 Mu (B.1.621, B.1.621.1) Zeta (P.2) o Variant of Interest (VOI) o Variant of Concern (VOC) Omicron (B.1.1.529, BA.1, BA.1.1, BA.2, BA.3, BA.4 and BA.5 lineages) o Variant of High Consequence (VOHC) How Variants Are Classified With the continuous evolution of SARS-CoV-2 and understanding of the impact of variants on public health, variants could also be reclassified based on their attributes and prevalence.
- Variants being monitored (VBM)– Variant of interest (VOI) Variant of Concern (VOC) Variant of high consequence (VOHC) Variants Being Monitored (VBM): Variants designated as VBM include those where data indicates there is a potential or clear impact on approved or authorized medical countermeasures or that has been associated with more severe disease or increased transmission but are no longer detected, or are circulating at very low levels.
- Variant of Interest (VOI) A variant with specific genetic markers that are associated with changes to receptor binding, reduced neutralization by antibodies generated against previous infection or vaccination, reduced effectivity of treatments, potential diagnostic impact, or predicted increase in transmissibility or disease severity.
- **Possible attributes of a Variant of Interest:** Specific genetic markers that are predicted to affect the transmission, diagnostics, therapeutics, or immune escape.

- Evidence that it is the cause of an increased proportion of cases or unique outbreak clusters.
- limited prevalence or growth in the US or in other countries.
- Variant of Concern (VOC) A variant that there's evidence of an increase in transmissibility, a lot of severe disease (for example, increased hospitalizations or deaths), a significant reduction in neutralization by antibodies generated throughout previous infection or vaccination, reduced effectiveness of treatments or vaccines, or diagnostic detection failures.
- **Possible attributes of a variant of concern:** Evidence of impact on diagnostics, treatments, or vaccines Widespread interference with diagnostic test targets evidence of substantially decreased susceptibility to one or a lot of class of therapies evidence of significantly decreased neutralization by antibodies generated during previous infection or vaccination Evidence of reduced vaccine-induced protection from severe disease Evidence of increased transmissibility Evidence of increased disease severity Variant of High Consequence (VOHC): A VOHC has clear evidence that prevention measures or medical countermeasures (MCMs) have significantly reduced effectiveness relative to previously circulating variants.
- **Possible attributes of a variant of high consequence:** Impact on MCMs Demonstrated failure of diagnostic test targets Evidence to suggest a significant reduction in vaccine effectiveness, a disproportionately high number of infections in vaccinated persons, or very low vaccine-induced protection against severe disease significantly reduced susceptibility to multiple EUA or approved therapeutics a lot of severe clinical disease and increased hospitalizations

Topic 9. NATIONAL CYBER FORENSIC LABORATORY (NCFL)

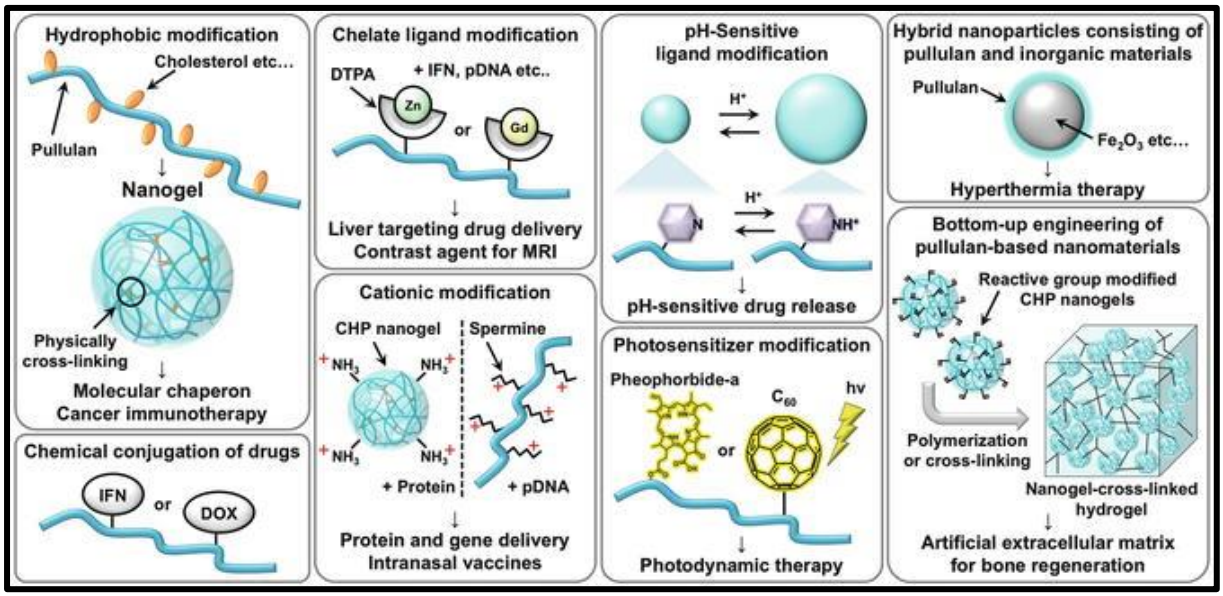
Importance for prelims: Science & Tech

Union Home and Co-operation Minister, Amit shah has formally inaugurated the National Cyber forensic Laboratory (NCFL) in Hyderabad.

- He inaugurated the laboratory at the premises of the Central Forensic Science Laboratory located at Ramanthapur in the city.
- NCFL-E (National Cyber Forensic Laboratory for Evidentiary purpose) at CFSL, Hyderabad has been created by upgrading the existing Digital Forensic Facility under the 'Centre for Cybercrime Prevention against women and children' (CCPWC) scheme of MHA, GoI.
- • NCFL-E (Digital forensic Division) of CFSL, Hyderabad is one of the first laboratory Notified as EXAMINER OF ELECTRONIC evidence of information Section 79A of knowledge Technology Act by MeitY.
- The NCFL-E (Digital Forensic Division) of CFSL, Hyderabad has been declared as 'Centre of Excellence' (CoE) for Cyber Forensics' by MHA, GoI
- • The NCFL has created four specialised hi-tech units to address problems in the field of digital forensics, that include a mobile phone embedded system examination unit, a Digital storage Media Examination Unit, an advanced Digital forensic Unit, and Crime Scene Unit.
- It is Expected to fast-track cyber crime cases in India.
- The NCFL-E (Digital Forensic Division) carries out the activities viz. HDD Forensics. Optical Media Forensics.
- Flash Media Forensics towards Computer Forensic Examination as well as Physical, File System and Logical lever Forensic Analysis of GSM, CDMA Mobiles.
- SIM Card Analysis towards Mobile Phone Forensic Examination. Damaged Media Examination.

Topic 10. PULLULAN

Importance for prelims: Science & Tech



Scientists have developed a new biomaterial that can be used to disinfect wounds and hastens the process of healing.

- **About the study:** The work is a collaboration between scientists from Indian Institute of Technology (IIT) Mandi, IIT Delhi and National Institute of Science Education and Research (NISER) in Bhubaneswar.
- The biomaterial is derived from the polymer pullulan which is secreted by the fungus Aureobasidium pullulans .
- It is an exopolysaccharide, that is, this polymer is secreted by the fungus itself into the medium on which it is growing.
- **About Pullulan:** Pullulan is basically a polymeric chain of glucose. Pullulan is a polysaccharide polymer.
- Pullulan is the produced from starch by the fungus Aureobasidium pullulans.
- Pullulan as a biomaterial is already successful and widely used commercially.
- It is exploited in food, cosmetics and pharmaceutical industry because of its non-toxic, non-mutagenic and non-immunogenic properties.

- Pullulan is mainly used by the cell to resist desiccation and predation.
- The presence of this polysaccharide also facilitates diffusion of molecules both into and out of the cell.
- As an edible, mostly tasteless polymer, the chief commercial use of pullulan is in the manufacture of edible films that are utilized in various breath freshener or oral hygiene products such as Listerine Cool Mint.
- Pullulan can also used as a vegetarian substitute for drug capsules, rather than gelatine.
- As a food additive, it's well-known by the E number E1204.
- Biomaterial is defined as "a material intended to interface with biological systems to evaluate, treat, augment or replace any tissue, organ or function of the body" and biocompatibility has been defined as "the study and knowledge of the interactions between the living and the nonliving materials.

What are examples of biomaterials?

- Biomaterials include metals, ceramics, glass, and polymers.
- These biomaterials can be found in things like contact lenses, pacemakers, heart valves, orthopaedic devices, and much more.

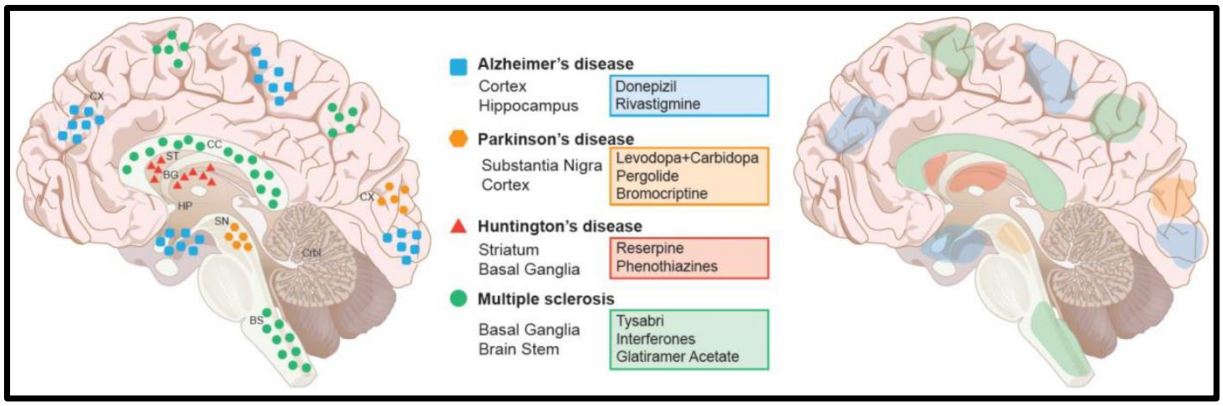
What are biomaterials used for?

- Biomaterials could also be natural or synthetic and are utilized in medical applications to support, enhance, or replace broken tissue or a biological function.
- The first historical use of biomaterials dates to antiquity when ancient Egyptians used sutures made from animal sinew.
- Hydrogels A hydrogel is a three-dimensional (3D) network of hydrophilic polymers that can swell in water and hold a large amount of water while maintaining the structure due the chemical or the physical cross-linking of individual polymer chains.

- A hydrogel is a crosslinked hydrophilic polymer that does not dissolve in water.
- They're highly absorbent yet maintain well-defined structures.
- These properties underpin several applications, especially in the biomedical area.
- Many hydrogels are synthetic, but some are derived from nature. Hydrogels have an inherent ability to accelerate wound healing by providing a closed and moist environment to the wounds for easy exchange of oxygen and act as an absorbent pad to remove the pus and debris.

Topic 11. NEURODEGENERATIVE DISORDERS

Importance for prelims: Science & Tech



Researchers from IISc Bangalore have identified a protein in yeast cells that dissolve RNA Protein complexes also known as RNA granules.

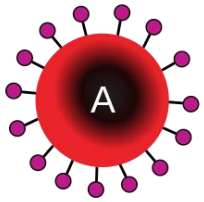
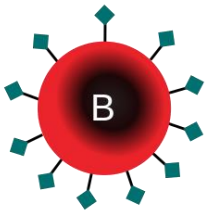
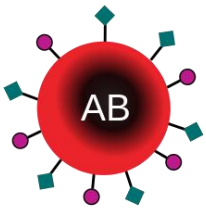
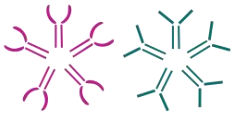
- The cytoplasm of any cell consists of structures made of messenger RNA (mRNA) and proteins known as RNA granules, in general.
- unlike other structures in the cell (such as mitochondria), the RNA granules are not covered and confined by a membrane.
- This makes them highly dynamic in nature, thereby al lowing them to constantly ex - change components with the surrounding. RNA granules are present in the cytoplasm at low numbers under normal conditions but increase in number and size under stressful conditions including diseases.(indicate neurological conditions)
- A defining feature of the RNA granule protein is the presence of stretches containing repeats of certain amino acids i.e. Repeats of arginine (R), glycine (G) and glycine (G)—known as RGG.
- Protein synthesis: Messenger RNAs are converted to proteins (building blocks of the cell) by the pro - cess of translation.
- RNA granules determine messenger RNA (mRNA) fate by deciding when and how much protein would be produced from mRNA.
- Protein synthesis is a multistep and energy expensive process.
- RNA granules also help in the process of shutting down protein

production.

- Some RNA granule types (such as processing bodies or P bodies) not only regulate protein production however also accomplish degradation and elimination of the mRNAs, that in turn helps in reducing protein production.
- In yeast cells, a protein sbp1 promotes the disintegration of RNA granules which can help in tackling neurodegenerative disorders, caused by RNA granules.

Topic 12. THE BLOOD GROUPS OF HUMANS AND PRIMATES

Importance for prelims: Science & tech

	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies in plasma	 Anti-B	 Anti-A	None	 Anti-A and Anti-B
Antigens in red blood cell	 A antigen	 B antigen	 A and B antigens	None

Chimpanzee, gorilla, orang-utan have blood groups containing AB, A, B and O, just like humans- shows a study.

- Analysis of the blood group markers of some Neandertals and Deni sovans showed the presence of the ABO group, and some other markers that are used today in blood transfusion.
- Neanderthals and Denisovans are an extinct species of hominids that were the closest relatives to modern human beings.
- Primates (chim panzee, gorilla, orangutan, gibbons) also have blood groups containing AB, A, B and O, just as we humans have.
- Blood is a constantly circulating fluid providing the body with nutrition, oxygen, and waste removal.
- Blood is mostly liquid, with the numerous cells and proteins suspended in it, making blood "thicker" than pure water.
- The average person has about the five liters (more than a gallon) of blood.

contains many types of cells: white blood cells (monocytes, lymphocytes, neutrophils, eosinophils, basophils, and macrophages), red blood cells (erythrocytes), and platelets.

- **Blood Types:** There are four main blood groups (types of blood) – A, B, AB and O.
- Blood group is determined by the genes one inherits from parents.
- Every group is either RHD positive or RHD negative, which means in total there are eight blood groups.
- Blood is made up of red blood cells, white blood cells, and platelets in a liquid known as plasma.
- Blood group is identified by antibodies and antigens in the blood. Antibodies are proteins found in plasma.
- They're part of the body's natural defences.
- They recognise foreign substances, such as germs, and alert the immune system, which destroys them.
- Antigens are protein molecules found on the surface of red blood cells.

The ABO system: There are 4 main blood groups defined by the ABO system:

1. **Blood group A (23%, In India) –** has A antigens on the red blood cells with anti-B antibodies in the plasma
2. **Blood group B (34%, In India) –** has B antigens with anti-A antibodies in the plasma
3. **Blood group O (35%, In India) –** has no antigens, but both anti-A and anti-B antibodies in the plasma
4. **Blood group AB (8%, In India) –** has both A and B antigens, but no antibodies Receiving blood from the wrong ABO group can be life-threatening.

- For example, if someone with group B blood is given group A blood,

their anti-A antibodies will attack the group A cells.

- This is why group A blood must never be given to someone who has group B blood and vice versa.
- As group O red blood cells don't have any A or B antigens, it will safely be given to the other group.
- **Blood Types:** The A, B, and O blood groups were first identified by Austrian immunologist Karl Landsteiner in 1901.
- Under the ABO blood group system, and blood group are classified into four common blood groups i.e. A, B, AB and O.
- Each red blood cell has antigen over its surface, which helps determine which group it belongs to.
- For instance, in the AB blood group, both antigens A and B are found.
- A will have A antigens; B will have B antigens. In O, there are no A or B antigens.
- Blood types are determined by the presence (or absence) of certain antigens (molecules that may trigger an immune response), if they're foreign to the body of the recipient.
- Thus, a matching of the blood type of the donor with that of the receiver is necessary.
- **The Rh system:** Red blood cells sometimes have another antigen, a protein known as the RhD antigen.
- If this is present, the blood group is RhD positive. If it's absent, the blood group is RhD negative.

This means one can be 1 of 8 blood groups:

1. A RhD positive (A+)
2. A RhD negative (A-)
3. B RhD positive (B+)
4. B RhD negative (B-)

5. RhD positive (O+)
6. RhD negative (O-)
7. AB RhD positive (AB+)
8. AB RhD negative (AB-)

What are the rarest blood types?

- AB negative is the rarest of the eight main blood types – just 1% of our donors have it.
- **O positive:** 35% **O negative:** 13% **A positive:** 30% **A negative:** 8% **B positive:** 8% **B negative:** 2% **AB positive:** 2% **AB negative:** 1%

What is the golden blood type?

- **Rhnull:** One of the rarest blood types in the world is Rhnull, sometimes referred to as 'golden blood'.
- People with this blood group have a complete absence of any of the Rh antigens.
- Blood bank where blood gathered by the donation from blood donors is saved and preserved for later use in blood transfusion at optimum temperature.

