TARGETING TNPSC GROUP-II 2023

6th TEST

Marks : 300
Time : 3 Hrs

Question with Simplified Answer

Mains Written Exam

SPOT - TEST

- SCIENCE & TECHNOLOGY
- NATIONAL & TAMILNADU CURRENT ISSUES

FULL TEST

English Medium

SURESH' IAS ACADEMY

தூத்துக்குடி	திருநெல்வேலி	இராமநாதபுரம்	மதுரை	சென்னை
162-A, எட்டையபுரம் ரோடு	8A/1, இலந்தகுளம் ரோடு, பாளையங்கோட்டை	82, புளிகாரத் தெரு, கண்ணன் கோவில் அருகில்	மாஸ்டர் மஹால் பின்புறம், முடக்குச்சாலை, காளவாசல்	4, அண்ணா ஆர்ச் நேர் எதிரில், Skywalk அருகில்.
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TEST 06 வெற்றி ஒன்றே இலக்கு

Answer Key - English

Unit - 01

1) What is Backcrossing?

Meaning 2

1. Backcrossing is a crossing of a hybrid with one of its parents or an individual genetically similar to its parent, to achieve offspring with a genetic identity closer to that of the parent.
2. Backcrossed hybrids are sometimes described with acronym "BC"; for example, an F1 hybrid crossed with one of its parents (or a genetically similar individual) can be termed a BC1 hybrid, and a further cross of the BC1 hybrid to the same parent (or a genetically similar individual) produces a BC2 hybrid.
3. It is used in horticulture, animal breeding, and production of gene knockout organisms

Uses of a backcross 4

- Backcrosses are used for the isolation or separation of unique genes in a similar population of species.
- The cultivar can be adapted to the same area as that of the original, the backcross decreases the amount required for field testing
- Backcross can be done repeatedly and the species which were previously backcrossed can be backcrossed again.
- It can prevent new recombination and is considered a traditional approach.
- This can be used for the insertion of unique and beneficial genes in the crosses
- It is useful in the breeding of cross-pollinated and self-pollinated plants.

2) Mention major oil exploration site of India

On-shore Oil Production In India 3

1. Brahmaputra valley of north-east India.
2. Barmer area of Rajasthan.
3. Gujarat coast in western India.
4. Cauvery on-shore basin in Tamil Nadu.
5. Andhra Pradesh has both on-shore and offshore oil reserves.

Off-shore Oil Production In India

a. Western Coast 3

1. Mumbai High, Bassein, and Aliabet are three main areas in Mumbai where oil is produced.
2. **Mumbai High:** 1974; Miocene-era rock strata.
3. **Bassein, SagarSamrat:** south of Mumbai High.
4. **Aliabet**, a small island off the coast of Khambhat in the Gulf of Khambhat.

b. Eastern Coast

1. The Godawari, Krishna, and Cauvery rivers' basins and delta regions have a lot of potential for oil and gas production.
2. The Rawa field, located in the **Krishna-Godavari off-shore basin**, is significant.
3. The **Cauvery on-shore basin**'s Narimanam and Kovilappal oil fields are also significant.

3) What is Neutral reaction? Explain with examples.

Meaning: 2

- Neutralisation is a chemical reaction where an acid and a base react with each other quantitatively. It is also written as Neutralisation. The acid strength of the reactant gives the pH of the neutralised solution.

Explanation of Neutralisation: 2

- It is an acid-base reaction in which an acid reacts with a base to form salt and water. The pH of the neutralised solution depends upon the acid strength of the reactants and their concentrations. The neutralisation reaction is best represented as:
- Acid + Base $\rightarrow$ Salt + Water

Neutralisation Reaction:

1. When a strong acid reacts with a strong base the resultant salt is neither acidic nor basic in nature i.e. it is neutral. For example when HCl

(Hydrochloric acid), a strong acid, reacts with NaOH, a strong base, and the resulting salt is sodium chloride and water.

- $HCl + NaOH \rightarrow NaCl + H_2O$

2. When a strong acid reacts with a weak base the resultant salt is acidic in nature. For example, $Fe(NO_3)_3$ is an acidic salt formed due to the neutralisation of iron(III) hydroxide (a weak base) with nitric acid (strong acid)

- $3HNO_3 + Fe(OH)_3 \rightarrow Fe(NO_3)_3 + 3H_2O$

3. Likewise when a strong base reacts with a weak acid then the resultant salt is basic in nature. For example, K_2CO_3 is formed due to the acid-base reaction of potassium hydroxide (strong base) and H_2CO_3 (weak acid).

- $H_2CO_3 + 2KOH \rightarrow K_2CO_3 + 2H_2O$

4. When a weak acid and weak base react with each other complete neutralisation does not occur due to incomplete ionisation of the acid and base.

Application of Neutralisation **2**

1. This method is used in wastewater treatment in order to reduce the damage created by the effluents.
2. Neutralisation is used in the manufacturing of antacid tablets.
3. The neutralisation reaction is used to control the pH of the soil.

4) What is meant by Drug Abuse? Give reasons for this issue. **2**

- World Health Organization (WHO) defines, Drug Abuse as the harmful or hazardous use of psychoactive substances, including alcohol and illicit drugs.
- Addiction is an advanced stage of substance abuse where the addict develops a compulsion to take the drug, persists in its use despite harmful consequences and exhibits a determination to obtain the drug by almost any means.

Causes of growing drug menace in India **4**

1. **Location of the country:** India is sandwiched between the two largest Opium producing regions of the world that is the Golden triangle (which comprises Thailand, Myanmar, Vietnam and Laos) on one side and the Golden crescent (includes Pakistan, Afghanistan and Iran) on the other.
2. **Peer pressure and on the pretext of being stress buster:** school and college students often start using drugs under peer pressure and on the pretext of being immense exam pressure.
3. **Poor implementation of laws:** drug trafficking across the borders, corruption in the policing system, negligence on the part of law enforcement agencies (for example use of drugs in rave parties), etc. are a few of the examples of poor implementation of laws.
4. **Changing traditional societal values**: The processes of industrialization, urbanization and migration have led to a loosening of the traditional methods of social control rendering an individual vulnerable to the stresses and strains of modern life.
5. **Financial problems and social neglect:** it often found that people under immense financial pressure, especially unemployed youth start consuming drugs. When an adolescent does not get adequate attention and love in the family or from friends / intimate partners / he often feels neglected and to cope up with this, they start using drugs

5) Write about merits and limitations of Bio fertilizers.

The advantages of bio fertilizers **3**

1. Bio fertilizers achieve higher crop yields while also enhancing soil health
2. Bio fertilizers replace the chemical fertilizers, which are not beneficial for long-term plant health, and can be toxic to the environment and consumers
3. Bio fertilizer production may be performed as a by-product of electricity generation from biogas
4. Exclusive use of bio fertilizers keep soils chemical free and helps maintain natural fertility
5. Bio fertilizers combat pathogens in both soil and plant, and work as a natural pesticide
6. Bio fertilizers are relatively easy to apply
7. Bio fertilizers help combat the effects of drought and other restrictive conditions
8. Bio fertilizers are cost effective, and are affordable even for low-income farmers

Limitations of bio fertilizers **3**

1. Bio fertilizers provide lower nutrient density than chemical fertilizers, so more product is often required for the same effect
2. Bio fertilizer production requires specific machinery
3. Bio fertilizers can be difficult to store and may have a much shorter shelf-life than chemical fertilizers
4. Bio fertilizers are often plant specific; what works on one crop does not work on another
5. Bio fertilizers can have a strong, distinctive odour

6) What is parthenogenesis? Give two examples from animals.