What is the difference between Neanderthal and Denisovan?

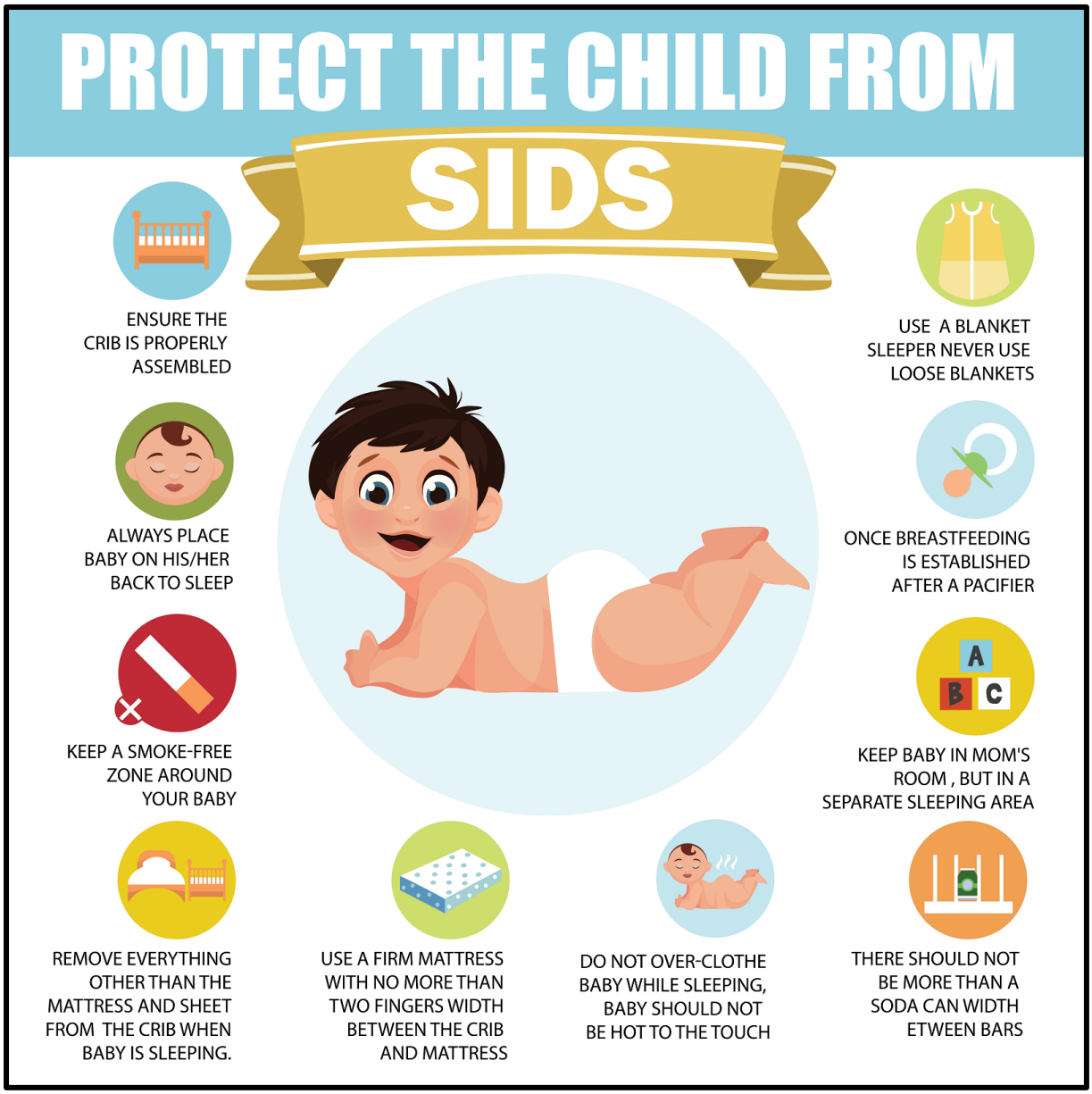
- Neanderthals were very early (archaic) humans who lived in Europe and Western Asia from about 400,000 years ago till they became extinct about 40,000 years ago.
- Denisovans are the another population of early humans who lived in Asia and were distantly related to Neanderthals.
- The primates (chimpanzee, gorilla, orangutan, gibbons) also have blood groups containing AB, A, B and O, just as we humans have.
- About Primates: Primates is a taxonomic order that includes a diversified group of animals such as Lemurs, Lorises, Tarsiers, Monkeys, Apes and Humans.

- **Apes and Humans:** both are members of superfamily Hominoidae and additional divided into 2 families viz., hylobatidae (Gibbons) and Hominidae (Orangutans, African apes and Human).
- **Gibbons:** Also called lesser apes.
- They are excellent brachiators (suspensory climbing) and are monogamous.
- **Orangutans:** Largest and rarest Asian apes.
- Usually walks by quadrupedal.
- Facing the danger of extinction.
- **African Apes:** Gorilla – Largest Apes. As of 2011, only the 786 gorillas in the world.
- **Chimpanzees –** more closely match humans than a gorilla. Quadrupedal knuckle walkers as a gorilla Intelligent animals with generally pleasant personalities.
- Their interactions may be quite noisy , violent, and sometimes fatal.
- **Bonobos:** Close relatives of chimpanzees. Sometimes referred to as pygmy chimpanzees.
- **Humans:** Only living species – Homo sapiens. Shows sexual dimorphism similar to that the of other apes.
- Humans and African apes have the same internal organs, same bones and some blood groups in common.
- Erect posture and bipedalism because of modified pelvic bone sand spinal column.
- Humans and chimpanzees share 96% similarities in DNA base-pair sequences.
- This shows that the two species had a common ancestor and got evolved into separated species 6-7 million years ago.

- **Stages of Evolution of Human:** Dryopithecus Ramapithecus Australopithecus Homo Homo habilis Homo erectus Homo sapiens Homo sapiens neanderthalensis Homo sapiens sapiens

Topic 13. SUDDEN INFANT DEATH SYNDROME (SIDS)

Importance for prelims: Science & Tech



A team of Australian researchers have known a biochemical marker in the blood that would help identify new-born babies at risk for sudden infant death syndrome (SIDS).

- **About SIDS:** Sudden infant death syndrome (SIDS) is the unexplained death, usually during sleep, of a seemingly healthy baby less than a year old.
- SIDS is sometimes referred to as crib death as a result of the infants often

die in their cribs.

- In their study, babies who died of sids had lower levels of an enzyme referred to as butyrylcholinesterase (BChE) shortly after birth, the researchers aforesaid.
- BChE plays a major role in the brain's arousal pathway, and low levels would cut back a sleeping infant's ability to wake up or respond to its environment.

What causes SIDS?

- The exact cause of SIDS is unknown, but it's thought to be down to a combination of factors.
- A combination of physical and sleep environmental factors will make an child more vulnerable to SIDS.
- These factors vary from the child to child.
- **Physical factors: Brain defects:** In many of the babies, the portion of the brain that controls breathing and arousal from sleep hasn't matured enough to work properly.
- Low birth weight. Premature birth or being a part of a multiple birth will increase the likelihood that a baby's brain hasn't matured completely, therefore he or she has less management over such automatic processes as breathing and heart rate. Respiratory infection.
- Many infants who died of sids had recently had a cold, which could contribute to breathing issues.
- **Sleep environmental factors:** The items in a baby's crib and his or her sleeping position can combine with a baby's physical problems to increase the risk of SIDS.
- **Examples include:** Sleeping on the stomach or side.
- Sleeping on a soft surface. Sharing a bed with the parents, siblings or pets. Being too warm while sleeping can increase a baby's risk of SIDS.

- **Risk factors:** Sex.
- Boys are slightly more likely to die of SIDS.
- Age. Infants are the most vulnerable between the second and fourth months of life. Race.
- For reasons that aren't well-understood, nonwhite infants are more likely to develop SIDS.
- Family history.
- Babies who've had siblings or cousins die of SIDS are at higher risk of SIDS.
- Second hand smoke.
- Babies who live with smokers have a higher risk of SIDS.
- Being premature.
- Both being born early and having a low birth weight increase your baby's chances of SIDS.
- Maternal risk factors Including mother younger than 20, Smokes cigarettes, Uses drugs or alcohol; Has inadequate prenatal care.

Topic 14. UNEP CELEBRATES 50 YEARS

Importance for prelims: Environment

UNEP celebrates the fifty years of solving the world's environmental challenges. because of the leading global environmental authority, the UNEP administers, or provides secretariat functions for, fifteen multilateral environmental agreements (MEAs).

- United Nations Environment Programme (UNEP) In 1972, the UNGA passed what is formally known as UN-Resolution 2997.
- It would be the last step in the establishment of the United Nations Environment Programme (UNEP) – an organisation conceived to spearhead a global effort to minimise humanity's footprint on the planet. UNEP is an agency of the UN.
- **Headquarters:** Nairobi, Kenya.
- **Governing Body:** UNEA (formed in 2012) – meets once in two years. It has overall responsibility for environmental problems among United Nations agencies.
- Addressing climate change or combating desertification, are overseen by other UN organisations, like the UNFCCC and the United Nations Convention to Combat Desertification.

- **Major Functions:** It hosts various Conventions like Minamata Convention, UNCBD, CITES, Basel Convention, Stockholm Convention, Rotterdam Convention, Montreal Protocol, Vienna Convention, CMS, Carpathian, Bamako, Tehran Convention.
- **Main activities:** are related to Climate Change, Disasters and Conflicts, Ecosystem management, Environmental Governance, Chemicals and waste, Resource Efficiency.
- UNEP's activities cover a wide range of the issues regarding the atmosphere, marine and terrestrial ecosystems, environmental governance and green economy.
- It is also a member of the United Nations Development Group.
- **Important Treaties signed under UNEP:** IPCC, (The World Meteorological Organisation and UN Environment established the Intergovernmental Panel on Climate Change (IPCC) in 1988.) Conservation of Migratory Species (CMS), UN Environment is additionally one of many Implementing Agencies for the global atmosphere Facility (GEF) and also the multilateral Fund for the Implementation of the montreal Protocol.
- In 2021, member states approved UNEP's new Medium-Term Strategy (MTS) for 2022- 25 that outlines UNEP's contribution to the '2030 Agenda for Sustainable Development' and the Programme for Work 2022-23.
- Multilateral Organisation Performance Assessment Network (MOPAN) was initiated in 2021 by Belgium, Netherlands and Switzerland and comprises 21 countries that assess the performance (2016-20) of the major multilateral organisations they fund.
- **Important Initiatives undertaken by UNEP so far:** Regional Seas Programme, 1974 Clean up the world Campaign, 1993 TUNZA, 2003

Billion Tree Campaign, 2006 Faith for Earth Initiative, 2008 World Environment Day (June 5th) Earth Hour Not all animals migrate by choice campaign, **2019 Reports of UNEP:** Emission Gap Report Adaptation Gap Report Frontiers Global Environment Outlook Invest in a Healthy Planet UNEP administers, or provides secretariat functions for, multilateral environmental agreements (MEAs) and other entities as follows: **Global MEAs:** Convention on Biological Diversity (CBD) Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Convention on the Conservation of Migratory Species of Wild Animals (CMS) Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade Stockholm Convention on Persistent Organic Pollutants Minamata Convention on Mercury Vienna Convention for the Protection of the Ozone Layer Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa Framework Convention on the Protection and Sustainable Development of the carpathians (Carpathian Convention) Regional Seas Conventions and Action Plans Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal environment of the the Atlantic Coast of the West, Central and Southern African Region (Abidjan Convention) Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention) Convention for the Protection and Development of the Marine environment of the wider Caribbean Region

(Cartagena Convention) Convention for the Protection, Management and Development of the Marine and Coastal environment of the Caspian Sea (Tehran Convention) Coordinating Body on the Seas of East Asia (COBSEA) Northwest Pacific Action Plan (NOWPAP) Other entities Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Intergovernmental Panel on Climate Change (IPCC) – hosted jointly by UNEP and the World Meteorological Organisation (WMO) United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) United Nations Environment Assembly (UNEA) The UNEP's governing body is called the United Nations Environment Assembly, which is claimed to be the world's highest decision making body on the environment.

- It meets once in two years to establish priorities for international environmental policies and develop international environmental law.
- Formed in 2012, it's headed by a Bureau and its President.
- The Bureau comprises 10 environment ministers of various countries who all hold two-year terms, based on geographical rotation.
- Presently, it's 193 member states (all United Nations member countries).

Topic 15. VALUE OF MPS' VOTE FOR PRESIDENT POLL TO GO DOWN

Importance for prelims: Polity

The value of the vote of an MP in the presidential polls to be held in July is likely to go down to 700 from 708 due to the absence of a Legislative Assembly in Jammu and Kashmir President Election: According to Article 52 of the Constitution of India there shall always be a President of India, holding the highest elective office in the country.

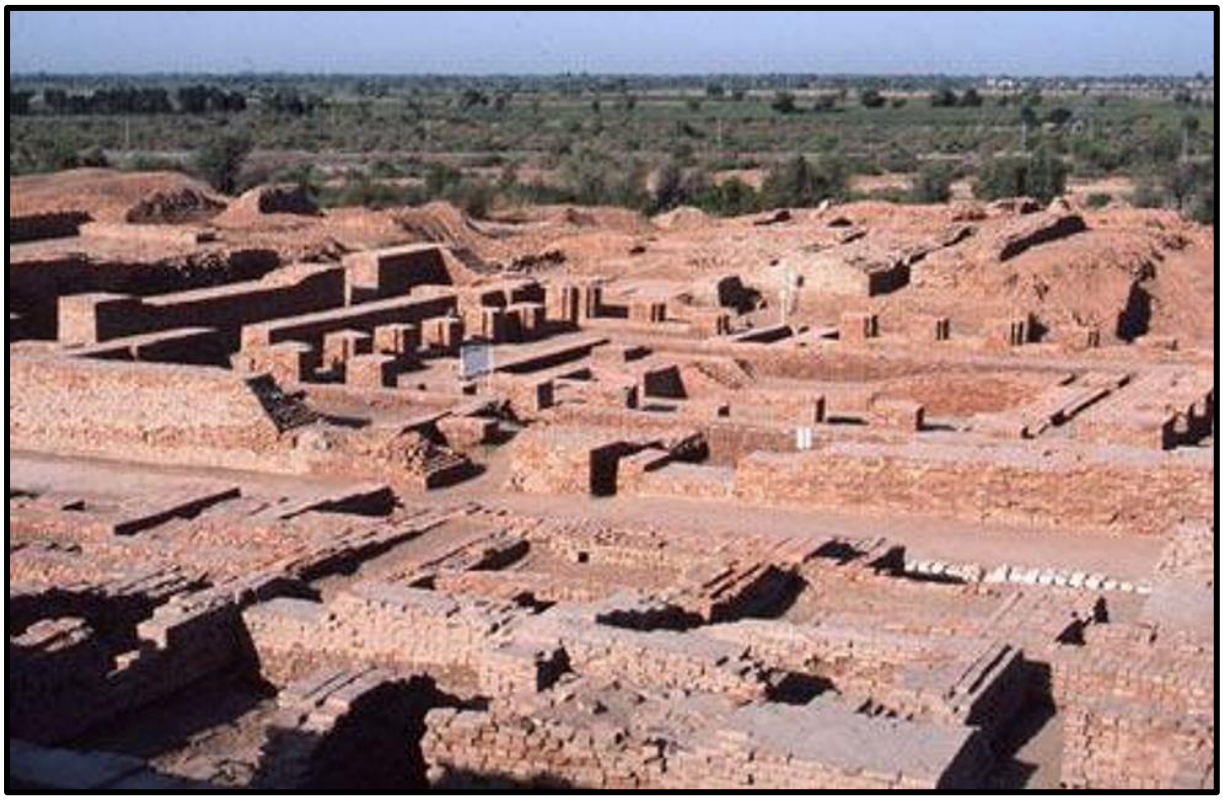
- The President holds office for a Period of 5 years from the date on which s/he enters upon her/his office.
- Accordingly, an election is held before the expiration of the term of the incumbent President.
- The President of India is elected by indirect election.
- He is elected by an electoral college in accordance with the system of proportional representation by means of a single transferable vote and secret ballot.
- **The electoral college consists of:** The elected member of both the Houses of Parliament.
- The elective member of the Legislative Assemblies of the States.
- The elected members of the Legislative assembly of Delhi, Puducherry and Jammu and Kashmir.
- **The electoral college excludes:** The nominated member of both the Houses of Parliament.
- The nominative members of the Legislative Assemblies of the States.
- The nominated members of the Legislative assembly of Delhi, Puducherry and Jammu and Kashmir.
- All the members of state legislative councils.
- Value of Vote A vote cast by each MP or MLA is not calculated as one

vote.

- Value of Vote of an MP is Total value of vote of all MLAs of all states divided by Total Value of elected MPs
- Therefore,value of each vote by an MP of the Rajya Sabha and the Lok Sabha is
- The value of each MLA's vote is determined by dividing the population of the State by the number of MLAs in its legislative Assembly, and the quotient achieved is further divided by 1000.
- Therefore, the vote value of each MLA differs from State to State based on a calculation that factors in its population vis-a-vis the number of members in its legislative Assembly.

Topic 16. EXCAVATION AT RAKHIGARHI SITE

Importance for prelims: History



The latest round of excavations at the 5,000-years-old Harappan site of Rakhigarhi in Haryana's Hisar district have revealed newer insights Archeological Findings: Excavations at the site of Rakhigarhi in Haryana's Hisar district have revealed structure of some houses, lanes and drainage system, and what could possibly be a jewellery-making unit Digging has also revealed pieces of copper and gold jewellery, terracotta toys, besides thousands of the earthen pots and seals.

- At Mound 1, a huge quantity of debris/ waste of semi-precious stones such as agate and carnelian have been found, along with evidence of street planning with a general width of 2.6m.
- At Mound 3, a burnt-brick wall has been the traced, conveying the possibility of a walled settlement.
- The noteworthy antiquity found at both the mounds include steatite seals, terracotta unbaked protection with relief of elephants and Harappan

script.

- At mound number 7, skeletons of two women were found believed to be nearly 5,000 years old. Pots and other artefacts were also found buried next to them in a pit, part of the funerary rituals back in the Harappan Civilisation era.
- **About Rakhigarhi:** Rakhigarhior Rakhi Garhi is a village and an archaeological site belonging to the Indus Valley Civilisation in Hisar District of the northern Indian state of Haryana, situated about 150 km northwest of Delhi.
- It was part of the mature phase of the Indus Valley Civilisation, dating to 2600- 1900 BCE.
- It was among the largest settlements of the ancient civilisation, though most of it remains unexavated.
- The site is located in the Ghaggar-Hakra River plain,some 27 km from the seasonal Ghaggar river.
- Budget (2020-21) has proposed to develop Rakhigarhi as an iconic site.
- The he site was excavated by Amarendra Nathof ASI. Dholavira

Topic 17. CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA (CITES)

Importance for prelims: Environment

The Convention on International trade in endangered species of wild Fauna and Flora (CITES) is an international agreement to which States and regional economic integration organizations adhere voluntarily.

- It provides public, private and non-governmental organisations with the knowledge and tools that enable human progress, economic development and nature conservation to take place together.
- **Aim:** Ensure that international trade in specimens of wild animals and plants does not threaten their survival.
- The CITES Secretariat is administered by UNEP (The united nations environment Programme) and is located at Geneva, switzerland.
- It plays a coordinating, advisory and servicing role in the working of the Convention (CITES).
- The Conference of the Parties to CITES, is the supreme decision-making body of the Convention and comprises all its Parties.

- Though CITES is legally binding on the Parties, it doesn't take the place of national laws.
- Rather, it provides a framework to be respected by each Party, which has to adopt its own domestic legislation to ensure that CITES is implemented at the national level.
- Functions The CITES works by subjecting international trade in specimens of selected species to certain controls.
- All import, export, re-export and introduction from the ocean of species coated by the Convention has to be authorized through a licensing system.
- Every Party to the Convention should designate one or more Management Authorities in charge of administering that licensing system and one or more Scientific Authorities to advise them on the effects of the trade on the status of the species.
- Appendices I, II and III to the Convention are lists of species afforded different levels or types of protection from over-exploitation.
- Appendix I It lists species that are the foremost endangered among CITES-listed animals and plants.
- Examples include gorillas, sea turtles, most lady slipper orchids, and giant pandas.
- Currently 931 species are listed.
- They're threatened with extinction and CITES prohibits international trade in specimens of those species except when the purpose of the import isn't commercial, for instance for scientific research.
- In these exceptional cases, trade may take place provided it is authorized by the granting of both an import permit and an export permit (or re-export certificate).
- Appendix II It lists species that are not necessarily now threatened with

extinction but that may become so unless trade is closely controlled.

- It also includes so-called "look-alike species", i.e. species whose specimens in trade look like those of species listed for conservation reasons.
- International trade in specimens of Appendix-II species could also be authorized by the granting of an export allow or re-export certificate.
- No import allow is necessary for these species underneath CITES (although a allow is needed in some countries that have taken stricter measures than CITES requires).
- Permits or certificates should only be granted if the relevant authorities are satisfied that certain conditions are met, above all that trade will not be detrimental to the survival of the species in the wild.
- Appendix III It is a list of species included at the request of a Party that already regulates trade in the species and that needs the cooperation of other countries to prevent unsustainable or illegal exploitation.
- International trade in specimens of species listed in this Appendix is allowed only on presentation of the appropriate permits or certificates.
- Species may be added to or removed from Appendix I and II, or moved between them, only by the Conference of the Parties. However, species may be added to or removed from Appendix III at any time and by any Party unilaterally.

Topic 18. WORLD'S LARGEST TROPICAL WETLAND PANTANAL

Importance for prelims: Environment

Brazilian scientists warn that the Pantanal is at risk of collapse. Once a model for sustainable land use, scientists alert world to "the tragedy of the commons" afflicting one among Earth's most biodiverse ecosystems

- **Pantanal:** It is the world's largest freshwater tropical wetland, located in South America
- The Pantanal spans over the 179,000 sq km in Brazil, Paraguay and Bolivia and boasts.
- It is one of Earth's most biodiverse ecosystems and one of the highest concentrations of flora and fauna in South America.
- Amazon rainforest located to its north The headwaters of the region's two major river systems, the Cuiabá and the Paraguay rivers, are located here,

Some of the Pantanal's most lively inhabitants include jaguars, giant anteaters, piranha, howler and capuchin monkeys, and green anacondas—the world's largest snakes unlike the Amazon, where the thick jungle obscures the view, the Pantanal is such an open environment Part of the pantanal is

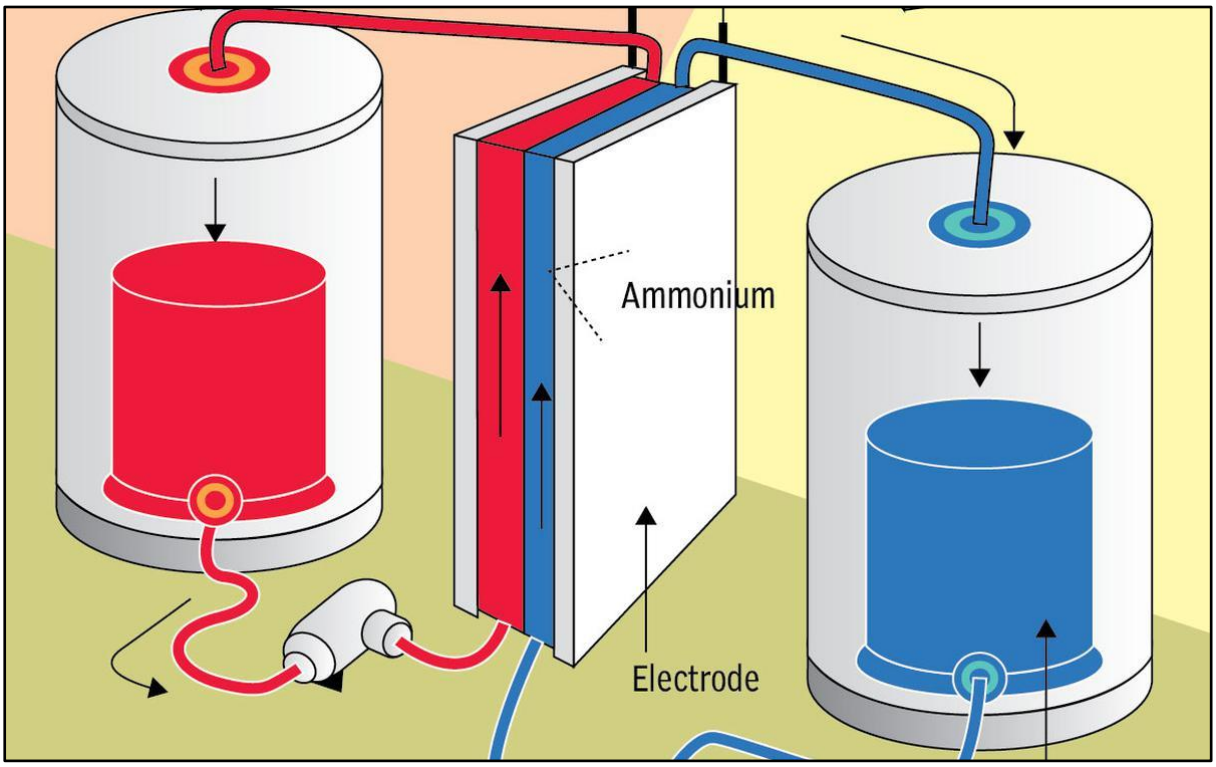
UNESCO World Heritage site What happened now?

- Twenty years ago, there was a warning that individual and local interests were detrimental to the collective interests of the conservation of the Pantanal, comparing the situation to the "tragedy of commons" or the "tyranny of small decisions."
- Two decades later, the forecast has become a reality.
- **What is Tragedy of Commons:** Tragedy of the Commons is an economic and environmental science problem where individuals have access to a shared resource and act in their own interest, at the expense of other individuals.
- This can result in overconsumption, underinvestment, and depletion of resources.
- First posited in 1968 by American ecologist Garret Hardin What is Tyranny of small decisions: The tyranny of small decisions is a phenomenon in which a number of decisions, individually small and insignificant in size and time perspective, cumulatively result in a larger and significant outcome which is neither optimal nor desired.
- Introduced by Alfred E. Kahn and he described the problem as a common issue in market economics which can lead to market failure.
- **Why Patanal is in brink of collapse:** As per a recent scientific study – over the past two decades the locally-made legal land-use decisions and proposals to open up the wetland to a lot of intensive uses that put together threaten the long-term survival of the Pantanal.

- The future of sustainable cattle ranching, fishing, ecotourism, traditional communities, biodiversity, and ecosystem services is under threat Approval of an increasing number of hydroelectric plants in the river basins may cause significant changes in the hydrology and nutrient intake in the ecosystems.
- The construction of Barranco Vermelho port on the Paraguay river in the State of Mato Grosso in jan 2022 may pose a substantial threat to the hydrology of Pantanal Climate change on a worldwide scale, deforestation in the Amazon rainforest and severe drought and large fires are different major threats "The Pantanal is an ecosystem wherever the extension and duration of the seasonal floods are vital to maintaining biodiversity, traditional cattle ranching and resources utilized by native communities.
- The convergence of threats that may lead to the disappearance of the Pantanal as we know it today.

Topic 19. MAGIC BACTERIA THAT TURNS AGRI WASTE INTO INDUSTRIAL ENZYMES

Importance for prelims: Science



'The use of non-food lignocellulosic biomass to produce industrially important enzymes and second-generation cellulosic ethanol as an alternative fuel.'

- Generally, wood lignocellulosic biomass often refers to hardwood and softwood, whereas non-wood lignocellulosic biomass is denoted as agricultural residues, native plants and non-wood plant fibres such as sugarcane bagasse, switchgrass and cotton fibre.
- Lignocellulolytic enzymes are biocatalysts involved in the breakdown of lignin and cellulosic materials into their components for further hydrolysis into useful products.
- Sometimes referred to as lignocellulases, they include hydrolytic enzymes that degrade recalcitrant lignocellulose, a component of plant biomass.

Why lignocellulosic biomass is important?

- Lignocellulosic biomass is that the most economical and highly renewable natural resource in the world.
- The development of renewable energy converted from lignocellulosic biomass as an alternative for fossil fuel is ultimately essential for the survival of the human race.

How does lignocellulosic biomass make ethanol?

- The conventional process includes 2 main steps.
- First, lignocellulose must be pretreated in order to remove lignin and enhance the penetration of hydrolysis agents without chemically destruction of cellulose and hemicellulose.
- Second, the pretreated material is the converted to bioethanol by hydrolysis and fermentation.

How is cellulosic biomass ethanol made?

- Converting cellulosic biomass to biofuels such as ethanol essentially involves breaking down the plant cell wall network structure and releasing the simple sugars that are subsequently fermented by bacteria or yeast to ethanol

How is ethanol created from biomass?

- The common method for converting biomass into ethanol is called fermentation.
- During fermentation, microorganisms (e.g., bacteria and yeast) metabolize plant sugars and the produce ethanol.
- Simultaneous saccharification and fermentation (SSF) is a process that combines enzymatic hydrolysis with fermentation to obtain value-added products in a single step.
- This process is based on the use of an enzymatic complex to hydrolyze cellulose and obtain sugars.

- To evaluate the saccharification and fermentation capacity of a previously isolated organism to hydrolyse low-cost lignocellulosic wastes such as wheat bran, sago waste, and rice bran without pre-treatment.
- The bacteria used was bacillus sp PM06, that they had isolated from sugar cane waste.
- Once this isolate was grown in the presence of lignocellulosic biomass, starch and cellulose were broken down to yield alpha-amylase and cellulase enzymes.
- Ethanol and acetic acid were also produced, that are helpful in various industries.

Topic 20. CONTRIBUTION OF INDIAN SCIENTISTS

Importance for prelims: Science

Indian Innovation, Not Jugaad; 100 Ideas That Transformed India – the combination of Indian revolutions.

- The green revolution was the emergence of new varieties of crops, specifically wheat and rice varietals, that we're able to double if not triple the production of these crops in two countries.
- The green revolution in India Mainly led by agricultural scientist M. S. Swaminathan in India, this period was part of the larger Green Revolution endeavor initiated by Norman E Borlaug, which leveraged agricultural

research and technology to increase agricultural productivity in the developing world.

- **Green revolution** – a period of technological innovation (1950-1970) that has allowed for increased crop yields.
- Norman Borlaug is considered a key figure in developing new wheat varieties that had improved yields and lacked the problems of old varieties.
- White revolution The primary aim of the white revolution was to make India a self-dependent country in milk production.
- This movement helped to increase the productivity of milk in the country which was then sold at competitive market prices.
- Dr Tribhuvan Das Patel launched the white revolution in Anand, Gujarat, in 1970.
- In the city of Anand, the 'Anand Milk Union Limited (AMUL) was founded.
- Dr Varghese Kurian was a pioneer in promoting the Amul cooperative society.
- The concept quickly spread across India, making India the world's "biggest milk producer."
- White revolution in India Padma Vibhushan Dr VergheseKurien, 'Father of White Revolution in India', left for his heavenly abode on 9th September 2012 at the age of 90.
- Dr Kurien was born at Kozhikode in Kerala on 26th November 1921 and completed a Bachelor's degree in Mechanical Engineering in 1943 from Madras University.
- Red revolution Red Revolution is the agricultural reform that led to the boost in the production of tomatoes and meat in India.
- Vishal Tewari is regarded as the father of the Red Revolution in the

country.

- This major boost in the farming and poultry sector took place in the 1980s Silver revolution Silver Revolution is related to Egg Production.
- It refers to the period during which the egg production rises considerably.
- It was done with the help of medical science and a diet rich in protein for the hens.
- It absolutely was like green and therefore the white revolution in India.. It was started in 1969-1978.
- **Brown Revolution:** This revolution focuses on meeting the demand for coffee from the developed nations by growing socially responsible and environment-friendly coffee Yellow revolution
- The revolution launched in 1986- 1987 to increase the production of edible oil, especially mustard and sesame seeds to achieve self-reliance is known as the Yellow Revolution.
- Sam Pitroda is known as the father of the Yellow Revolution in India. Blue Revolution
- The Blue Revolution refers to the significant growth and intensification of global aquaculture production -domestication and farming of fish, shellfish, and aquatic plantsfrom the middle of the 20th century to present, particularly in underdeveloped countries.