Meaning: **2**

- Parthenogenesis is a form of asexual reproduction in which an unfertilized egg develops into a new individual. It is a method in which a new individual developed without fertilization. Here, males do not have any role to play and only female gametes develop into new offspring.

Examples: **2**

1. Animals such as bees, wasps, ants have no sex chromosomes. These organisms reproduce by parthenogenesis.
2. A few plants, reptiles and fish are also capable of reproducing in this manner.
3. A few organisms such as crayfish, snakes, komodo dragons and sharks can reproduce sexually as well as by parthenogenesis. This is known as facultative parthenogenesis.

Significance of Parthenogenesis **2**

- Parthenogenesis is important for the following reasons:

1. Parthenogenesis helps in determining the sex of an individual in honey bees, wasps, etc.
2. It supports the chromosomal theory of inheritance.
3. Variations from populations are eliminated by parthenogenesis.
4. It is the simplest, most stable and easy process of reproduction.
5. Polyploidy in organisms is caused by parthenogenesis.
6. It helps in the development of advantageous mutant characters.
7. Non-adaptive combination of genes is controlled.
8. There are no sterile races.

7) What is inhibin? State its functions. **1**

- Inhibin is a protein secreted by the Sertoli cells in men and by the granulosa cells in women.

Inhibin **1**

- It is a hormone released by the gonads i.e. testis in males and ovary in females to inhibit the secretion of a pituitary hormone known as follicle- stimulating hormone FSH.

Types: **1**

1. There are two types of inhibin found in the body known as inhibin A and inhibin B.
2. Inhibin A is formed in the Sertoli cells of seminiferous tubules in males and granulosa cells in females.

Functions of Inhibin: **2**

1. Two gonadotropins namely Luteinizing hormone LH and Follicle- stimulating hormone FSH are produced by the anterior pituitary.
2. In males, LH acts on Leydig cells and stimulates the production of androgens which in turn stimulates spermatogenesis. And FSH acts on Sertoli cells which aid in the process of spermatogenesis.
3. In females, the pituitary hormones along with the ovarian hormones fluctuate throughout the menstrual cycle which is essential for the proper functioning of each organ involved.
4. FSH and LH reach their peak level in the middle of the menstrual cycle which induces rupture of the Graafian follicle and release of ovum i.e. ovulation.

Importance of Inhibin **1**

1. Inhibin A is detected in the blood serum of a woman who is pregnant with a child having Down syndrome. Thus, this is used as a test to detect Down syndrome in the second trimester of pregnancy.
2. Inhibins are also involved in controlling the formation of gametes and fetal development.

3. It inhibits the synthesis and release of the follicle-stimulating hormone in the pituitary gland and reduces the hypothalamic LH - releasing hormone content

8) What is extra chromosomal inheritance? Explain.

Definition: **2**

1. Extrachromosomal or extra nuclear inheritance or cytoplasmic inheritance is a form of non-Mendelian inheritance, which is defined as the transmission of genes outside the nucleus that is found in most eukaryotes. It commonly occurs in the cytoplasmic organelles such as mitochondria and chloroplasts or in cellular parasites like viruses or bacteria.
2. Extrachromosomal inheritance is also known as maternal inheritance because this type of inheritance is governed by the maternal genes and not the nuclear genes. This inheritance does not follow the Mendelian pattern of inheritance.

Criteria for Extrachromosomal Inheritance **2**

- The criteria for extrachromosomal inheritance are as follows:

1. The extrachromosomal DNA does not follow the Mendelian pattern of inheritance, unlike the common nuclear DNA.
- The extrachromosomal DNA doesn't have its own protein synthetic machinery for the process of replication, transcription, and translation. So, it synthesizes its own DNA and makes its own protein.
2. The extrachromosomal DNA is inherited from the maternal side because the female gamete contains more cytoplasm than the male gamete.
3. All the progenies obtained by this inheritance have the phenotype of only one parent, i.e., the mother.
4. The extranuclear genes present in the mitochondria and plastids cannot be mapped to the chromosomes in the nucleus.
5. This inheritance is not affected by substituting the nucleus with a different genotype.

Importance of extra nuclear inheritance **2**

- Those genes play important roles in the cell. Mutations in extra nuclear genes are responsible for some hereditary diseases in humans and other organisms, are used in plant breeding, and are used to study population genetics and evolution.

9) Explain the Three Level Of Impact Of Extinction Of Species.

Extinction **3**

1. Extinction is the process of evolution that leads to the disappearance of a population or species.
2. When a species becomes extinct, all its genetic heritage is lost. The species evolve into new species in order to adapt to the environmental changes or changes in the genetic heritage.
3. Over 99% of all the species that once lived on the Earth, amounting to over five billion species, are estimated to be extinct.
4. As per the estimations on the number of current species, a range from 10 -14 million, of which more than 1.2 million have been studied and more than 86% have not yet been discovered.

Three Level of Impact Of Extinction Of Species

1. Species extinction: **3**

- Species Extinction is **the complete disappearance of a species from Earth**. Species go extinct every year, but historically the average rate of extinction has been very slow with a few exceptions.

2. Mass Extinction

- Mass extinction event is **when species vanish much faster than they are replaced**. This is usually defined as about 75% of the world's species being lost in a 'short' amount of geological time - less than 2.8 million years.

3. Global extinction:

- Global extinction event is when iteliminates most of the species on a large scale or larger taxonomic groups in the continent or the Earth.
- Extinction events open up new habitats and so can facilitate the radiation of organism which are survived the mass extinction.

10) What is corona discharge?

Explanation: **2**

1. A corona discharge is a process by which a current flows from an electrode with a

high potential into a neutral fluid, usually air, by ionizing that fluid so as to create a region of plasma around the electrode. The ions generated eventually pass the charge to nearby areas of lower potential, or recombine to form neutral gas molecules.

2. It represents a local region where the air (or other fluid) has undergone electrical breakdown and become conductive, allowing charge to continuously leak off the conductor into the air.
3. A corona discharge occurs at locations where the strength of the electric field (potential gradient) around a conductor exceeds the dielectric strength of the air.
4. It is often seen as a bluish glow in the air adjacent to pointed metal conductors carrying high voltages, and emits light by the same mechanism as a gas discharge lamp.

Corona Discharge - Commercial And Industrial Applications: **2**

1. Removal of unwanted electric charges from the surface of aircraft in flight and thus avoiding the detrimental effect of uncontrolled electrical discharge pulses on the performance of avionic systems
2. Manufacture of ozone
3. Sanitization of pool water
4. In an electrostatic precipitator, removal of solid pollutants from a waste gas stream, or scrubbing particles from the air in air-conditioning systems
5. Photocopying
6. Air ionisers
7. Production of photons for Kirlian photography to expose photographic film
8. EHD thrusters, lifters, and other ionic wind devices
9. Nitrogen laser
10. Ionization of a gaseous sample for subsequent analysis in a mass spectrometer or an ion mobility spectrometer
11. Static charge neutralization, as applied through antistatic devices like ionizing bars
12. Refrigeration of electronic devices by forced convection

Corona discharge-Demerits: **2**

1. **Electric power transmission, where it causes:**

a. Power loss

b. Audible noise

c. Electromagnetic interference

d. Purple glow

e. Ozone production

f. Insulation damage

g. Possible distress in animals that are sensitive to ultraviolet light

2. Electrical components such as transformers, capacitors, electric motors, and generators:

a. Corona can progressively damage the insulation inside these devices, leading to equipment failure

b. Elastomer items such as O-rings can suffer ozone cracking

c. Plastic film capacitors operating at mains voltage can suffer progressive loss of capacitance as corona discharges cause local vaporization of the metallization.