Topic 21. DILIP MAHALANABIS

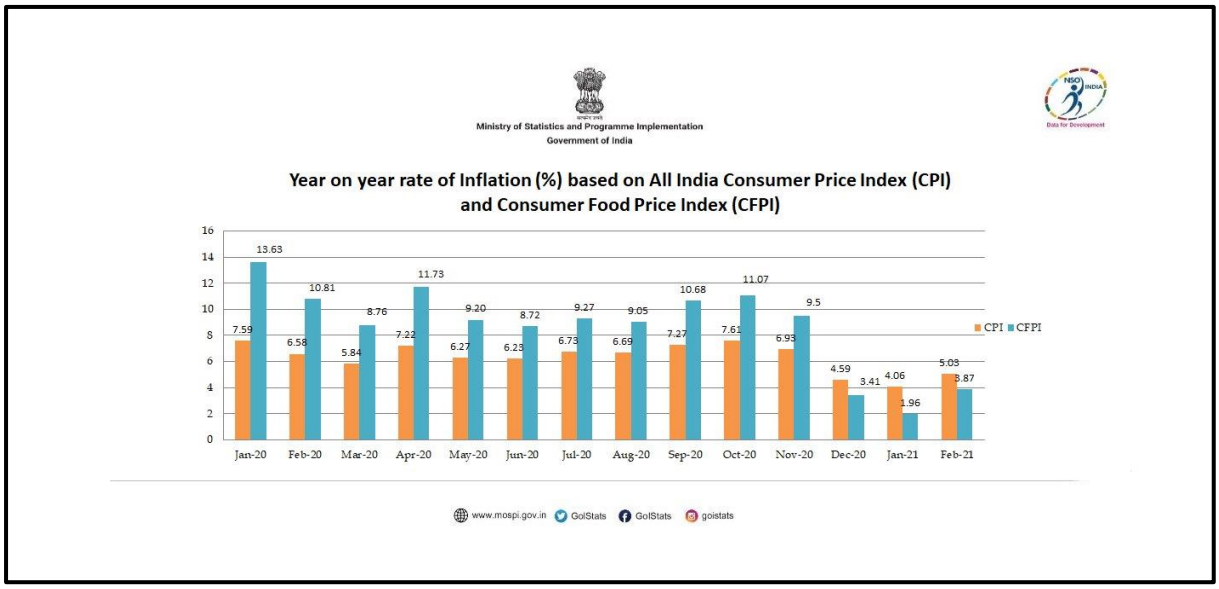
Importance for prelims: Science

New book on Indian innovations that transformed India released Oral Rehydration Therapy, which savesmillions of infants from the clutches ofdeath every year, not just in India, butacross the globe, is a treatment fordiarrhoea that was developed as an easy to-use treatment procedure by an Indiandoctor, Dilip Mahalanabis, who wasworking to prevent and treat dehydrationamong refugees of the Bangladeshwar in 1971.

- Based on the treatment methods adoptedby Dr Mahalanabis, WHO launched in 1978 the global diarrhoealdisease control programme, with ORS asthe main strategy.
- Oral rehydration therapy (ORT) may be a sort of fluid replacement used to prevent and treat dehydration, particularly because of diarrhea.
- It involves drinking water with the modest amounts of sugar and salts, specifically sodium and potassium

Topic 22. CONSUMER FOOD PRICE INDEX (CFPI)

Importance for prelims: Economy



It is a measure of change in retail costs of food merchandise consumed by a defined population group in a given area with reference to a base year.

- The Central Statistics Office (CSO), Ministry of Statistics and Programme Implementation (MOSPI) started releasing Consumer Food Price Indices (CFPI) for three categories -rural, urban and combined – separately on an all India basis with effect from May, 2014.
- Like Consumer Price Index (CPI), the CFPI is also calculated on a monthly basis and methodology remains the same as CPI. The base year presently used is 2012.
- The CSO revised the Base Year of the CPI and CFPI from 2010=100 to 2012=100 with effect from the release of indices for the month of January 2015. CFPI (Rural/ Urban/ Combined) is compiled as the weighted average of the Cereals and Productssub group of CPI for each of those categories – Rural/ Urban/ Combined.
- **Modified weights of these Sub-groups within CFPI are as follows:** All India Weights of different Sub-groups within Consumer Food Price Index Sub groups Description Rural Urban Combined a.

- Cereals and products 36.71 28.51 34.16 b. Pulses and products 6.25 6.11 6.20 c.
- Oils and fats 8.98 9.44 9.13 d. Egg, fish and meat 6.50 7.38 6.77 e. Milk and products 16.53 21.59 18.10 f.
- Condiments and spices 4.10 3.79 4.00 g. Vegetables 12.64 12.93 12.74 h. Fruits 3.65 6.14 4.43 i.
- Sugar etc. 4.64 4.11 4.47 Total Weights 100.00 100.00 100.00 Inflation rates (on point to point basis i.e. August, 2014 over August, 2014 over August, 2013), based on the general Indices and CFPIs, are issued by CSO.
- Globally, food price index is being released by Food and Agriculture Organization of the United Nations.
- The FAO Food Price Index is a measure of the monthly change in international prices of a basket of food commodities.
- It consists of the average of five commodity group price indices (Cereal, Vegetable Oil, Dairy, Meat and Sugar) weighted with the average export shares of each of the groups for 2002-2004.
- After the revision of Whole Sale Price Index (WPI) with the new base year 2011-12, a new "WPI Food Index" is being compiled by combining the "Food Articles" under "Primary Articles" in WPI and "Food Products" underneath "Manufactured Products" in WPI.
- Together with the Consumer Food Price Index released by Central Statistics Office, this would help monitor the price situation of food items better.

Topic 23. ISRO TESTS BOOSTER FOR GAGANYAAN

Importance for prelims: Science

The Indian Space Research Organization (ISRO) has successfully carried out the static test of the HS200 solid rocket booster, taking the space agency one more step closer to the keenly awaited Gaganyaan human spaceflight mission Designed and developed by the Vikram Sarabhai Space Centre (VSSC) in Thiruvananthapuram for over two years, the HS200 booster is the 'human-rated' version of S200 rocket boosters used on the geosynchronous satellite launch vehicle Mk-III (GSLV Mk-III), also known as the LVM3.

- The GSLV Mk-III rocket, which can be used for the Gaganyaan mission, can have 2 HS200 boosters that may supply the thrust for lift-off.
- The HS200 is a 20-metrelong booster with a diameter of 3.2 metres and is

the world's second largest operational booster using solid propellant.

- The successful completion of this test marks a major milestone for the prestigious human space flight mission of ISRO, the Gaganyaan, as the first stage of the launch vehicle is tested for its performance for the full duration,"
- Since Gaganyaan is a manned mission, the GSLV Mk-III will have improvements to increase reliability and safety to meet the requirements of 'human rating.'
- GSLV or Geosynchronous Satellite Launch Vehicle The GSLV or Geosynchronous Satellite Launch Vehicle is classified as a MediumLift Launch Vehicle (MLLV) and is rated to carry a payload of 8,000 kilo to LEO or Low Earth Orbit.
- An MLLV is defined as a vehicle that can take a payload of 2,000-20,000 kg to LEO.
- The GLSV program, which started in the early 2000s, was initially expected to carry satellites to GTO (Geostationary Transfer Orbit).
- This vehicle is powerful enough to go to the Moon and is capable of the taking humans to space.
- Of the three propulsion stages of the GSLV Mk-III, the second stage uses liquid propellant while the third is a cryogenic stage.
- Currently, the vehicle comprises three stages:
- **First stage:** Two S200 boosters are strapped on to the core of the rocket. These boosters are the third-largest solid fuel boosters ever developed and also the second largest in service.
- Only the now-retired Space Shuttle and the Ariane rockets used larger boosters.
- The S200s each carry 207 tonnes of the propellant and deliver 5,150 kN of peak thrust.

- **Second stage:** By far the most under-rated motor on the GSLV, the second stage rockets, designated L110, are liquid fuel rockets based on the French Viking engine.
- This engine was, in turn, jointly developed by Indian and French scientists.
- The version we use in India is Known as the Vikas engine.
- These engines carry about 116 tonnes of fuel and generate about 1,600 kN of thrust at sea level.
- **Third stage:** The engine that makes the GSLV a GSLV is that the third stage motor.
- A recordsetter in its own right, this cryogenic engine is classified as one of the most powerful upper stage motors in the world.
- It develops a thrust of 200 kN in vacuum and can operate for 640 seconds.
- For fuel, it uses a mixture of oxygen and hydrogen, that are cooled to refrigerant temperatures (below -183ºC) and are therefore in liquid form.
- A cryogenic engine is extremely efficient as compared to a regular rocket motor, making it ideal for spacecraft.
- It's also incredibly hard to develop, that is why only a handful of nations have succeeded in building one.
- • the average price of a GSLV launch is estimated to be about Rs 400 Cr or $62 mn, making it one amongst the most affordable launch vehicles in the world. Gaganyaan is a mission by the Indian Space Research Organization (ISRO).
- **Under the Gaganyaan schedule:** Three flights will be sent into orbit.
- There will be two unmanned flights and one human spaceflight.
- The Gaganyaan system module, called the Orbital Module will have three Indian astronauts, including a woman.

- It will circle Earth at a low-earth-orbit at an altitude of 300-400 km from earth for 5- 7 days.
- **Payloads:** Crew module –spacecraft carrying human beings. Service module –powered by two liquid propellant engines.
- It will be equipped with emergency escape and emergency mission abort. GSLV Mk III, also called the LVM-3 (Launch Vehicle Mark-3,) the three-stage heavy lift launch vehicle, will be used to launch Gaganyaan because it has the necessary payload capability.
- **Training in Russia:** In June 2019, the Human house Flight Centre of the ISRO and also the Russian government-owned Glavkosmos signed a contract for the training, which has Russian support in the selection of candidates, their medical examination, and space training.
- The candidates can study in detail the systems of the Soyuz manned spaceship, yet as be trained in short-term weightlessness mode aboard the Il-76MDK aircraft.
- The Soyuz is a Russian spacecraft.
- The Soyuz carries people and supplies to and from the space station.
- The Il-76MDK could be a military transport plane specially designed for parabolic flights of trainee astronauts and space tourists.

Topic 24. SCO ANTI-TERROR MEET IN DELHI

Importance for prelims: IR

China, Russia, Pak. to attend THE SCO anti-terror meet in Delhi

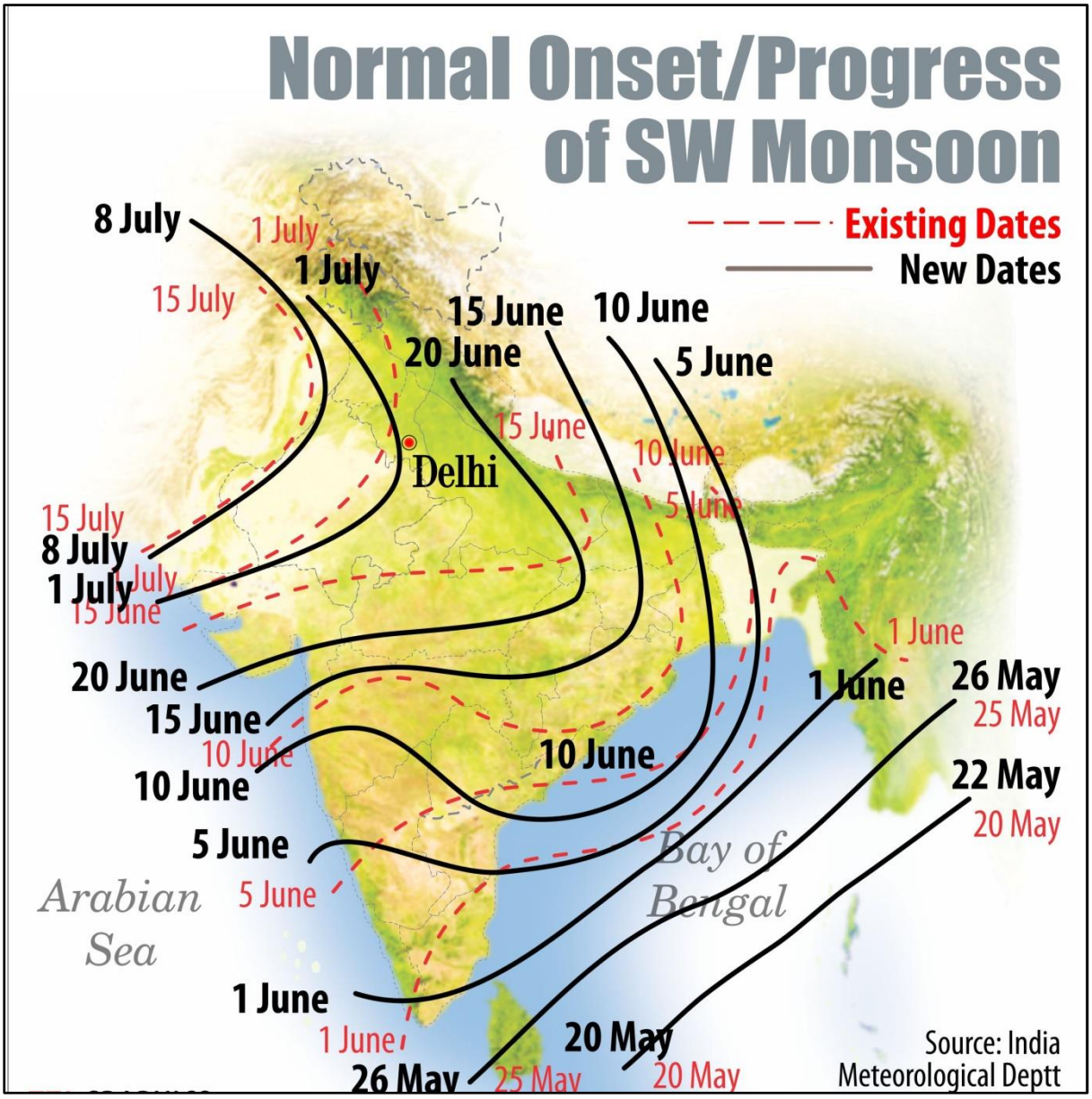
Concept: The Shanghai Cooperation Organisation (SCO) is a permanent intergovernmental international organisation, the creation of which was announced on 15 June 2001 in Shanghai (China) by the Republic of Kazakhstan, the People's Republic of China, the Kyrgyz Republic, the Russian Federation, the Republic of Tajikistan, and the Republic of Uzbekistan. it absolutely was preceded by the Shanghai 5 mechanisms.

- **The SCO's main goals are as follows:** strengthening mutual trust and the neighbourliness among the member states; promoting their effective cooperation in politics, trade, the economy, research, technology and culture, as well as in education, energy, transport, tourism, environmental protection, and other areas; making joint efforts to maintain and ensure peace, security and stability in the region; and moving towards the establishment of a democratic, fair and the rational new international political and economic order.
- The Heads of State Council (HSC) is the supreme decision-making body in the SCO.
- It meets once a year and the adopts decisions and guidelines on all important matters of the organisation.
- The SCO Heads of government Council (HGC) meets once a year to discuss the organisation's multilateral cooperation strategy and priority areas, to resolve current important economic and different cooperation strategy and priority areas, to resolve current important economic and other cooperation issues, and also to approve the organisation's annual budget.
- The SCO's official languages are Russian and Chinese.

- The organisation has 2 permanent bodies — the SCO Secretariat based mostly in Beijing and also the executive Committee of the Regional Anti-Terrorist Structure (RATS) based in Tashkent.
- SCO comprises eight member states, namely India, Kazakhstan, China, the Kyrgyz Republic, Pakistan, Russian, Tajikistan, and Uzbekistan.

Topic 25. ONSET OF MONSOON

Importance for prelims: Geography



The southwest monsoon is likely to set in over Kerala on May 27, well ahead of its normal date of June 1, the India Meteorological Department (IMD) announced on Friday (May 13). If the forecast turns out to be accurate, this may be the earliest onset of the monsoon over Kerala since at least 2009. There can be "a model error of four days on either side", according to IMD.

What does the "onset of monsoon" mean?

- The onset of the monsoon over Kerala marks the start of the four-month,

June-September southwest monsoon season over India, that brings quite seventy per cent of the country's annual rainfall.

- The onset of the monsoon could be a significant day in the India's economic calendar.
- According to the IMD, the onset of the monsoon marks a significant transition in the large-scale atmospherical and the ocean circulations in the Indo-Pacific region, and also the Department announces it only after the certain newly defined and measurable parameters, adopted in 2016, are met.
- IMD checks for the consistency of rainfall over a defined geography, its intensity, and wind speed.
- **Factors responsible for onset of monsoon:** In general, the Andaman and Nicobar Islands start receiving monsoon rainfall between May 15 and May 20 every year, and it usually starts raining along the Kerala coast in the last week of the May.
- However, the onset is not officially declared until the prescribed conditions (below) are met.
- **Rainfall:** The IMD declares the onset of the monsoon if at least 60% of 14 designated meteorological stations in Kerala and Lakshadweep record at least 2.5 mm of rain for for two consecutive days at any time after May ten.
- In such a situation, the onset over Kerala is declared on the second day, provided specific wind and temperature criteria also are fulfilled.
- **The 14 enlisted stations are:** Minicoy, Amini, Thiruvananthapuram, Punalur, Kollam, Alappuzha, Kottayam, Kochi, Thrissur, Kozhikode, Thalassery, Kannur, Kasaragod, and Mangalore.
- **Wind field:** The depth of westerlies should be upto 600 hectopascal (1 hPa is equal to 1 millibar of pressure) in the area bounded by the equator

to 10ºN latitude, and from longitude 55ºE to 80ºE.

- The zonal wind speed over the area bound by 5-10ºN latitude and 70-80ºE longitude should be of the order of 15-20 knots (28-37 kph) at 925 hPa.
- **Heat:** according to IMD, the INSAT-derived Outgoing Longwave Radiation (OLR) worth (a measure of the energy emitted to space by the Earth's surface, oceans, and atmosphere) should be below 200 watt per sq m (wm2) in the box confined by 5- 10ºN latitude and 70-75ºE latitude.

Is it unusual for the monsoon to hit the Kerala coast early?

- Neither early nor late onset of the monsoon is unusual, even if the forecast for this year is for earlier than would be usually expected.
- In 2018 and 2017, the onset over Kerala occurred on May 29 and May 30 respectively.
- In 2010, onset occurred on May 31.
- In 2020 and 2013, the monsoon was exactly on time, hitting the Kerala coast on June 1.
- In the rest of the years going back to 2010, the onset was delayed.
- In 2019, the IMD had announced a delay of six days, and predicted the onset for June 6.
- The monsoon finally set in over Kerala on June 8, 2019.

Does an early onset foretell a good monsoon?

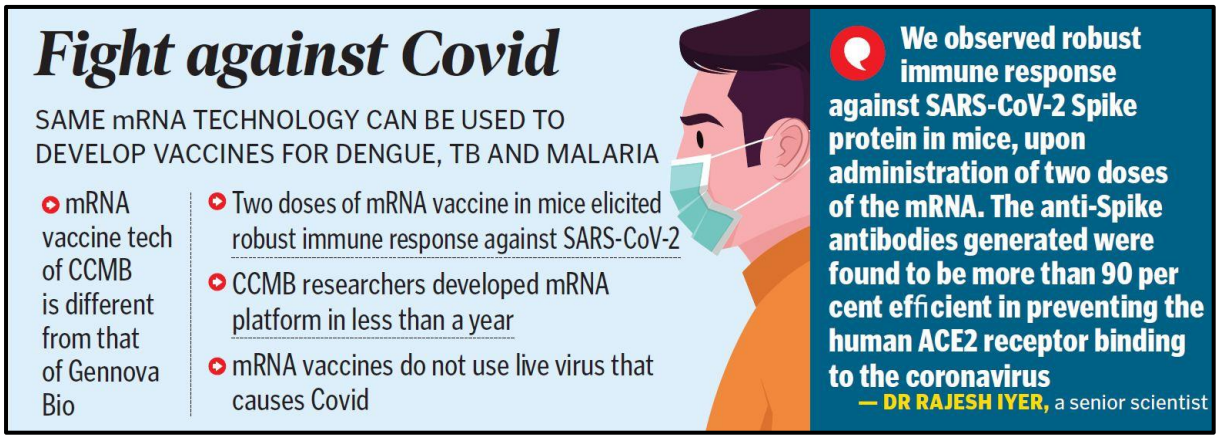
- No, it doesn't — just as a delay doesn't foretell a poor monsoon.
- The onset is just an event that happens throughout the progress of the monsoon over the Indian subcontinent.
- A delay of a few days, or perhaps the monsoon arriving a few days early, has no bearing on the quality or amount of rainfall, or its regional distribution across the country, during the four-month monsoon season. In a recent year, the onset of the monsoon occurred two days in advance

of the normal date, and it rained heavily for about 10 days after that — however, the season as a whole ended with 14 July less rain than normal.

- On April 14 this year, the IMD released its 1st Long range Forecast (LRF) for this year, in which it predicted a "normal" monsoon — which means rainfall is likely to be in the range of 96% to 104% of the long period average (LPA) of the 1971- 2020 period.
- The average annual rainfall for the country as a whole in the southwest monsoon season throughout this period was 87 cm.
- **And does a delayed onset mean cascading delays across the country?**
- A delay in onset over Kerala will potentially delay the arrival of the monsoon in different parts of the country, particularly in the southern states, which normally start rain within days of the monsoon reaching to the Kerala coast.
- However, a delayed onset over Kerala doesn't automatically or invariably mean delays in the arrival of the monsoon over the entire country.
- The northward progression of the monsoon after it's hit the Kerala coast depends on a lot of local factors, as well as the creation of low pressure areas.
- It is possible that despite a late onset over Kerala, other parts of the country start getting rain on time.

Topic 26. CCMB DEVELOPS INDIAN MRNA VACCINE PLATFORM

Importance for prelims: Science and Technology



mRNA vaccine and robust immune response

- A vaccine's goal is to train the body's immune system to defend against disease Many vaccines use a weakened or the dead version of the actual virus to stimulate an immune response.
- In contrast, mRNA (messenger RNA) vaccines use a to tell to inform the body's cells to produce proteins that the immune system recognizes because the virus.
- The part of the mRNA that encodes a protein, plugging in new code specific to the virus to protect against, and causes one's body to produce proteins that match that virus' proteins.
- The mRNA vaccine promises to deal with other infectious diseases such as TB, dengue, malaria, chikungunya, rare genetic diseases, and others.
- This technique ha as rapid turnaround time, which means vaccines can be developed for other diseases or a pan-COVID vaccine covering different variants Binding to the ACE2 receptor is a critical initial step for SARS-CoV to enter into target cells.
- Recent studies also highlighted the important role of the ACE2 in mediating entry of SARS-CoV-2.
- Hela cells expressing ACE2 are susceptible to SARS-CoV-2 infection

whereas those without ACE2 aren't.

- The COVID-19 spike protein in mice upon administration of two doses of the mRNA vaccine.
- "The anti-spike antibodies generated were found to be more than ninetieth efficient in preventing the human ACE2 receptor binding to the coronavirus measuring anti-spike protein antibodies in human plasma or serum is commonly used to determine prior exposure to SARS-CoV-2 infection and to assess the antiviral protection capacity.
- The mRNA vaccine candidate is now undergoing preclinical hamster challenge studies to evaluate the efficacy to protect against live virus infection.

Topic 27. GOVERNMENT BONDS AND BOND YIELD

Importance for prelims: Economy

The 10-year benchmark bond ended at 7.46%, after earlier reaching a high of 7.49%. The official aforesaid the govt expects the run to conduct a switch operation, offering investors an opportunity to exchange their short-dated bonds for debt with a longer maturity, or to buy back the government bonds within the next two weeks.

- Bonds are loans the one makes to a corporation or government.
- The interest payments remain mostly unchanged over the lifetime of the loan.
- Moreover, one receives the principal at the end of the loan tenure if the borrower does not default.
- Bond yield, on the other hand, is that the return that an investor gets on that bond or on a particular government security. Bond yield and bond prices:
- A fall/rise in interest rates in an economy pushes up/pulls down bond prices.
- However, bond yields fall/rise in this situation.
- This happens because if Reserve Bank of India, for example, decides to increase interest rates, the bond's value (which is offering similar return because the current interest rates) would fall because its coupon payment is less attractive currently on a relative basis. Therefore, investors would chase new bonds with better risk-free returns.
- **Causes of high bond yield:** Higher government borrowing-Higher government borrowing through Issuance of securities, especially when inflation is high, will push up yields on bonds and result in a falling bond price.
- Inflation Rise in repo rate- if RBI, for example, decides to increase

interest rates, the bond's price (which is offering similar return as the current interest rates) would fall because its coupon payment is less attractive now on a relative basis.

- **Rise in Fed rate-capital outflows Impact:** Rising yields mean investors expect a rise interest rates and therefore, sell the bond papers they are holding thus, leading capital outflows and stock market crash due to outflow of funds from the equity market.
- **Measures:** Measures that would boost demand (leads to decline in bond supply or rise in price of bonds) for government bonds and keep yields in check: Increase the held to maturity (HTM) limit of the banks substantially –
- The entire investment portfolio of the banks (including SLR securities and non-SLR securities) are classified under three categories viz.
- 'Held to Maturity', 'Available for Sale' and 'Held for Trading'.
- Held-to-maturity securities are debt security investments which the holder has the intention and ability to hold until a specific date of maturity.
- The investments classified under HTM needn't be marked to market and can be carried at acquisition cost, as subsequent changes in market value are ignored because the return is predetermined.
- Earlier RBI allowed the HTM investment to rise provided it remains within an overall limit of 19.5 percent of the deposit base.
- This 19.5 per cent limit has now been increased to 22 per cent.
- This extra limit of 2.5 per cent meant an extra demand of nearly Rs 3.56 trillion bonds.
- **Open Market Operation**-The central bank conducts special open market operations (OMO), under which it simultaneously buys and sells bonds worth Rs.
- In market parlance, this kind of OMO is called Operation Twist.

- Reverse the funds taken underneath long-term repo operations (LTROs), to ease their value of funds.
- Thus, the banks could reduce their interest liability by returning funds taken at the repo rate prevailing at that time (5.15 per cent) and availing funds at this repo rate of four per cent.
- Reversal of LTRO can reduce intertemporal consequences for Banks, and can improve appetite for banks to borrow and park bound.
- Increase Statutory Liquidity ratio- also increase demand for bonds as SLR includes investment in government bonds.
- An Appreciating rupee theoretically makes import cheaper, and therefore controls inflation.
- It is considered an indirect method of raising interest rates without touching policy rates potential of leading capital inflows.
- **Issue:** RBI policy to curtail bond yield is generally associated with excess liquidity in the system especially OMO (purchasing bonds in return of money) thus, is in conflict with the ongoing monetary tightening session.

Topic 28. SOVEREIGN RATING

Importance for prelims: Economy

Country	Moody's Ratings	S&P Ratings	Fitch Ratings
USA	Aaa	AA+	AAA
UK	Aa2	AA	AA
Germany	Aaa	AAA	AAA
France	Aa2	AA	AA
Japan	A1	A+	A
Spain	Baa1	A-	A-
Italy	Baa2	BBB	BBB
Greece	B3	B+	BB-
Mexico	A3	BBB+	BBB+
Malaysia	A3	A-	A-
Philippines	Baa2	BBB	BBB
Pakistan	B3	B	B
Russia	Ba1	BBB-	BBB-
Turkey	Ba2	BB-	BB
Argentina	B2	B+	B
Brazil	Ba2	BB-	BB-
Egypt	B3	B	B
South Africa	Baa3	BB	BB+
Israel	A1	AA-	A+
India	Baa2	BBB-	BBB-
China	A1	A+	A+

There is a danger that we could witness a drop in WGI scores because of the latest negative commentary on India by think tanks, survey agencies and international media.

- This could possibly downgrade our Sovereign Ratings to junk Sovereign
- Credit Rating: A sovereign credit rating is an independent assessment of the creditworthiness of a country or a sovereign entity.
- It will give investors insights into the level of risk associated with investing in the debt of a particular country, as well as any political risk.
- In addition to issue bonds in external debt markets, another common motivation for countries to obtain a sovereign credit rating is to attract foreign direct investment (FDI).

- At the request of the country, a credit rating agency can valuate its economic and political environment to assign it a rating.
- S&P gives a BBB- or higher rating to countries it considers investment grade, and grades of BB+ or lower are deemed to be speculative or "junk" grade.
- Moody's considers a Baa3 or higher rating to be of investment grade, and a rating of Ba1 and below is speculative.
- A rating agency could be a company that assesses the financial strength of companies and government entities, particularly their ability to meet principal and interest payments on their debts.
- Fitch Ratings, Moody's Investors Service and Standard & Poor's (S&P) are the big three international credit rating agencies controlling approximately 95% of global ratings business.
- In India, there are six credit rating agencies registered under Securities and Exchange Board of India (SEBI) namely, CRISIL, ICRA, CARE, SMERA, fitch India and brickwork Ratings.
- **Factors determining:** A country's sovereign rating is based on subjective factors such as assessments on governance, political stability, rule of law, corruption, press freedom, and so on.
- Credit agencies use the World Bank's World Governance Indicators (WGI) as a proxy for these subjective factors.
- A downgrade implies: Being downgraded can have a big impact on a country's ability to borrow money on the markets.
- Investors see it as a riskier bet and demand higher returns to lend to governments.
- Even if it manages to raise any funds, it will come at exorbitant cost.
- The Worldwide Governance Indicators (WGI) project reports aggregate and individual governance indicators for over two hundred countries and

territories over the period 1996–2020, for 6 dimensions of governance: Voice and Accountability Political Stability and Absence of Violence/Terrorism Government Effectiveness Regulatory Quality Rule of Law Control of Corruption These aggregate indicators combine the views of a large number of enterprise, citizen and expert survey respondents in industrial and developing countries.

- They are based on over thirty individual information sources produced by a variety of survey institutes, think tanks, non-governmental organizations, international organizations, and private sector corporations.

Topic 29. RABINDRANATH TAGORE

Importance for prelims: History

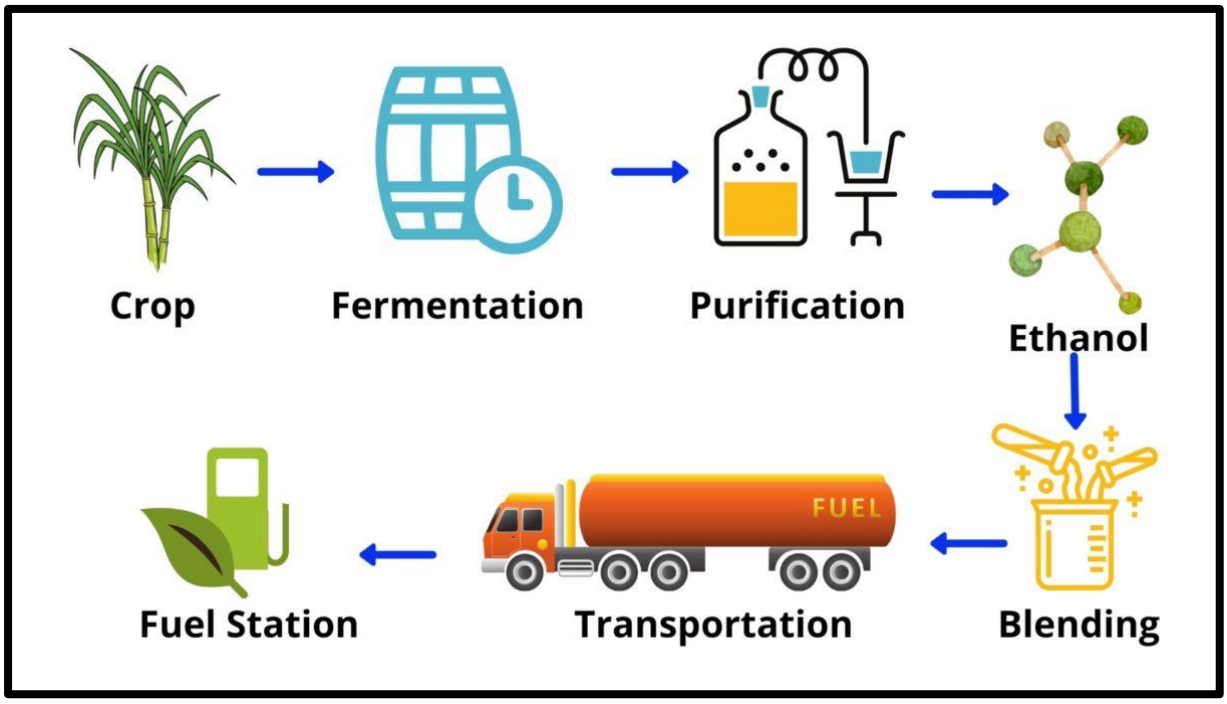
Rabindranath Tagore celebrates 161st birth anniversary Rabindranath Tagore: Rabindranath Tagore was a Bengali poet, novelist, and painter, who was born in Calcutta on May 7, 1861 and was highly influential in introducing Indian culture to the west.

- He was also referred to as 'Gurudev', 'Kabiguru', and 'Biswakabi'.
- He was the first non-European to receive the Nobel Prize for his work on Gitanjali in 1913.
- In 1915, Tagore was awarded knighthood by the British King George V.
- However, in 1919, following the Jallianwalla Bagh massacre he renounced his Knighthood. Rabindranath Tagore was a good friend of Mahatma Gandhi and is said to have givenhim the title of Mahatma.
- He not only gave the national anthems for two countries, India and Bangladesh, but also inspired a Ceylonese student of his, to pen and composes the national anthem of Sri Lanka.
- Tagore believed in open-air education and had reservations about any teaching done within four walls.
- This was because of his belief that walls represent the conditioning of the mind.
- Tagore did not have a good opinion about the Western method of education introduced by the British in India; on this subject, Tagore and Gandhiji's opinion matched.
- So, in 1921, he founded the Vishwabharati University at Santiniketan. He believed it stifled creativity.
- He conceived of an educational system wherever the students' curiosity was kindled and learning became more natural.
- He had spoken at the world Parliament for Religions in the years 1929

and 1937.

Topic 30. ETHANOL BLENDING

Importance for prelims: Environment



The level of ethanol blending in petrol in India has reached 9.99 per cent, petroleum Minister Hardeep Singh Puri aforesaid on Monday.

- India had targeted 10 per cent ethanol blending in petrol by the end of 2022 and 20 per cent blending by 2030.
- The Centre has also targeted five per cent blending of biodiesel with diesel by 2030.
- The ethanol blending programme is aimed at reducing the country's dependence on crude oil imports, cutting carbon emissions and boosting farmers' incomes.
- The Centre has also announced an additional duty of Rs 2 per litre on unblended fuels starting October to incentivise blending. 99% ethanol blending in petrol achieved by our OMCs (Oil Marketing Companies) shows that India was on course to achieve 20 per cent blending by 2025-2026.