11) Write short note on Fortified Rice

Fortification: **1**

a. Fortification is the **addition of key vitamins and minerals** such as iron, iodine, zinc, Vitamin A & D to staple foods such as rice, milk and salt to improve their nutritional content.

b. These nutrients may or may not have been originally present in the food before processing.

Fortification of Rice: **1**

a) According to the Food Ministry, **fortification of rice is a cost-effective and complementary strategy** to increase vitamin and mineral content in diets.

b) According to FSSAI norms, 1 kg fortified rice will contain iron (28 mg-42.5 mg), folic acid (75-125 microgram) and Vitamin B-12 (0.75-1.25 microgram).

c) In addition, **rice may also be fortified with micronutrients**, singly or in combination, with zinc, Vitamin A, Vitamin B1, Vitamin B2, Vitamin **B3 and Vitamin B6.**

d) To address anemia and micro-nutrient deficiency in the country, Government of India approved the Centrally Sponsored Pilot Scheme on "Fortification of Rice & its Distribution under Public Distribution System" for a period of 3 years beginning 2019-20 with total budget outlay of Rs 174.64 Cr.

What is the Need of Food Fortification? 2

1. **India has very high levels of malnutrition** among women and children. According to the Food Ministry, every second woman in the country is anaemic and every third child is stunted.
2. India has slipped to **101st position in the Global Hunger Index (GHI) 2021** of 116 countries, from its 2020 position of 94th.
3. The deficiency of micronutrients or micronutrient malnutrition, also known as "hidden hunger", is a serious health risk.
4. **Rice is one of India's staple foods**, consumed by about two-thirds of the population. Per capita rice consumption in India is 6.8 kg per month. Therefore, fortifying rice with micronutrients is an option to supplement the diet of the poor.

Concerns associated with rice fortification? 2

a) The consumption of iron-fortified foods by such patients can **reduce immunity and affect organs**.

b) In some cases it was seen that fortified rice **adversely impacted the health** of individuals thereby showing a lack of efficacy. Nutrients don't work in isolation but need each other for optimal absorption. Adding one or two synthetic chemical vitamins and minerals will not solve the larger problem;

c) It can lead to toxicity in undernourished populations.**Thalassemia, sickle cell anemia and malaria** are conditions where there is already excess iron in the body, whereas TB patients are unable to absorb iron. Consumption of iron-fortified foods among patients of these diseases can reduce immunity and the reduce functionality of organs

d) It sometimes **alters the taste of the product** which reduces the acceptance; thereby diminishing the consumption.

e) Mandatory fortification could lead to hyper vitaminosis. Hypervitaminosis is a condition of abnormally high storage levels of vitamins, which can lead to various symptoms such as over excitement, irritability, or even toxicity.

12) Mention the various energy losses in a transformer.How can it controlled? 6

- **Hysteresis loss:** This is due to the repeated magnetization and demagnetization of the iron core caused by the alternating input current.
- This can be minimized by using alloys like metal or silicon steel.
- **Copper loss:** Current flowing through the primary and secondary windings lead to Joule heating effect. Hence some energy is lost in the form of heat. Thick wires with considerably low resistance are used to minimize this loss.
- **Eddy current loss:** Varying magnetic flux produces eddy current in the core. This leads to wastage of energy in the form of heat. This can be minimized by using a laminated core made of stelloy; an alloy of steel.
- **Fluxloss:** Flux produced in the primary coil is not completely linked with the secondary coil due to leakage. This can be minimized by using a shell type core

13) What is myopia? What is its remedy?

What is Myopia? 2

- Myopia is also known as near-sightedness or short-sightedness. What happens here is that light rays do not focus on the surface of the retina but in front of it. This results in images being blurry when perceived. In such a case, distant images appear out of focus but objects nearby are seen clearly. This is why myopia is also called near or short-sightedness.

Reasons for Myopia: 2

- It can occur if the eyeball is elongated leading to image formation in front of the retina. It can also occur if the refracting power of the lens is affected due to the cornea or lens being too curved. This effect can be more pronounced with age. A combination of these effects will also lead to myopia.

How can myopia be corrected? 2

- The concave lens is used to correct myopia. The concave lens which is curved inwards, is

placed in front of the myopic eye. The concave lens helps in moving the image back to the retina and thus helping the person to get a clearer vision.

14) Why Nitrogen nutrition is necessary to plants? What are the methods to solve the Deficiency?

Need for nitrogen by plants: **3**

- Nitrogen is the most frequently limiting nutrient for crop growth and promotes the growth of plants.
- Nitrogen is absorbed by roots as inorganic nitrate i.e. NO_3 and ammonium NH_4^+ ions.
- NO_3 is converted to NH_2 and assimilated to form organic compounds inside the plant.
- Fertilizers, as well as animal and plant waste, enrich the soil with nitrogen.
- Nitrogen fixation occurs when bacteria are in the soil.
- They convert nitrogen to ammonium and nitrate, which plants absorb.
- Nitrogen is required by plants to produce amino acids, proteins, and DNA.
- Nitrogen is necessary because it is a component of chlorophyll.
- It is also an essential component of amino acids, which serve as the building blocks of proteins.

Fix Nitrogen Deficiency In Plants **3**

1. Organic Methods Of Nitrogen Deficiency Treatment

- Organic matter not only adds vital nutrients for plants but improves soil structure and helps retain soil moisture. Basic sources of N supply are widely used in organic farming and include:

1. compost;
2. animal manure;
3. N-fixing plants (e.g., legumes);
4. horn, bone, fish, or blood meal;
5. nettle slag;
6. groundnut husks;
7. coco peat (coir pith);
8. edible and non-edible oil cakes;
9. green manure;
10. tree leaves;
11. ashes, etc.

2. Chemical Methods To Fix Nitrogen Deficiency

- Inorganic amendments suggest using synthesized N-containing fertilizers to promote crop recovery from nitrogen deficiency, e.g., NPK, nitrolime, ammonium nitrate, urea, etc.
- Soil testing before a cropping season will help understand the required corrections of pH and nutrient content.

15) List out the various Bio scientific research institutions of Union Government in TamilNadu.

1. BCG Vaccine Laboratory Chennai **6**
2. Cancer Institute (WIA) Chennai www.cancerinstitutewia.org Captain
3. Srinivasa Murthy Research Institute of Ayurveda and Siddha Drugs Development
4. Chennai Central Cattle Breeding Farm Chennai
5. Central Leprosy Teaching & Research Institute Chengalpattu
6. Central Sericultural Germplasm Resources Centre Hosur
7. Centre for Research in Medical Entomology Madurai
8. Clinical Research Unit (Siddha) Tirunelveli Tirunelveli
9. Clinical Research Unit for Homeopathy Chennai www.ccrhindia.org
10. Dr. AchantaLakshmipati Research Centre for Ayurveda Chennai
11. National Institute for Research in Tuberculosis Chennai
12. National Institute of Epidemiology Chennai www.nie.gov.in
13. National Research Centre for Banana Triuchirappalli
14. Pasteur Institute of India Nilgiris
15. Regional Research Institute of Unani Medicine Chennai Chennai
16. Salim Ali Centre for Ornithology and Natural History Coimbatore

17. Siddha Medicinal Plants Garden Mettur Dam
18. Sugarcane Breeding Institute Coimbatore Coimbatore
19. Survey of Medicinal Plants & Collection Unit (H) Emerald The King Institute of Preventive Medicine Chennai

16) What is augmented reality? How it is differ from virtual reality?

What is Augmented Reality (AR)? **1**

- **Augmented Reality (AR)** is a perfect blend of the digital world and the physical elements to create an artificial environment. Apps which are developed using AR technology for mobile or desktop to blend digital components into the real world. The full form of AR is Augment Reality.
- Example: AR technology helps to display score overlays on telecasted sports games and pop out 3D photos, text messages, and emails.

What is Virtual Reality (VR)? **1**

- **Virtual Reality (VR)** is a computer-generated simulation of an alternate world or reality. It is used in 3D movies and video games. It helps to create simulations similar to the real world and "immerse" the viewer using computers and sensory devices like headsets and gloves.
- Apart from games and entertainment, virtual reality is also used for training, education, and science. The full form of VR is Virtual reality.

Difference Between Augmented Reality (AR) vs Virtual Reality (VR) **4**

- Here are the important differences between AR and VR:

AR	VR
The system augments the real-world scene	Completely immersive virtual environment
In AR User always have a sense of presence in the real world	In VR, visual senses are under control of the system
AR is 25% virtual and 75% real	VR is 75% virtual and 25% real
This technology partially immerses the user into the action	This technology fully immerses the user into the action
AR requires upwards of 100 Mbps bandwidth	VR requires at least a 50 Mbps connection
No AR headset is needed.	Some VR headset device is needed.
With AR, end-users are still in touch with the real world while interacting with virtual objects nearer to them.	By using VR technology, VR user is isolated from the real world and immerses himself in a completely fictional world.
It is used to enhance both real and virtual worlds.	It is used to enhance fictional reality for the gaming world.

17) What is TamilNadu Green Mission? Explain

Orgin: **1**

1. The State of Tamil Nadu intends to sustainably manage its forest and tree cover recognisingit's key role in climate change adaptation and mitigation.
2. The State plans to augment the national efforts in creating the additional carbon sink of 2.5 to 3 billion tonnes in its forest and tree cover by the year 2030 as a part of its Nationally Determined Contribution (NDC) commitments under the Paris Agreement

Objectives: **2**

i) Increase the Forest and Tree Cover in the State from present 23.8% to 33% by the year 2030-2031 as per the National Forest Policy, 1988 and Vision of the Government of Tamil Nadu, through Afforestation activities on the degraded forest landscape and tree planting activities outside the forest areas.

ii) Expand tree cover on farmlands to complement agricultural crops. Build a robust data base on farmers and the growing stock in their land for developing a strong institutional marketing linkage for tree growers to enhance income opportunities.

iii) Improving growing stock and biodiversity in the State of Tamil Nadu through community-public-private participation (CPP Mode).

Salient features 3

1. Green Tamil Nadu Mission Mission aims in increasing the state's tree and forest cover from 23.69% to 33%.
2. 73 lakhs seedlings have been raised and handed over to Department of Agriculture.
3. 260 nurseries in 43 forest division throughout the State.
4. State Green Committee & District Green Committee for protection & management of trees.
5. Under this Mission, 265 crores seedlings of native trees of economic and ecological significance will be planted over a period of10 years on suitable public lands like Urban areas, Farms, Educational Institutions, Temple grounds, Sacred Groves, Industrial Areas, Tank Foreshore, Padugai areas, areas under the control of Defence and Police establishments etc., covering an area of about 13,500 sq.km.
6. Utmost care will be taken to ensure that suitable tree species with optimum growth are planted considering edaphic and climate conditions of the site.
7. This will ensure optimum survival after planting.
8. Planting of non-native species, 3 tree planting drives on grasslands and wetlands, and promotion of monoculture will be discouraged.

18) Estimate the recent actions taken by TamilNadu government for environmental protection. 6

1. National Green Corps (NGC)
2. Eco-Clubs
3. Awareness about ill effects of burning of Rubber, Plastic materials.
4. Conducting Environmental Awareness Camps
5. TamilNadu Biodiversity Conservation and Greening Project
6. Massive Tree Planting Programme.
7. Raising Sandal Plantations.
8. Resolving Man Animal Conflicts
9. Pallikaranai Marshland
10. Drought Relief Measures taken in TamilNadu Forest Department
11. Restoration and Re-construction Works After Vardah Cyclone
12. A Grievance Redressal Day
13. The Scheme of Raising Palmyrah Palm Plantation
14. Forest Genetic Resources Tree Park At Chennai
15. Automatic Weather Stations

Unit - 02

1) What do you know about Germplasm conservation? Discuss it.

Germplasm conservation 2

- Germplasm conservation is the most successful method to conserve the genetic traits of endangered and commercially valuable species.
- Germplasm is a live information source for all the genes present in the respective plant, which can be conserved for long periods and regenerated whenever it is required in the future

National Gene Bank 2

- The National Gene Bank was established in the year 1996 to preserve the seeds of Plant Genetic Resources (PGR) for future generations, and has the capacity to preserve about one million germplasm in the form of seeds.
- NBPGR is meeting the need of in-situ and ex-situ germplasm conservation through Delhi Headquarters and 10 regional stations in the country.

National Bureau of Plant Genetic Resources (NBPGR) 2

- It is a nodal organisation for management of plant genetic resources in India and functions under the control of Indian Council of Agricultural Research (ICAR).
- It is conserving seed germplasm for long-term conservation (at -20°C) in its National Genebank (NGB).
- Union Minister for Agriculture and Farmers Welfare inaugurated the world's second-

largest refurbished state-of-the-art National Gene Bank at the National Bureau of Plant Genetic Resources (NBPGR).

Significance **2**

1. Presently, it is protecting 4.52 lakh accessions, of which 2.7 lakh are Indian germplasm and the rest have been imported from other countries.
2. An accession is a single, collected variety or varieties of a wild plant, a landrace or a plant variety that has been produced by selective breeding, more commonly known as a cultivar

Functions **4**

1. The NGB has four kinds of facilities, namely, Seed Genebank (- 18°C), Cryogenebank (-170°C to -196°C), In vitro Genebank (25°C) and Field Genebank, to cater to long-term as well as medium-term conservation.
2. It stores different crop groups such as cereals, millets, medicinal and aromatic plants and narcotics, etc.
3. India's seed vault is at Chang La (Ladakh) in the Himalayas.
4. National Animal Gene Bank, established at the National Bureau of Animal Genetic Resources (NBAGR - Karnal, Haryana), has the objective of conserving the indigenous livestock biodiversity

2) What is Albedo effect and write their effects?

Albedo **2**

1. Albedo is the portion of solar energy reflected from the surface of the Earth back into space. It is a reflection coefficient and has a value of less than one.
2. When the solar radiation passes through the atmosphere, a certain amount of it is scattered, reflected and absorbed. The reflected sum of radiation is called the albedo of the earth.
3. Albedo is an important concept in climatology, astronomy, and environmental management.
4. It plays a major role in the energy balance of the earth's surface, as it defines the rate of the absorbed portion of the incident solar radiation

Effects of Albedo **1**

1. The difference in the average albedo of Earth has an important influence on the temperature of the Earth.
2. If the average albedo is lower than the previous year's albedo, it specifies that the amount of radiation absorbed is higher
3. This results in the rise in the temperature of the Earth.
4. Earth's albedo is constantly measured using satellites to monitor global warming.

Terrestrial albedo **1**

- In visible light, albedo ranges from around 0.9 for new snow to almost 0.04 for charcoal, including some of the darkest materials. Deeply shadowed cavities will reach the black body's active albedo of zero.

1. Illumination: **5**

- Apart from situations in which a variation in illumination causes a change in the Earth's surface at that spot, albedo is indeed not dependent solely on illumination as increasing the amount of incident light proportionally affects the quantity of reflected light (for example, through melting of reflective ice).

2. **Insolation Effects:**

- The degree of albedo temperature effects is determined by the quantity of albedo as well as the extent of local insolation (solar irradiance);
- high albedo areas in the arctic and antarctic regions seems cold because of low insolation, while high albedo areas in the Sahara Desert, that also have a significantly higher albedo, would be warmer due to increased insolation.