Topic 31. MINISTRY REVISES MPLADS RULES

Importance for prelims: Polity

The Union Finance Ministry has ordered revised rules, under which the interest that the fund accrues can be deposited in the Consolidated Fund of India.

So far, the interest accrued on the fund used to be added to the MPLADS account and could be usedfor the development project

- The MPLADS is a plan scheme fully funded by Government of India. The annual MPLADS fund entitlement as per the MP constituency is Rs. 5 crore.
- MPs are to recommend every year, works costing at least 15 per cent of the MPLADS entitlement for the year for areas inhabited by Scheduled Caste population and 7.5 % for areas inhabited by S.T. population.
- **Works under the scheme:** Works, developmental in nature, based on locally felt needs and always available for the use of the public at large, are eligible under the scheme.
- Preference under the scheme is given to works relating to national priorities, such as provision of drinking water, public health, education, sanitation, roads, etc.
- **Release of Funds:** Funds are released in the form of grants in-aid directly to the district authorities.
- • The MPLADS fund is released to the district authority and therefore the MPs only have power to recommend development work.
- The payment is also released by the designated district authority on completion of the work The funds released under the scheme are non-lapsable.
- The liability of funds not released in a particular year is carried forward to the subsequent years, subject to eligibility.
- **Execution of works:** The MPs have a recommendatory role under the

scheme.

- They recommend their choice of works to the involved district authorities who implement these works by following the established procedures of the concerned State Gov.
- The district authority is empowered to the examine the eligibility of works sanction funds and select the implementing agencies, the prioritise works, supervise overall execution, and monitor the scheme at the ground level.
- **Recommendation of works:** The Lok Sabha Members can recommend works in their respective constituencies.
- The elected members of the Rajya Sabha can recommend works anywhere in the state from which they are elected.
- Nominated members of the Lok Sabha and Rajya Sabha may select works for implementation anywhere in the country Consolidated Fund of India Consolidated Fund of India is the most important of all government accounts.
- Revenues received by the govt and expenses made by it, excluding the exceptional items, are a part of the Consolidated Fund.
- This fund was constituted under the Article 266 (1) of the Constitution of India.
- All revenues received by the government by way of direct taxes and indirect taxes, money borrowed and receipts from loans given by the government flow into the Consolidated Fund of India.
- All government expenditure is made from this fund, except exceptional items that are met from the Contingency Fund or the general public Account.
- Importantly, no money will be withdrawn from this fund without the Parliament's approval.

Topic 32. NTPC INVITES BIDS TO IMPORT4.53 MILLION TONNES OF COAL

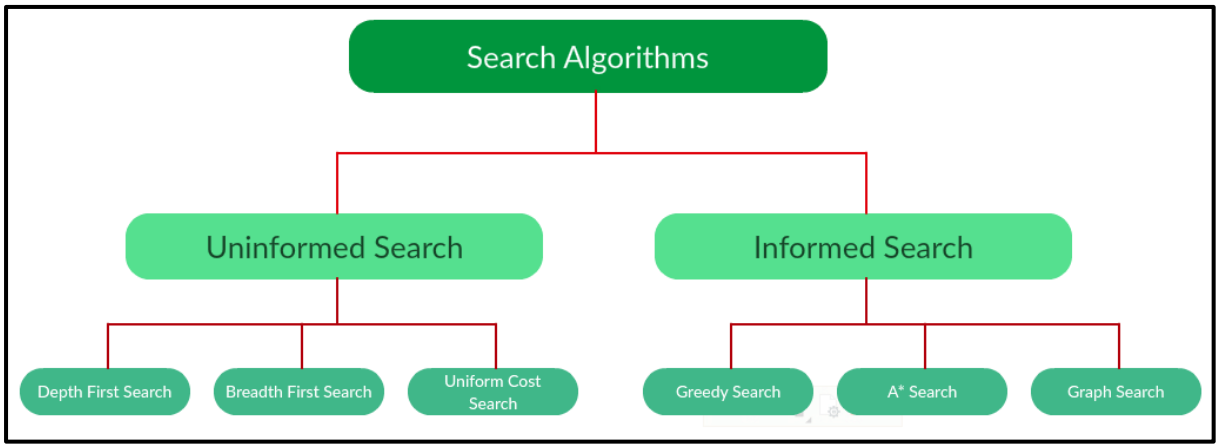
Importance for prelims: Geography

State-owned power big NTPC has invited bids to the procure 4.53 million tonnes (MT) of imported coal, mainly for blending with the domestic dry fuel in thermal plants

- Bids were also invited for the procurement of 1.6 MT of imported coal on a power station basis for NTPC plant sat Talcher Kaniha, Farakka, Kahalgaon, Barh, Barauni, Bongaigaon, Simhadri and Ramagundam. Bids were invited for the procurement of 1.5 MT of imported coal to supply the dry fuel at thermal plants located at the Kudgi, Solapur, Sipat, Mouda, Gadarwara, Laraand Korba power plants.

Topic 33. THE SEARCH ALGORITHM IN ACTION

Importance for prelims: Science and Technology



Search algorithms becoming a privacy threat by the dominant search engines.

- A search algorithm could be a unique formula that a search engine uses to retrieve specific info stored within a data structure and determine the significance of a web page and its content. Search algorithms are the unique to their search engine and determine search engine result rankings of web pages

What are the major search engines?

- Top search engines includes Google.
- Bing. Baidu. Yahoo! Ask.com. DuckDuckGo.

What are the 3 common types of search engines?

- There are 3 main kinds of search engines, web crawlers, directories, and sponsored links.
- Search engines typically use a number of methods to collect and retrieve their results.
- **These include:** Crawler databases. Major Google algorithm updates Date: February 24, 2011. … Date: April 24, 2012. … Date: August 22, 2013. … Date: April 21, 2015. … Rank Brain. Date: October 26, 2015. … Date: May 4, 2018. … Date: October 22, 2019. … Core Updates. Date: 2017-present. PageRank is a search algorithm utilized by the

google works by counting the number and quality of links to a page to determine a rough estimate of how important the website is.

- The underlying assumption is that more important websites are likely to receive more links from other websites.
- The image below is a graphical representation of page rank.
- Note circle B is large because many other pages link to it.
- But C few links, Circle C is larger because it is linked to from an authoritative source HITS This is also known as "hubs and authorities".
- A good hub represented a page that pointed to many other pages, and a good authority represented a page that was linked by many different hubs.
- Hyperlink-Induced Topic Search assigns two scores for each page: its authority, which estimates the value of the content of the page, and its hub value, which estimates the value of its links to other pages.
- HITS identifies good authorities and hubs for a topic by assigning two numbers to a page: an authority and a hub weight.
- These weights are defined recursively.

What are the concerns?

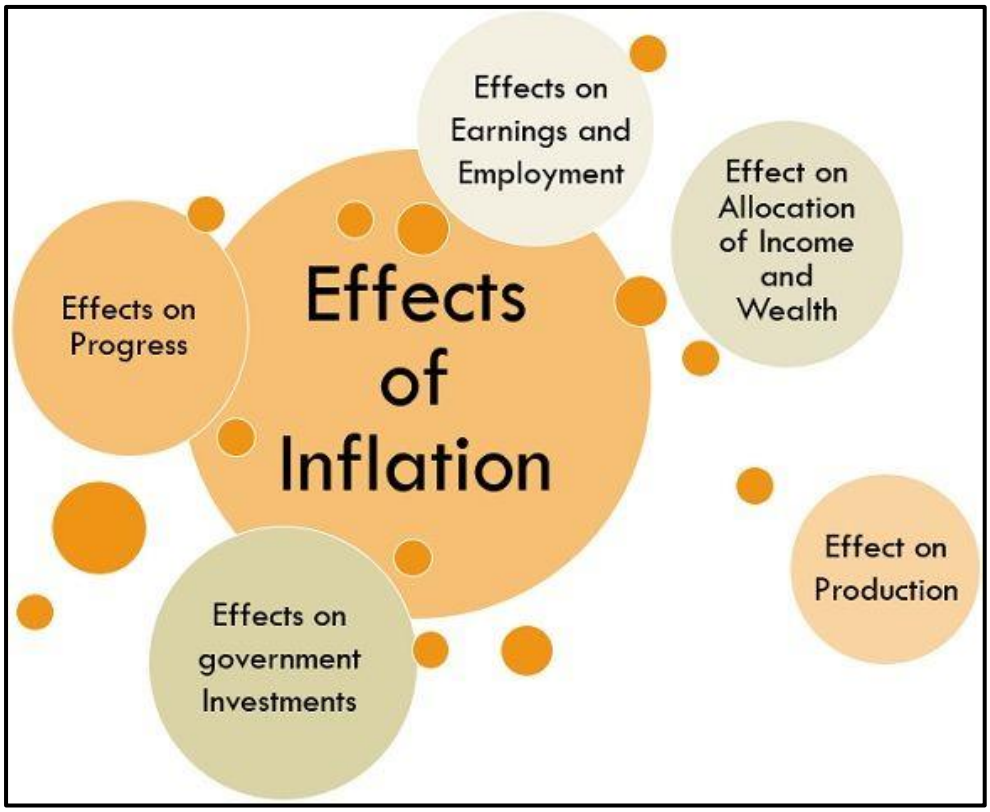
- The search giant's trackers have allegedly been found on majority of the top million websites, this means they're not only tracking what you search for, [but] they're also tracking which websites you visit, and using all your data for ads that follow you around the internet.
- The use of data from profiles, including those established based on data collected by search algorithms and search engines, directly affects the right to a person's informational self-determination.
- Most of Google's revenues stem from advertisements, like those it shows consumers in response to a search question.
- The current state of algorithms These search algorithms can be used to personalise services in ways that are difficult to detect, leading to search

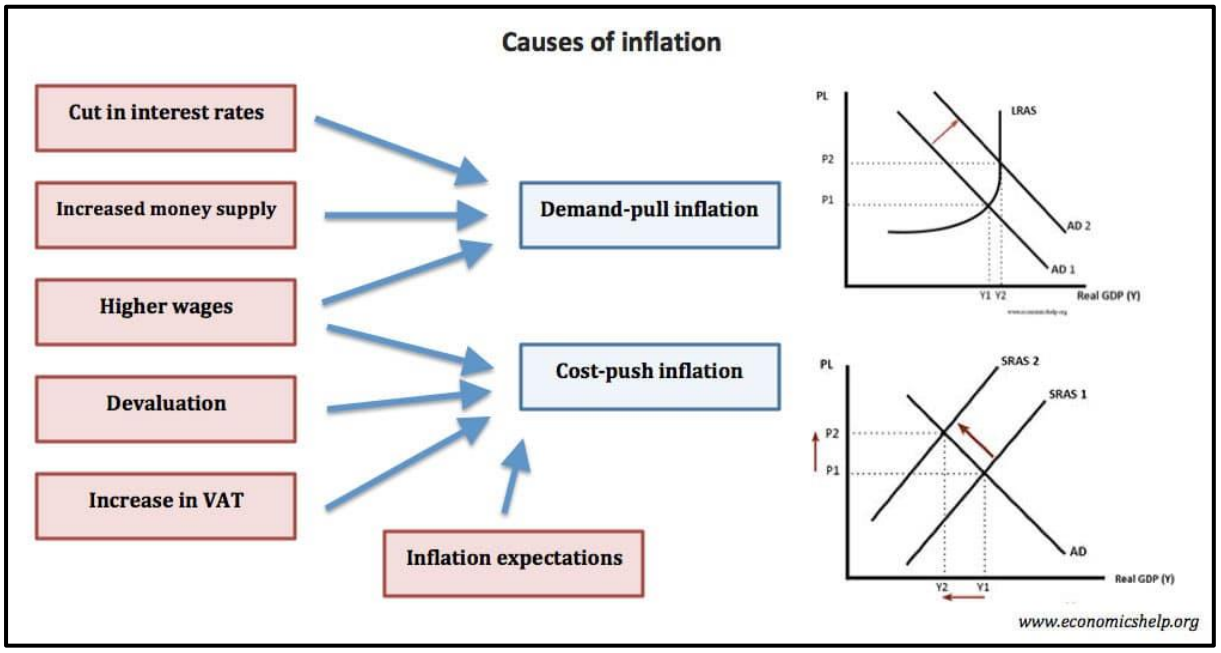
results that can be manipulated to reduce choice or the artificially change consumers' perceptions.

- Companies also can use these algorithms to change the way they rank products on websites, prioritising their own products and excluding competitors. some of these issues have caught the eye of regulators and as a result these search algorithms have come under their scrutiny.
- Under the Commission's proposal on the Digital Services Act, transparency measures for online platforms on a variety of issues, as well as the algorithms used for recommending content or products to users are expected to come into force.
- Majority of the algorithms utilized by private firms are area unit currently subject to little or no regulatory oversight.

Topic 34. INFLATION IN INDIA CAUSE AND EFFECT

Importance for prelims: Economy





The official data revealed that retail inflation had grown by 7.8% in April- the highest rate in the last 8 years.

- **Details:** Retail inflation has been high since October 2019 and has, in

fact, touched the 4% mark just once since then.

- In all other months, it has been higher than 4% and regularly breached the 6% since February 2022.
- **Causes:** Ukraine War- leading rise in price of crude oil and natural gas. India importing more than 80 Percent of its domestic need of those goods imported inflation is one among the most important causes.
- Rise in Food Inflation Rise in price of core items-all other items excluding food and fuel, which makeup the remaining 47% of the headline inflation- the CPI.
- **Impact:** Reduces purchasing power of money- it is the ability of money to buy a particular quantity of good and service.
- As price rise lower amount of goods purchased with same quantity of money.
- Reduce Aggregate Demand-as more money required for purchasing initial quantities of goods.
- Reduces real rate of interest – thus reduces productive savings and investments.
- Reduced real interest rate benefits borrowers and helps the govt meet its debt obligations in an easier manner.
- Help achieve fiscal deficit target- Fiscal Deficit limits are expressed as a percentage of the nominal GDP.
- As the nominal gross domestic product (GDP) rises because of inflation (without necessarily implying an increase in overall production), the same amount of fiscal deficit (borrowing) becomes a smaller percentage of the gross domestic product (GDP).
- **Corporate profitability** –rises in the short run as they have a large inventory of raw material thus able to pass the rising price to the consumers.

- However in the long run due to fall in aggregate demand and rise in cost of production profits decline.
- **Currency depreciation-** as rise in prices of exports and imports become relatively cheaper.
- Further, due to low real interest rate capital outflows leading to the overall BOP deficit and currency depreciation as demand for foreign currency rises relative to domestic currency.
- Wage price spiral-People expect future prices to be higher and demand higher wages.
- But this, in turn, creates its own spiral of inflation as companies try to price goods and services even higher due to rise in the cost of production.

Topic 35. RBI GOLD ACQUISITION

Importance for prelims: Economy

India's gold holdings have gone up to 760.42 tonnes, with the Reserve Bank of India (RBI) adding another 16.58 tonnes of the yellow metal to the country's foreign exchange kitty during the six months ended March 2022.

- **Details:** RBI's gold acquisition happened at a time when foreign portfolio investors (FPIs) were exiting India and forex reserves declined by $44.73 billion from $642.45 billion in September 2021 to $597.72 billion on Apr 29, 2022, as per reserve bank information.
- In value terms (USD), the share of gold in the total foreign exchange — or forex — reserves increased from about 5.88 per cent as at end-September 2021 to about 7.01 per cent as at end-March 2022 making India the ninth-largest holder of gold reserves.

Why?

- While gold no longer plays a direct role in the international monetary system, central banks and governments still hold extensive gold reserves to preserve national wealth and protect against economic instability.
- Reserve asset-Gold is the third largest reserve asset globally, following US dollar- and euro-denominated assets.
- Collateral in the financial transactions, much like other high-quality, liquid assets like government debt.
- Stability and diversity to the forex reserves at a time when capital outflows fluctuating.
- Central bank balance sheet The liabilities side of it comprises the currency in circulation, commercial bank reserves (money kept by lenders with it) and the government reserves (State balances kept with it).
- The asset side has the forex reserves, government securities and gold.
- The balancing item represents the central bank's equity and accumulated

surplus.

Topic 36. INDIGENOUS CATTLES

Importance for prelims: Economy

23 breeds of indigenous cattle registered a decline in numbers – ranging from 1.08% to 93.48% – in seven years between 2012 and 2019, according to the latest breed-wise report of livestock and poultry in India.

- The report, is based on 20 Live stock Census conducted during 2018-19, was released by Union Fisheries, Animal Husbandry and Dairying.
- According to the report, the total number of indigenous cattle declined by 6% to 14.21 crore in 2019 from 15.12 crore in 2012.
- Their share in the total cattle population fell to 73% from 79% during this period.
- According to the 20th livestock Census, "Animals that belong to the Descript (identified)/Non-descript (non-identified) breeds of indigenous origin are considered as indigenous animals."
- However, the number of Exotic/Crossbred cattle grew from 3.9 crore in 2012 to 5 crore in 2019.
- The Census defines "Exotic" cattle as "the animals which have their origin in other countries".
- The report has divided autochthonic bovine population in 2 groups – forty one recognised breeds and Non-Descript.
- Of the indigenous cattle population, NonDescript had the most numbers – 10.02 crore – during 2019, while the combined number of 41 breeds stood at 2.49 crore. Among five breeds, which have seen maximum decline in their numbers, are Khariar(-93%), Kherigarh(-75%), Kenkatha (-67%), Motu (56%) and Hariana (56%).
- Khariar, found mainly in Odisha and Chhattisgarh; Hariana breed is found mainly in Haryana, Uttar Pradesh, Rajasthan, Madhya Pradesh and Bihar; Motu is found in Odisha; Red Kandhari in Maharashtra; Kenkatha

in Madhya Pradesh and Uttar Pradesh; and Kherigarh in Uttar Pradesh. Other breeds which have registered a decline are: Dangi, found mainly in the maharashtra and the Gujarat; Rathi (Rajasthan, Punjab and Haryana); Deoni(Maharashtra, karnataka and Telangana); Tharparkar(Uttar Pradesh, Rajasthan and Jharkhand); Kangayam (Tamil Nadu); Binjharpuri (Odisha); Kankrej (Gujarat and Rajasthan); Nagori (Rajasthan and Punjab); MalnadGidda (Karnataka); Mewati(Uttar Pradesh); Khillar (Karnataka and Maharashtra); Kosali (Chhattisgarh); Malvi (Madhya Pradesh, Maharashtra and Rajasthan); Umbla Cherry (Tamil Nadu); Gaolao(Madhya Pradesh and Maharashtra); Ghumusari (Odisha); and Hallikar(Karnataka).

- The 14 indigenous breeds, which have registered an increase between 2012-19 are: Vechur (512%), Punganur, (369%), Bargur (240%), Bachaur (181%), Krishna Valley (57%), Pulikulum, (38%), Siri (36%), Gir (34.12%), Amritmahal (31%), Sahiwal (22%), Ongole(11%), Red Sindhi (10%), Nimari(6) and Ponwar (2.46%).
- In terms of absolute number, Girhad the highest population of 68.57 lakh followed by Lakhimi (68.29 lakh) and Sahiwal (59 lakh).
- According to the 20 Livestock Census, 04% of the livestock population belong to cattle.

Topic 37. THE INDIA HYPERTENSION CONTROL INITIATIVE

Importance for prelims: Science and Technology

On the hypertension spectrum

- High blood pressure (hypertension) is a common condition in which the long-term force of the blood against your artery walls is high enough that it may eventually cause health problems, such as heart disease.
- hypertension is diagnosed if, when it's measured on 2 different days, the systolic blood pressure readings on both days is ≥140 mmHg and/or the diastolic blood pressure readings on both days is ≥90 mmHg. Blood pressure is denoted by 2 numbers

1. Systolic number – the pressure in blood vessels when the heart contracts or beats.
2. Diastolic number – the pressure in the vessels when the heart rests between beats. Hypertension– or elevated blood pressure is a serious medical condition that– significantly increases the risks of heart, brain,

kidney and other diseases.

- An estimated 1.28 billion adults aged 30-79 years worldwide have hypertension, most (two-thirds) living in low- and middle-income countries An estimated 46% of adults with hypertension are unaware that they have the condition.
- Less than half of adults (42%) with hypertension are diagnosed and treated. Approximately 1 in 5 adults (21%) with hypertension have it under control.
- Hypertension is a major cause of premature death worldwide.
- One of the global targets for non-communicable diseases is to reduce the prevalence of hypertension by 33% between 2010 and 2030.
- The risk factors for the hypertension modifiable risk factors include Unhealthy diets (excessive salt consumption, A diet high in saturated fat and trans fats, Low intake of fruits and vegetables),physical inactivity, Consumption of tobacco and alcohol, Being overweight or obese.
- Non-modifiable risk factors include A family history of hypertension, Age over 65 years and Co-existing diseases such as diabetes or kidney disease. Common symptoms of hypertension
- It is called a “silent killer”. Most people with hypertension haven't any warning signs or symptoms.
- Early morning headaches, Nosebleeds, Irregular heart rhythms, vision changes, and Buzzing in the ears. Fatigue, Nausea, Vomiting, Confusion, Anxiety, Chest pain, and Muscle tremors.

Why is hypertension an important issue in low- and middle-income countries?

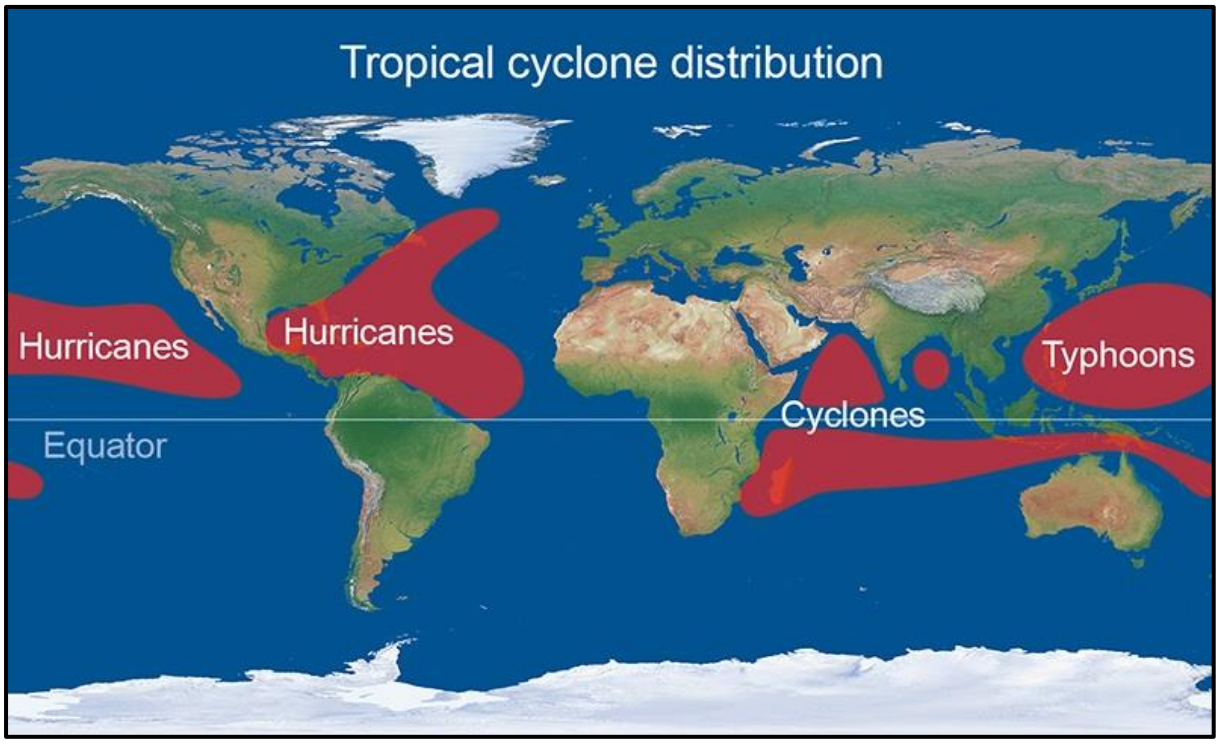
- The prevalence of hypertension varies across regions and the country income groups.
- The WHO African Region has the highest prevalence of hypertension

(27%) while the WHO Region of the Americas has the lowest prevalence of hypertension (18%).

- The number of adults with hypertension increased from 594 million in 1975 to 1.13 billion in 2015, with the increase seen largely in low- and middle-income countries.
- This increase is due mainly to a rise in hypertension risk factors in those populations.
- In India A project known as the India hypertension control Initiative (IHCI) finds that almost twenty third out of 2.1 million Indians have uncontrolled blood pressure.
- The India hypertension control Initiative (IHCI) is a multi-partner initiative, implementing and scaling up a public health hypertension control program across India.
- **About the IHCI:** Recognising that hypertension is a serious, and growing, health issue in India, the Health Ministry, the Indian Council of Medical Research, State Governments, and WHO-India began a five-year initiative to monitor and the treat hypertension.
- India has committed to a "25 by 25" goal, that the aims to reduce premature mortality because of non-communicable diseases (NCDs) by twenty fifth by 2025.
- One of the nine voluntary targets includes reducing the prevalence of high blood pressure by 25% by 2025.

Topic 38. TROPICAL CYCLONES NAMES

Importance for prelims: Geography



Cyclone Asani, formed in the Bay of Bengal, is likely to the intensify into a severe cyclonic storm in coming days. The name 'Asani' was given by Sri Lanka. Asani or 'wrath' in Sinhalese will be the first cyclonic storm of the season.

Why name cyclones?

- According to the World Meteorological Organisation (WMO), an agency under the United Nations, there can be more than one cyclone at a time in a particular geographical location or around the globe and the systems can last for a week or more.
- Therefore, each tropical storm is given a name to avoid confusion, in facilitating disaster risk awareness, management and mitigation.
- Usually, short and easy-to-pronounce names are helpful in effectively giving out detailed storm information between hundreds of scattered stations, coastal bases and ships at sea.
- The process also reduced errors.

- In the beginning, storms were named arbitrarily.
- Later, meteorologists decided to name storms from a list for a more organised and efficient system.
- With Cyclone Asani — a name given by Sri Lanka that means 'wrath' in Sinhalese — formed in the Bay of Bengal on Sunday morning and hurtling towards the east coast, the same question pops up again.

How are cyclones named?

- There are six Regional Specialised meteorological Centres (RSMCs) worldwide and five regional Tropical Cyclone Warning Centres, that are mandated for issuing advisories and naming of cyclonic storms.
- The India Meteorological Department (IMD) is one of the six Regional Specialised Meteorological Centres (RSMCs) that is tasked with giving a title to a cyclone that forms over the northern Indian Ocean when it has reached a maximum sustained surface wind speed of 62 kmph or more.
- The naming of cyclones in the Bay of Bengal and Arabian Sea started in September 2004.
- The IMD provides cyclone and storm surge advisories to 13 countries across the north Indian Ocean.
- If the storm's wind speed reaches or crosses this mark, it is then classified into a hurricane/cyclone/typhoon.
- The list is arranged according to the names, given by alphabetically-arranged countries, that are neutral to gender, politics, religious beliefs and cultures.
- Once a name is used, it will not be repeated again.
- The word, which can have a maximum of eight letters, should not be offensive to any member country or hurt the sentiments of any group of population.
- The most recent list released in 2020 has 169 names, including 13 names

each from 13 countries.

- Earlier, eight countries had given 64 names.
- Names from India that have been used include Gati (speed), Megh (cloud), Akash (sky).
- Other designations that have been used earlier included Ogni, Helen and Fani from Bangladesh; and Laila, Nargis and Bulbul from Pakistan. The cyclone that will form after Asani will be called Sitrang, a name given by Thailand.
- Earlier, WMO had retired 'Ida' from the future list of names as the storm was a destructive and deadly hurricane.
- Regardless of the name, the intensity of cyclones varies.
- For instance, for instance, Cyclone Gulab made landfall in the September 2021, splashing heavy rains along with strong winds over north coastal Andhra Pradesh and adjoining south coastal Odisha, before weakening into
- a deep depression.
- But Cyclone Amphan that made landfall in May 2020 left as many as 80 people dead and caused havoc in parts of Odisha and West Bengal.

What are tropical cyclones?

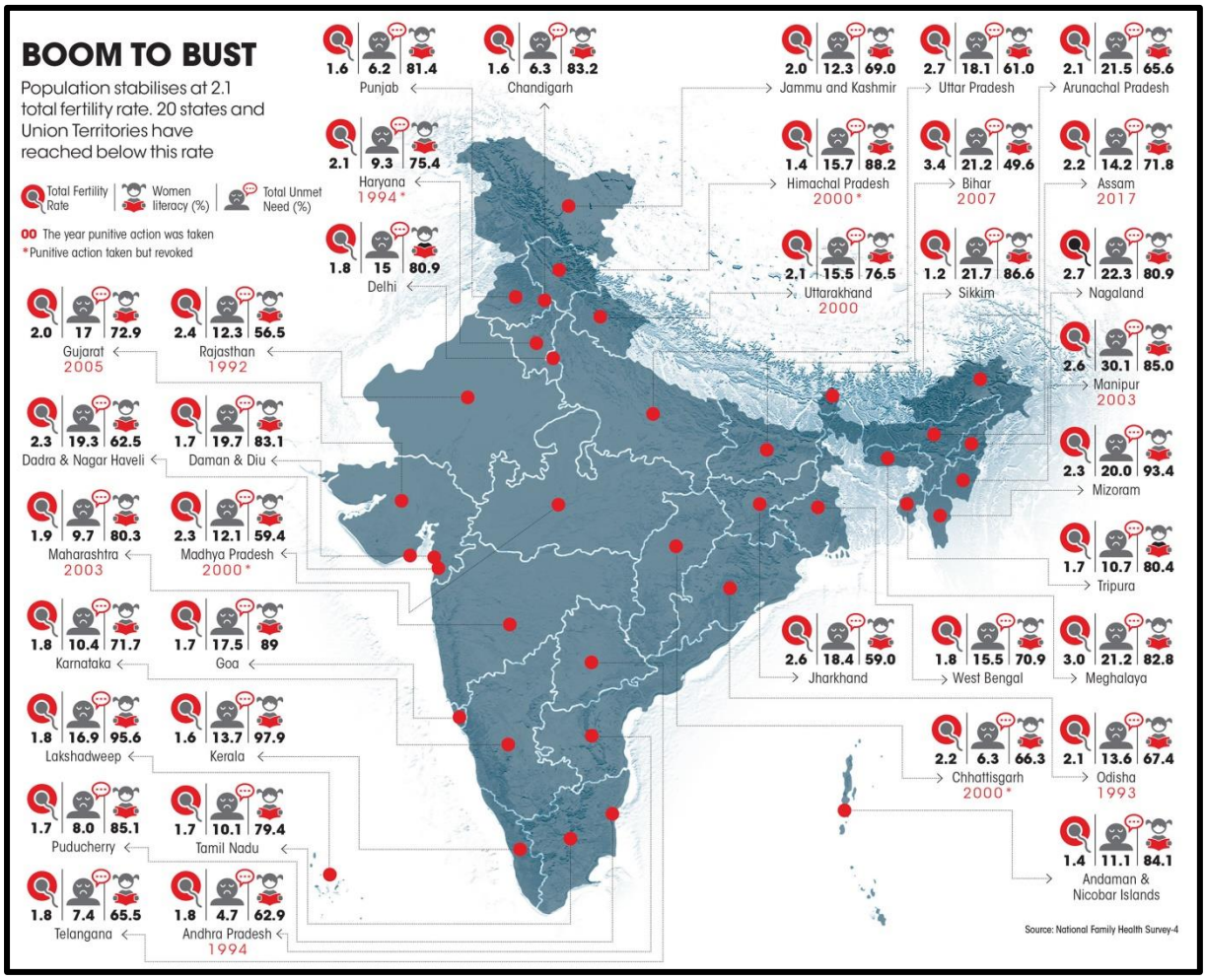
- A tropical cyclone is an intense circular storm that the originates over warm tropical oceans and is characterised by low atmospheric pressure, high winds, and heavy rain.
- A characteristic feature of the tropical cyclones is that the eye, a central region of the clear skies, warm temperatures, and low atmospheric pressure.
- Storms of are square measure known as hurricanes in the north atlantic and eastern Pacific and typhoons in South-East Asia and China.
- They are called tropical cyclones in the southwest Pacific and Indian

Ocean region and Willy-willies in north-western Storms rotate counter-clockwise in the northern hemisphere and clockwise in the southern

- The conditions favourable for the formation and intensification of tropical storms are: Large sea surface with temperature higher than 27° C.
- Presence of the Coriolis force.
- Small variations in the vertical wind speed.
- A pre-existing weak low-pressure area or low-level-cyclonic circulation.
- Upper divergence above the sea level system.