3. **Albedo–Temperature Feedback:**

- A snow–temperature input occurs when the albedo of a region changes due to snowfall. A film of snowfall raises local albedo, which reflects sunlight and cools the region. In theory, if no outdoor temperature changes, the increased albedo and lower temperature will maintain the entire snow and invite more snowfall, deepening the snow–temperature response.

4. **Snow**:

- Snow albedo varies dramatically, varying from 0.9 for freshly fallen snow to 0.4 for snow melt and even as low as 0.2 for dirty snow.
- Ice albedo in Antarctica measures somewhat more than 0.8. As a marginally snow-covered region warms, the snow melts, reducing the albedo and thereby causing more snowmelt as the snowpack absorbs additional radiation.

5. **Solar Photovoltaic Effects:**

- The electrical energy production of solar photovoltaic systems may be affected by albedo.

Astronomical albedo **3**

- With an albedo of 0.99, Enceladus, a moon of Saturn, does have one of the highest recorded albedos of just about anybody throughout the Solar System.
- The albedos of several tiny items in the outer Solar System and asteroid belt are as small as 0.05. The albedo of a standard comet nucleus is 0.04. A basic and intensely space weathered layer containing certain organic compounds is assumed to be the source of this kind of dark surface.
- The Moon's overall albedo is estimated to be about 0.14, but it is highly directional and non-Lambertian, with a serious opposition impact.

3) What are the effects of deforestation and benefits of agroforesty?

Deforestation **1**

- Deforestation is the process of clearing forests or other barren places of trees in order to meet human needs.
- Natural forests are being cut down to make way for farming, the construction of dwellings and factories, the clearing of regions for cattle grazing, mining, the construction of dams, and other human activities

Effects of DeforestationImpact on Water Cycle **1**

- Since trees are so important to the water cycle, deforestation can cause enormous problems.
- The process of transpiration is used by trees and plants to control the amount of moisture in the atmosphere.
- Due to the absence of transpiring trees, deforestation is accompanied by a reduction in humidity.
- In cleared land, the water content of the soil and groundwater levels both decrease.

Soil Erosion **1**

- Tree roots have a tendency to attach to the soil bedrock, strengthening the soil.
- The soil becomes vulnerable to erosion when trees are cut down as a result of deforestation.
- Landslides are frequently accompanied by deforestation of sloped terrain, which can be explained by the loss of soil adhesion due to the absence of trees.
- Deforestation can be seen as a contributor to other environmental difficulties because soil erosion is a direct factor of eutrophication.

Biodiversity **1**

- Forests are home to a diverse range of species. In fact, tropical rainforests are thought to be the world's most diversified ecosystems.
- Deforestation is a serious danger to this ecosystem's biodiversity.
- Clearing forest area on a local scale can result in a fall in the number of certain species.
- Deforestation, on the other hand, can result in the extinction of some beneficial species on a worldwide scale.

Economical Impact **1**

- Deforestation makes it easier to generate raw materials for a variety of industries.
- Agriculture, the woodworking industry, and the construction sector are all examples.
- Overexploitation of wood and timber, on the other hand, can have a detrimental impact on the economy.
- Deforestation produces short-term economic gains, but it also reduces long-term output.

Benefits of Agroforestry **7**

1. **Economic Value:** It meets almost half of the country's fuelwood needs, about two-thirds of the small timber demand, 70-80% of the plywood requirement, 60% of the raw

material for the paper pulp industry, and 9-11% of the green fodder needs.

2. Tree products and tree services also contribute robustly to rural livelihoods.

3. Fruit, fodder, fuel, fibre, fertiliser, and timber add to food and nutritional security, income generation, and work as insurance against crop failure.

4. **Carbon Sequestration**: Agroforestry or tree-based farming is an established nature-based activity that can aid carbon-neutral growth.5. It enhances tree cover outside forests, works as a surrogate for natural forests sequestering carbon, keeps the pressure off natural forests, and helps increase farmers' income.

6. **Lower Consumption of Fertilisers:** Nitrogen fixing trees grown in the agroforestry systems are capable of fixing about 50 -100 Kg Nitrogen/ha per year - one of the most promising components of the agroforestry system.

7. The leaf litter after decomposition forms humus, releases nutrients and improves various soil properties, it also reduces the fertiliser needs.

8. Due to lower requirement of chemical fertilisers agroforestry can supplement organic farming.

9. **Ecology Friendly:** Use of lesser chemicals will also help in mitigating anthropogenic effects on climate.

10. Agroforestry helps in erosion control and water retention, nutrient recycling, carbon storage, biodiversity preservation, and cleaner air and helps communities withstand extreme weather events.

11. **Global Climate Goals:** Agroforestry can also help India meet its international obligations on

12. **Climate** - creating an additional carbon sink of 2.5 to 3 billion tonnes of carbon dioxide equivalent through additional forest and tree cover by 2030 and net-zero by 2070.

13. **Desertification** - achieving 26 million hectares of Land Degradation Neutrality by 2030, thus, meeting 9 of the 17 Sustainable Development Goals.

14. **Better Agriculture Yields**: Higher yields of crops have been observed in forest-influenced soils than in ordinary soils.

15. Appropriate agroforestry systems improve soil physical properties, maintain soil organic matter and promote nutrient cycling.

16. Agroforestry will also help in generation and promotion of sustainable renewable biomass based energy.

4) Explain the role of hormones of oxytocin and relaxin in parturition and lactation.

Paturition **4**

- Parturition means childbirth. It is also known as labour. It is the mechanism of signalling the onset of labour (or) a procedure of delivering a child after the completion of pregnancy period. The developed child is born with the release of cortisol.
- During parturition process, the cervix dilates and relaxes. Along with cortisol, oxytocin and estrogen hormones are released to begin the milk production and labour.
- During parturition, the uterus contracts to push the fetus towards the cervix and continues until the fetus comes down the birth canal. In this process, the head should be first to come out.

Lactation **2**

- After parturition, the uterus releases the placenta and it passes out immediately after the fetus is born.
- Lactation begins and the first milk is called colostrum.
- This milk contains antibodies, which is required for a newborn baby to protect it against infectious diseases and other allergies.

Role of oxytoxin **2**

- Receptor cells that allow your body to respond to oxytocin increase gradually in pregnancy and then increase a lot during labor.
- Oxytocin stimulates powerful contractions that help to thin and open (dilate) the cervix, move the baby down and out of the birth canal, push out the placenta, and limit bleeding at the site of the placenta.

- During labor and birth, the pressure of the baby against your cervix, and then against tissues in the pelvic floor, stimulates oxytocin and contractions.
- So does a breastfeeding newborn

Role of Relaxin 4

- Relaxin is a reproductive hormone produced by your ovaries and the placenta.
- It loosens and relaxes your muscles, joints and ligaments during pregnancy to help your body stretch.
- Relaxin also helps your body prepare for delivery by loosening the muscles and ligaments in your pelvis

5) Amniocentesis, the foetal sex determination test, is banned in our country, Is it necessary? Comment

Amniocentesis 3

- Amniocentesis is a pre-natal diagnostic technique that is used to determine the sex and metabolic disorders of the developing foetus in the mother's uterus through the observation of the chromosomal patterns.- This method was developed so as to determine any kind of genetic disorder present in the foetus.
- However, unfortunately, this technique is being misused to detect the sex of the child before birth and the female foetus is then aborted.
- Thus, to prevent the increasing female foeticides, it is necessary to ban the usage of amniocentesis technique for determining the sex of a child.

Status of female foeticide in India 3

- According to analysis Pew Research centre, at least 9 million girls are 'missing' in India as a result of female infanticide from 2000 to 2019.
- To compare, this is slightly lower than the entire population of Uttarakhand.
- India banned prenatal sex-determination testing in the Pre-Conception and Pre-Natal Diagnostic Techniques Act 1994.
- The clandestine use of ultrasound facilities for this purpose continues, however, as do sex-selective abortions

Necessity of Ban on Amniocentesis in India 2

- Yes, the ban on amniocentesis for sex determination is necessary in India.
- In a country like India, where there are certain socioeconomic problems and prevalence of certain malpractices such as female foeticides, this method can be easily misused.
- In order to prevent this, amniocentesis to determine the sex of a foetus is banned in our country.

Procedure 3

- The procedure of amniocentesis involves the aspiration of a small amount of the amniotic fluid from the amniotic sac inside the uterus of the mother.
- This fluid contains some of the foetal tissues and thus foetal DNA can be examined from this sample.
- The foetal DNA is examined for any chromosomal aberrations and abnormalities and treated with gene therapy if possible. In certain cases where the prognosis is bad, even abortion may be advised by the health care worker.
- While examining the foetal tissues, it is also possible to determine the sex by looking at the sex chromosomes present in the amniotic fluid.

Conclusion 1

- Amniocentesis for sex determination is not banned worldwide and carried out in many western countries, where female foeticide is not prevalent

6) Explain the applications of any three of the following.

a) Thomson effect

b) Peltier effect

c) Seebeck effect.

d) Uses of ferromagnetic materials

a) Thompson effect 3

- The Joule-Thomson effect also known as Kelvin–Joule effect or Joule-Kelvin effect is the change in fluid's temperature as it flows from a higher pressure region to lower pressure.

Applications

1. The cooling produced in the Joule-Thomson expansion has made it a very valuable tool in refrigeration.
2. The effect is applied in the Linde technique in the petrochemical industry, where the cooling effect is used to liquefy gases.
3. It is also used in many cryogenic applications. For example for the production of liquid nitrogen, oxygen, and argon.
4. The effect can also be used to liquefy even helium

b) Peltier effect **3**

- Jean Charles Peltier a French physicist 1834 discovered the thermoelectric effect while doing his research on electricity.
- The Peltier effect consists of passing a current through a circuit made up of different materials.
- Its junctions are at the same temperature, producing the reverse effect of the Seebeck (thermoelectric effect)

Applications **3**

1. **Water Extraction**: The Peltier effect is used in dehumidifiers for the process of extraction of water from the air.
2. **DNA Synthesis:** A thermal cycler make use of this effect for the process of DNA synthesis.
3. **Spacecrafts**: The Peltier effect is used in spacecrafts to balance the effects of sunlight on both sides of the craft. It helps in dissipating the heat due to direct sunlight on one side of the spacecraft to the other side which doesn't receive sunlight, and so is much cooler.

c) Seebeckeffect **3**

- The Seebeck effect is the conversion of heat directly into electric potential at the junction of two dissimilar metals of conduction.
- It was named after German physicist Thomas Johann Seebeck.

Applications

1. This is commonly used in thermoelectric generators. They are used in industries and power plants since they do not let the remaining heat go to waste.
2. It is used in thermocouples to calculate the differences in the temperature or to operate the electronic switches that control powering of the system.
3. It is used in automobile industries to employ a thermoelectric generator for improving the efficiency of fuel.
4. Seebeck effect is used to measure the potential difference between two semiconductors.

d) Uses of ferromagnetic materials **3**

- Ferromagnetic materials have many electrical, magnetic storage, and electromechanical equipment applications.
- **Permanent magnets:** Ferromagnetic materials make permanent magnets because their magnetisation lasts longer
- **Transformer core:** The material must also have intense magnetic induction to make the transformer core and inductor subject to rapid cyclic changes. The material body should have high permeability to show a high value of magnetic induction, and it must also have low hysteresis loss to decrease energy losses. Ferromagnetic materials are popular to achieve this goal
- **Magnetic strips and memory**: The magnetisation of a magnet depends not only on the field but also on the cycle. Therefore, the magnetisation value of the sample is a record of the cycles it has undergone. Accordingly, such a machine will act as a memory unit
- Ceramics coat magnetic tapes in an audio player or build stores in a modern computer. Ceramics are treated with barium-iron oxides and are also called ferrites.
- They are used as flux multipliers to expand the core of electromagnetic machines
- Preservations of either data (magnetic recording) or energy (magnets)
- Used to store non-volatile data on hard drives, tapes, and more
- Used in information processing by collaborating with electric light and magnetic influence power supply

- Used in equipment such as transducers, microphones, and capacitors. Implemented in applications where it requires an extended piezoelectric coupling constant
- Used in devices such as generators, telephones, loudspeakers, electric motors, and magnetic strips on the back of debit and credit cards.

7) Discuss about the applications of ultrasonic waves?

Ultrasonic Waves **2**

- Ultrasonic sound is the term used for sound waves with Frequencies greater than 20,000 HZ.
- These waves cannot be heard by the human ear, but the audible frequency range for other animals includes ultrasound frequencies.

Examples **1**

- Ultrasonic whistles are used in cars to alert deer to oncoming traffic so that they will not leap across the road in front of cars.

Uses of Ultrasonic waves **2**

In Medical Field

- It is used as a medical diagnostic tool
- An important use of ultrasound is in examining inner parts of the body.
- The ultrasonic waves allow different tissues such as organs and bones to be 'seen' or distinguished by bouncing of ultrasonic waves by the objects examined.
- The waves are defected, analysed and stored in a computer.
- An echogram is an image obtained by the use of reflected ultrasonic waves.

Marine Surveying **1**

- Ultrasonic sound is having application in marine surveying also.
- It is used in the SONAR system to detect the depth of the sea and to detect enemy submarines.

Cleaning technology **1**

- Ultrasounds can be used in cleaning technology.
- Minute foreign particles can be removed from objects placed in a liquid bath through which ultrasound is passed.
- Ultrasounds can also be used to defect cracks and flaws in metal blocks.

Echo Cardiography **1**

- Ultrasonic waves are made to reflect from various parts of the heart and from the image of the heart this technique is called "echo cardiography".

Removal of Kidney Stones **2**

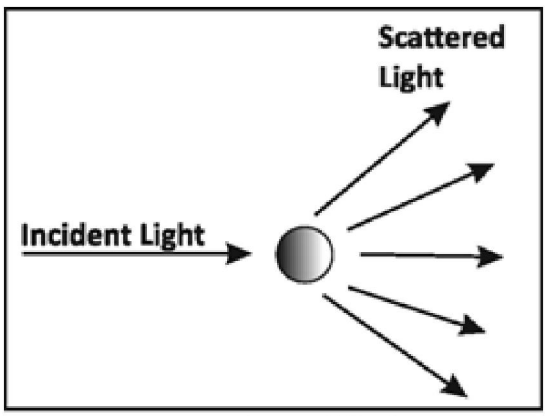
- Ultrasound may be employed to break small 'stones' formed in the kidney into fine grains. These grains later get flushed out with urine.
- It is extensively used in medical applications like 'sonogram'.
- It is also employed in dish washers.

Galton's whistle **2**

- Another important application of ultra sound is the Galton's whistle.
- This whistle is inaudible to the human ear, but it can be heard by the dogs.
- It is used to train the dogs for investigation.

8) Why does sky look blue and clouds look white? Explain its phenomenon.

Phenomenon behind the appearance of blue & white color of sky and clouds **2**



Scattering of light

- **Scattering of Light:** When sunlight enters the Earth's atmosphere, the atoms and molecules of different gases present in the atmosphere refract the light in all possible directions.