Topic 39. INDIA'S POPULATION

Importance for prelims: Geography



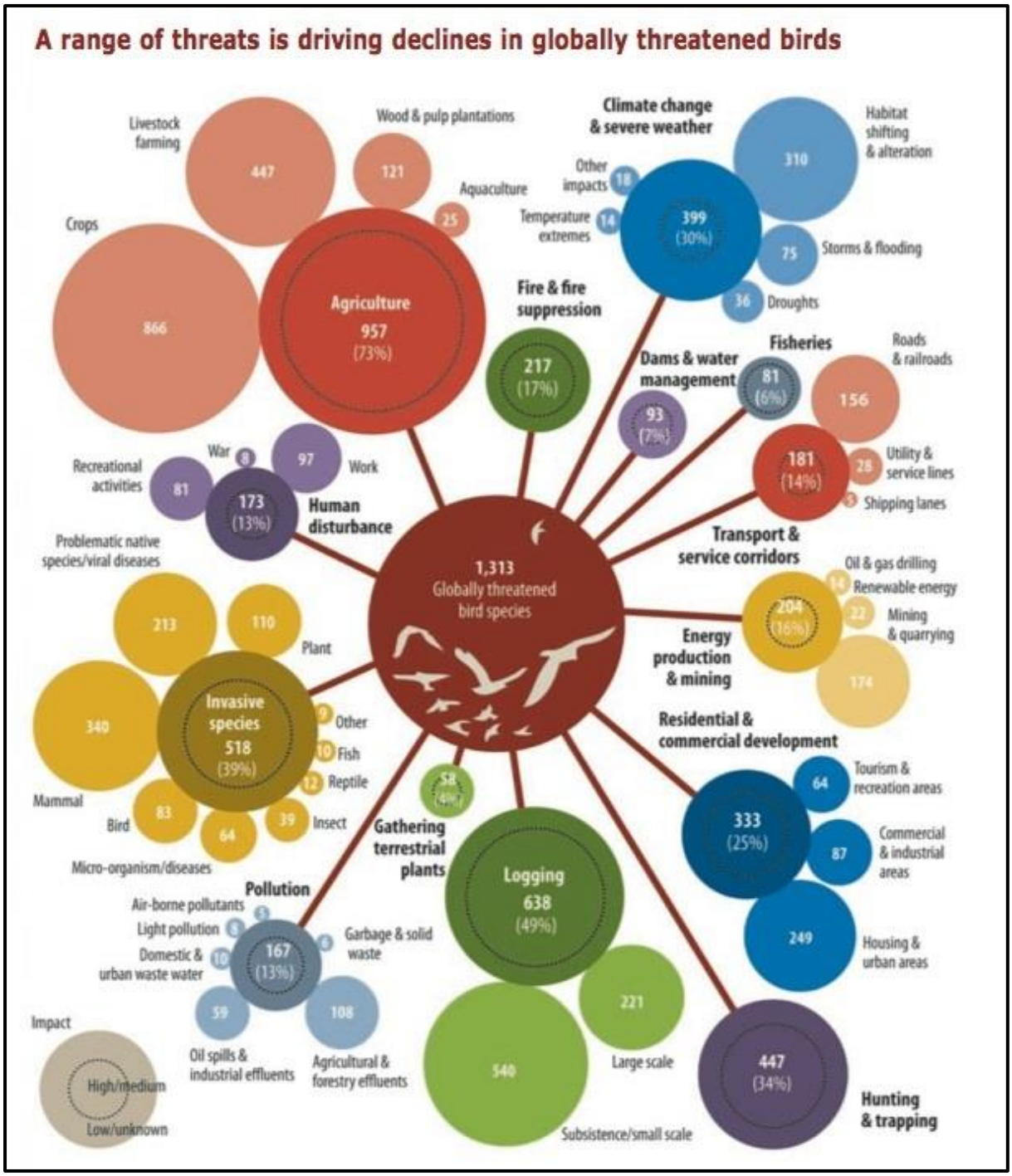
INDIA'S POPULATION remains young, with more than one-fourth aged under 15 years and less than an eighth over 60.

- There has been only a slight dip in the young population's share in the last 5 years: Between the National Family Health Survey-4 (2015-16) and NFHS-5 (2019- 21), released last week, the under-15 population has declined by 2 percentage points, from 29%to 27%, while the over-60 population has increased by as many points, from 10% to 12%.
- Over half the population (52%) is below 30, compared to 55.5% in NFHS-4.
- The NFHS divides the population into 5-year age groups from 0-4 years to 75-79, whereas those over eighty are counted in a single age group.

- The age pyramid shows India's population is young, which, NFHS-5 notes, is typical of developing countries with low life expectancy.
- The pyramid also shows that fertility has decreased considerably in the last five years.
- The NFHS defines a household as a person or group of related or the unrelated persons who live together in the same dwelling unit(s), who acknowledge one adult male or female as the head of the household, who share the same house keeping arrangements, and who are considered a single unit.
- The average household size has decreased slightly between 2015-16 and 2019- 21 (from 4.6 persons to 4.4).
- Just over one one sixth of households (18%) have female heads, up from 15% in NFHS-4.

Topic 40. STATE OF THE WORLD'S BIRDS REPORT

Importance for prelims: Environment



The State of the World's Birds, an annual review of environmental resources led by the Manchester Metropolitan University gives an overview of the changes in the knowledge of avian biodiversity and the extent to which it's imperilled.

Key Findings of the Study:

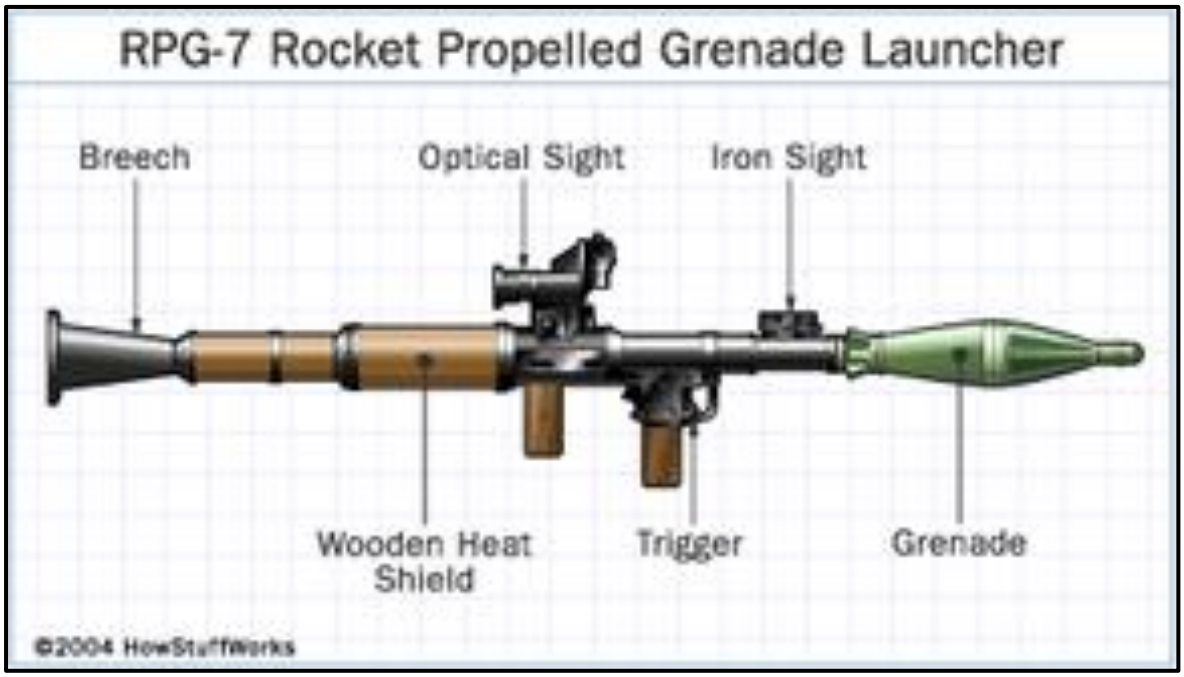
- The report revealed that the population of 48% of the 10,994 surviving species of birds is declining While 4,295 or 39% of the species have stable trends, about 7% or 778 species have increasing population trends. The trend of 37 species is unknown.
- The study draws from BirdLife International's latest assessment of all birds for the International Union for Conservation of Nature's Red List that shows 1,481 or 5% species are currently threatened with global extinction.
- The bird species are non-randomly threatened across the avian tree of life, with richness of threatened species disproportionately high among families like parrots, pheasants and allies, albatrosses and allies, rails, cranes, cracids, grebes, megapodes, and pigeons.
- The more threatened bird species (86.4%) are found in tropical than in temperate latitudes (31.7%), with hotspots for threatened species concentrated in the tropical Andes, southeast Brazil, eastern Himalayas, eastern Madagascar, and South East Asian Islands.
- **Significance of Birds:** Birds are global taxon with one or more species occupying all habitats across the Earth's terrestrial surface including urban environments.
- They contribute toward many ecosystem services that either directly or indirectly benefit humanity.
- These include the provisioning, regulating, cultural, and supporting services.
- The functional role of birds within ecosystems as pollinators, seed-dispersers, ecosystem engineers, scavengers and predators not only facilitate accrual and maintenance of biodiversity however also support human endeavours like the sustainable agriculture via pest control besides

aiding other animals to multiply.

- For instance, coral reef fish productivity has been shown to increase as seabird colonies recovered following rat eradication in the Chagos archipelago.
- Wild birds and products derived from them are economically importantas food (meat, eggs).
- Approximately 45% of all extant bird species are used in some way by people, primarily as pets (37%) and for food (14%).
- The cultural role of birds is perhaps more important than any other taxonomic group, the study says.
- Beyond symbolic and artistic values, bird watching is a global pastime practised by millions of people.
- Garden bird-feeding is valued at $5-6 billion per year and growing by 4% annually.
- **Threats to Avian Biodiversity:** land cover and land-use change, continued growth of human populations and of per capita rates of consumption, habitat fragmentation and degradation, especially in the tropics; hunting and trapping illegally in the Mediterranean region, invasive alien species and disease, infrastructure, energy demands and pollution; agrochemical and pharmaceutical usage, global trade teleconnections and climate change.
- **Can the avian loss be stemmed?**
- Yes, if biodiversity loss is addressed and efforts are done to achieve more effective and sustainable conservation outcomes, linking birds to human well-being, sustainability, climate resilience, and environmental justice.

Topic 41. ROCKET-PROPELLED GRENADE

Importance for prelims: Defence



RPG based on the German Panzerfaust anti-tank weapon

- A weapon of Soviet origin.
- The initials in Russian stand for rucknoypeotivotankovvygranaromyot, which roughly translates into “handheld anti-tank grenade launcher”.
- It is a portable, shoulder-fired weapon that is easy to operate and can cause widespread damage whether it is targeted at personnel, armoured vehicles or buildings.
- There are different versions that have been designed based on how they are intended to be used, with varying warhead capacities, effective ranges and penetration levels.
- Types of the RPGs (current, past and under development) include: Anti-personnel explosives. RPG-7: Reloadable RPG launcher, TBG-7V thermobaric rocket and the OG-7V fragmentation grenade. RPG-27 “Tavolga”:
- One-shot disposable RPG launcher, RShG-1 thermobaric rockets.

- Anti-tank explosives.
- RPG-1. RPG-2. Bunker buster. RMG.
- **Origins:** The origins of the RPG's use date back to conflicts around the world beginning with the First World War.
- Various such handheld weapons have been developed by western military powers, but the most prolific of these has been the RPG, which has been used in almost every major insurgency or terrorism- affected region around the world.
- Soviet-origin RPGs have been used extensively in the Vietnam conflict as well as in conflicts in Afghanistan, Somalia, Syria Iraq, and even Jammu and Kashmir.
- Security forces in Kashmir have in the past recovered RPGs from terrorists they have killed, and have also found evidence of the use of RPGs.

How does a rocket-propelled grenade work?

- The abrupt acceleration of the grenade leaving the launcher triggers a piezoelectric fuzethat ignites the primer (pyro-retarding gunpowder mixture).
- This then ignites the squib of nitro, thereby the activating the rocket propulsion system (sustainer motor) to carry the grenade the rest of its trajectory.
- The RPG-7, whose designation stands for Ruchnoy Protivotankoviy Granatomet—or "hand-held anti-tank grenade launcher"—is a recoilless, muzzle-loaded, shoulder-fired anti-tank weapon that the fires a fin-stabilized rocket with a shaped charge warhead. The Chinese license-built version is called the type sixty five RPG.
- The RPG-7 anti-tank grenade launcher is robust, simple and lethal.
- It is also extremely popular.

- The RPG-7 is the result of many years of revisions and modifications.
- The "original" RPG — based on the German Panzerfaust anti-tank weapon – was eventually followed by the RPG-2, the RPG-3 and then on.
- The RPG-4 had passed field trials in 1961, test findings of a newer model, the RPG7, were released that same year, but with much improved firing range and armor piercing capabilities.
- So in 1961 it was the RPG-7, not the RPG-4, which the Soviet Armed forces adopted for actual use.
- The RPG-7 is used by the armies of over the forty different countries and is also used, reportedly, by a range of terrorist organizations in the Middle East and the Latin Americas.
- Firing an RPG-7 The RPG operator or an artillary assistant takes a propelling charge (booster, in image below) and the screws it onto the end of a warhead.
- Basically, this is often a stabilising pipe that has four stabilising fins that are folded around it with 2 extra fins at its rear end.
- A cardboard container encases the back end of the stabilising pipe.
- Inside the cardboard container, a squib of nitroglycerin powder is wrapped around the stabilizing pipe and a primer or charge of gunpowder is stuffed into the end of the stabilizing pipe.
- The RPG operator or artillary person then takes this assembled artillery and loads it into the front end of the RPG launcher so that it lines up with the trigger mechanism.
- **After the RPG operator pulls the trigger, this is what happens:** There are several types of grenades that can be used in the RPG-7.
- Point initiating, base-detonating (PIBD) piezoelectric fuze: they are impact grenades.
- And, several others have back-up time delay systems, so if they have not

reached a target during a certain amount of your time (something like four and a half seconds) the grenade will self-destruct.

- The most commonly launched grenades are a High Explosive(HE) or High Explosive Anti-Tank (HEAT) Impact grenades must be unarmed until they are actually fired because any accidental contact might set them off.
- Since they're usually shot from a launcher, they have to have an automatic arming system.
- The arming system is triggered by the propellant explosion that drives the grenade out of the launcher.
- The grenade's acceleration or the rotation throughout its flight arms the detonator.
- As for the back-up timed delay, the same fuze mechanism that sets off the rocket would set this off.
- The spark ignites a slow-burning material in the fuse.
- In about four seconds, the delay material burns all the way through.
- The end of the delay element is connected to the detonator.
- The burning material at the end of the delay ignites the material in the detonator, thereby exploding the warhead.
- Nicknamed 'Netto', RPG-22 may be a one-shot disposable Soviet anti-tank rocket launcher that propels a 72.5 mm fin-stabilised projectile which will be prepared to fire in around ten seconds, and penetrate 400 mm of armour, 1.2 metres of brick or 1 metre of reinforced concrete.
- The smoothbore container is made from two fibreglass parts; a main tube containing the rocket, and a telescoping forward extension, which slides over the barrel.
- In transport mode, both ends of the barrel are closed by plastic covers, which open when the weapon is extended.

- The firing mechanism is the manually cocked by raising the rear sight.
- Lowering the rear sight de-cocks the weapon if there is no target.
- On firing, there is a back blast danger area behind the weapon, of at least 15 metres.
- The solid propellant motor completely burns out while the rocket is still in the barrel tube, accelerating it to about 133 metres per second.
- The weapon has simple pop-up sights graduated to ranges of 50, 150 and 250 metres.
- To keep training costs down, a reusable RPG-22 is available that fires a 30 mm sub calibre projectile, weighing 350g, to operational ranges.
- Handling is identical to that of the full calibre version, with the exception of the discharge noise and back blast.
- On the evening of the 20 September 2000, the MI6 Building in London (the headquarters of the british Secret Intelligence Service) was attacked by unapprehend forces using an RPG-22 anti-tank rocket, causing superficial damage.

Topic 42. OFFICE OF THE REGISTRAR GENERAL AND CENSUS COMMISSIONER (ORGI)

Importance for prelims: Polity

WHO's latest updates on the global Health Estimates (GHE) revealed that India accounting for eighty per cent of the excess mortality throughout Covid 19 of India informed who that in view of the availability of authentic information published through the Civil Registration System (CRS) by Registrar General of India (RGI), mathematical models shouldn't be used for projecting excess mortality numbers for India.

- **Functions of ORGI:** The office of RGI is primarily responsible for the following activities: Housing & Population Census: The Census Commissioner, of India is that the statutory authority vested with the responsibility of conducting the Housing & the Population Census in India under Census Act, 1948 and therefore the Rules framed under it.
- Planning, coordination and supervision of the field activities; data processing; compilation, tabulation and dissemination of Census results are the primary duties of this office.
- **Civil Registration System (CRS):** The Census Commissioner, India is also the designated as Registrar General, India under the Registration of Births & Deaths (RBD) Act, 1969, which provides for the compulsory registration of births and deaths.
- In this role, the RGI coordinates the functioning of the civil registration and vital statistics system in the country through all States and UTs.
- **Sample Registration System (SRS):** Implementation of Sample Registration System, wherein large-scale sample survey of vital events is conducted on a halfyearly basis, is also the responsibility of the ORG&CCI.
- SRS is an important source of vital rates like Birth Rate, Death Rate,

infant mortality Rate and Maternal Death rate at the State level in the country.

- **National Population Register (NPR):** In pursuance to provisions contained in Citizenship Rules, 2003 framed under the Citizenship Act, 1955, the National Population Register is prepared by collecting information relating to all persons who are usually residing in the country.
- **Mother Tongue Survey:** The project surveys the mother tongues, that are returned consistently across 2 and more Census decades.
- The research programme documents the linguistic features of the selected mother tongues.