- This is called as 'Scattering of light'. In this phenomenon, the beam of light is redirected in all directions when it interacts with a particle of medium.
- The interacting particle of the medium is called as 'scatterer'

Types of scattering 1

- When a beam of light, interacts with a constituent particle of the medium, it undergoes many kinds of scattering.

On the basis of initial & final energy 2

- Based on initial and final energy of the light beam, scattering can be classified as,

1. Elastic scattering
2. Inelastic scattering

1. Elastic scattering

- If the energy of the incident beam of light and the scattered beam of light are same, then it is called as 'elastic scattering'.

2. Inelastic scattering

- If the energy of the incident beam of light and the scattered beam of light are not same, then it is called as 'inelastic scattering'.

On the basis of nature and size 7

- The nature and size of the scatterer results in different types of scattering.
- They are Rayleigh scattering, Mie scattering, Tyndall scattering, Raman scattering.

1. Rayleigh scattering

- The scattering of sunlight by the atoms or molecules of the gases in the earth's atmosphere is known as Rayleigh scattering.

Rayleigh's scattering law

- Rayleigh's scattering law states that, "The amount of scattering of light is inversely proportional to the fourth power of its wavelength".
- Amount of scattering $'S' \propto \frac{1}{\lambda^4}$

Reason for blue colour of sky

- According to this law, the shorter wavelength colours are scattered much more than the longer wavelength colours.
- When sunlight passes through the atmosphere, the blue colour (shorter wavelength) is scattered to a greater extent than the red colour (longer wavelength).
- This scattering causes the sky to appear in blue colour.

Reason for Red colour at sunrise and sunset

- At sunrise and sunset, the light rays from the Sun have to travel a larger distance in the atmosphere than at noon.
- Hence, most of the blue lights are scattered away and only the red light which gets least scattered reaches us.
- Therefore, the colour of the Sun is red at sunrise and sunset.

2. Mie scattering

- Mie scattering takes place when the diameter of the scatterer is similar to or larger than the wavelength of the incident light.
- It is also an elastic scattering. The amount of scattering is independent of wave length.
- Mie scattering is caused by pollen, dust, smoke, water droplets, and other particles in the lower portion of the atmosphere.

Reason for White colour of Clouds

- Mie scattering is responsible for the white appearance of the clouds.
- When white light falls on the water drop, all the colours are equally scattered which together form the white light.

9) Write brief notes on Carbon Cycle and its importance.

Carbon cycle 1

- Carbon cycle is the process where carbon compounds are interchanged among the biosphere, geosphere, pedosphere, hydrosphere, and atmosphere of the earth.

Steps in carbon cycle 4

1. Carbon present in the atmosphere is absorbed by plants for photosynthesis.
2. These plants are then consumed by animals and carbon gets bioaccumulated into their bodies.
3. These animals and plants eventually die, and upon decomposing, carbon is released back into the atmosphere.

4. Some of the carbon that is not released back into the atmosphere eventually become fossil fuels.
5. These fossil fuels are then used for man-made activities, which pump more carbon back into the atmosphere.

Importance of Carbon cycle **7**

1. Even though carbon dioxide is found in small traces in the atmosphere, it plays a vital role in balancing the energy and traps the long-wave radiations from the sun.
2. Therefore, it acts like a blanket over the planet.
3. If the carbon cycle is disturbed it will result in serious consequences such as climatic changes and global warming.
4. Carbon is an integral component of every life form on earth. From proteins and lipids to even our DNA. Furthermore, all known life on earth is based on carbon.
5. Hence, the carbon cycle, along with the nitrogen cycle and oxygen cycle, plays a vital role in the existence of life on earth.
6. Carbon cycle explains the movement of carbon between the earth's biosphere, geosphere, hydrosphere and atmosphere.
7. Carbon is an important element of life.
8. Carbon dioxide in the atmosphere is taken up by green plants and other photosynthetic organisms and is converted into organic molecules that travel through the food chain. Carbon atoms are then released as carbon dioxide when organisms respire.
9. The formation of fossil fuels and sedimentary rocks contributes to the carbon cycle for very long periods.
10. The carbon cycle is associated with the availability of other compounds as well.

10) Why Ethanol is mixed with commercial fuels? Discuss how it will control the demand of fuel in future?

Ethanol-blended petrol **2**

- Primarily is a biofuel that is obtained from an organic source like sugarcane.
- Now a days it has become very common to locate a banner at the fuel outlets stating that the petrol they sell contains ethanol.
- Infact printing bills also come up with the added information that the customers are being provided with petrol blended with 10% ethanol.

Ethanol blending done by **2**

- The blending mechanism is operated by the oil marketing companies in their terminals. Indian Oil Corporation Ltd. blends ethanol at its terminals at Tiruchi, Coimbatore, Salem and Madurai.
- Hindustan Petroleum Corporation Ltd blends the bio-fuel with petrol at its terminal in Chennai, while Bharat Petroleum Corporation Ltd. in terminals in Chennai and Karur.
- The modus operandi includes a stream of ethanol stored in a tank. A separate pumping and metering mechanism is deployed for loading the ethanol into the petrol loading arm at terminals.

Reason for ethanol to be blended with petrol **2**

1. Ethanol is an organic compound, also known as Ethyl Alcohol, which is produced from biomass.
2. The reason it is blended with petrol is its higher octane number than gasoline, which contributes in improving the octane number of petrol.
3. Ethanol has insignificant amount of water in it.
4. Ethanol contains a signifcant amount of oxygen. Therefore the blending is only supposed to facilitate more complete combustion of fuel which consequently will curtail the degree of emissions without causing any performance reduction or harm to the vehicle.

Ethanol fulfilling demand in future **6**

1. the National Policy on Biofuels 2018, provides an indicative target of 20% ethanol blending under the Ethanol Blended Petrol (EBP) Programme by 2025.
2. Achieving energy security and the transitioning to a thriving low carbon economy is critical for a growing nation like India.
3. Blending locally produced ethanol with petrol will help India strengthen its energy

security, enable local enterprises and farmers to participate in the energy economy and reduce vehicular emissions.

4. India's net import of petroleum was 185 million tons in 2020-21. Most of the petroleum is used by vehicles and therefore a successful 20% ethanol blending programme can save the country 4 billion dollars per annum.
5. Ethanol blending will help bring down our share of oil imports on which India spends a considerable amount of precious foreign exchange.
6. It is estimated that a 5% blending (105 crore litres) can result in replacement of around 1.8 million barrels of crude oil.
7. More ethanol produced from farm residue will boost farmers' income and minimise air pollution by reducing the amount of stubble burned.
8. ndia's biofuel policy stipulates that fuel requirements must not compete with food requirements and that only surplus food crops should be used for fuel production.9. Producing ethanol from crop residue will then be a good alternative

11) What is the current status of India in Global Hunger Index? What do you consider that to not in progression in basic health indices even India got 75 years of Independence?

Current status of India in Global Hunger Index **3**

- India has slipped 6 places and ranked 107, out of 121 countries, in Global Hunger Index (GHI) 2022.
- In common parlance, hunger refers to discomfort due to a lack of food.
- However, the GHI is not such a simplistic measure "it captures the multidimensional nature of hunger".
- There are 4 measures it used by GHI:

1. Undernourishment
2. Child Stunting
3. Child Wasting
4. Child Mortality

- The overall score is placed on a 100-point scale and a lower score is better.
- A score between 20 and 34.9 is pegged in the "serious" category and this is where India finds itself with a total score of 29.1. (GHI 22)

Reasons for low rank of India in Health **9**

1. **Poverty Backing Hunger:** Poor living conditions limit the availability of food for children, while overpopulation, coupled with limited food access, result in malnutrition in children, especially in rural India.
2. **Faulty Public Distribution:** There has been a wide variation in the distribution of food in urban and rural areas, with grains being diverted to the open market in order to make a higher profit, and poor quality grains being sold in ration shops, and the irregular opening of these shops contributing to hunger and malnutrition.
3. **Unidentified Hunger:** Due to the arbitrary nature of the criteria used to determine a household's Below Poverty Line status and the fact that these criteria vary from state to state, food consumption has declined significantly due to the inaccurate classification of above poverty line (APL) and below poverty line (BPL).
4. Besides this, the poor quality of grains have further contributed to the problem.
5. **Hidden Hunger**: India is experiencing a severe micronutrient deficiency (also known as hidden hunger). There are several causes of this problem, including poor diet, disease, and a failure to meet micronutrient needs during pregnancy and lactation.
6. **Lack of adequate knowledge** amongst mothers regarding nutrition, breast-feeding and parenting is another area of concern.
7. **Gender Inequality:** Due to patriarchal mindset, gender inequality places the girl child at a disadvantage compared to boys and causes them to suffer more since they are last to eat and considered less important.
8. In contrast to boys, girls are deprived of mid-day meals due to a lack of access to school.
9. **Lack of Immunisation:** Children are neglected when it comes to preventive care (specifically immunizations) due to lack of awareness and not given access to health care for diseases due to affordability issues.

10. **Lack of Audit for Nutritional Programmes:** Although a number of programmes with improving nutrition as their main component are planned in the country, there is no specific nutritional audit mechanism at local governance level.

12) What are the steps taken by Government of Tamilnadu for the growth of Drones? Discuss the needs to develop the field of Drones. 2

Tamil Nadu Unmanned Aerial Vehicle Corporation

- Tamil Nadu now has its own drone manufacturing corporation established at a cost of rs10 crore at the Anna University.
- **Objective**: The corporation will design, manufacture and trade all types of drones and allied systems.

Applications 7

1. drones were used by the State police department and later by the Disaster Management Department to conduct surveys in mines and for aerial photography.
2. The need for drones is rising and universities should emerge as research centres.
3. drone corporation that will help generate around 40,000 employment opportunities and better irrigation management.
4. these drones will help Tamil Nadu government curb illicit mining of minerals through survey and monitoring of around 1,700 quarries.
5. Illicit mining is a headache for the State government, which is losing revenue as nearly 60 per cent of the excavated minerals getting 'leaked
6. Usage of drones would reduce risks to human life and health, especially in counter insurgency operations and high-altitude areas for the military while also reducing overall costs.
7. Using a drone, around 20 acres of agricultural land can be covered in a day for spraying fertilisers or pesticides.
8. Efficiency can be managed, farmers' lives and health can be sustained because if a person goes and sprays pesticides, it would invariably lead to some health issues for them

Drone hub 2

- The Tamil Nadu Defence Industrial Corridor (TANDICO), an arm of Tamil Nadu Industrial Development Corporation (TIDCO), plans to convert an unused airstrip in Ulundurpet or Cholavaram into a potential drone hub.
- To reduce entry barriers for drone companies, TANDICO is in the process of setting up a drone testing facility.
- This would either be under the Defence Testing Infrastructure Scheme or other scheme to enable drone manufacturers test their products, which would be an additional enabler for drone manufacturing in the State

Drone pilot training 1

- These training centres (in Madurai and Coimbatore) could produce about 2,500 drone pilots per year at the rate of about 200 pilots per month

Unit - 03

1) With the Global task of G-20 presidency turns towards India's table, discuss India's role as leader of global south.

Introduction 1

- The Group of 20 is a non-treaty-based organization of 19 countries and the EU that traces its origins to the Asian financial crisis of 1997-99, when the G7 convened a meeting of finance ministers of a select group of countries and central bank governors from around the world to find ways to arrest the meltdown threatening to engulf the world.
- The broad objective of this grouping was to shore up the world's economic and financial stability.
- The presidency of G-20 for the year 2023 will be taken up by India and the theme is **"One Earth, One Family, One Future"** coupled with official symbol of the lotus.

What are India's G20 Priorities? 2

Green Development, Climate Finance &LiFE

- The opportunity to lead G20 comes at a time of compounding existential threat, with the COVID-19 pandemic having exposed the fragilities of our systems under the cascading impacts of climate change. In this regard, climate change is a key priority for India's

presidential Presidency, with a particular focus towards not only climate finance and technology, but also ensuring just energy transitions for developing nations across the world.

- Understanding that the issue of climate change cuts across industry, society, and sectors, India offers the world LiFE (Lifestyle for Environment) -a behaviour-based movement that draws from our nation's rich, ancient sustainable traditions to nudge consumers, and in-turn markets, to adopt environmentally-conscious practices. This ties closely with India's G20 theme: 'VasudhaivaKutumbakam' or 'One Earth. One Family. One Future.

Accelerated, Inclusive & Resilient Growth **1**

- An accelerated, resilient and inclusive growth is a cornerstone for sustainable development. During its G20 Presidency, India aims to focus on areas that have the potential to bring structural transformation. This includes an ambition to accelerate integration of MSMEs in global trade, bring in the spirit of trade for growth, promote labour rights and secure labour welfare, address global skills gap, and build inclusive agricultural value chains and food systems etc.

Accelerating progress on SDGs **1**

- India's G20 Presidency collides with the crucial midpoint of the 2030 Agenda. As such, India acknowledges the detrimental impact of COVID-19, which changed the current decade of action into a decade of recovery. In line with this perspective, India wants to focus on recommitting G20's efforts to achieving the targets laid out in the 2030 Agenda for Sustainable Development

Technological Transformation & Digital Public Infrastructure **2**

- As G20 Presidency, India can foreground its belief in a human-centric approach to technology, and facilitate greater knowledge-sharing in priority areas like digital public infrastructure, financial inclusion, and tech-enabled development in sectors ranging from agriculture to education

Multilateral Institutions for the 21st century

- India's G20 priority will be to continue pressing for reformed multilateralism that creates more accountable, inclusive just, equitable and representative multipolar international system that is fit for addressing the challenges in the 21st century

Women-led development **3**

- India hopes to use the G20 forum to highlight inclusive growth and development, with women empowerment and representation being at the core of India's G20 deliberations. This includes a focus on bringing women to the fore, and in leading positions, in order to boost socio-economic development and achievement of SDGs.

- India kick-started its presidency term agenda with a series of cultural initiatives that included various Jan Bhagidari activities, a special University Connect event with 75 educational institutions from across the country, the lighting up of 100 ASI monuments with the G20 logo and colours, and showcasing G20 at the Hombill festival in Nagaland.

- Sand artist Shri SudarshanPattnaik also created sand art of India's G20 logo on Puri beach in Odisha. Various other events, youth activities, cultural performances, and site excursions showcasing the sights and traditions of respective city-venues, are also planned throughout the year-long calendar.

India as a representative of Global South **1**

- Recently, while presenting India's statement at the United Nations General Assembly, External Affairs Minister remarked that the global South was the most impacted by the "sharp deterioration in the international landscape".

Raise global issues which affects developing countries **1**

- As the voice of developing countries India will try to work with other G20 members to address serious issues of debt, of economic growth, terrorism, counterfeit currency food and energy security and particularly, of environment.

Leverage Digital Infrastructure **2**

- There is rise of digital divide in the developing world indicated with India's presidency it

could portray itself as a leader in transferring this technology to other countries, as it has the world class digital infrastructure that could be shared with the world.

- Portray itself as global peacemaker: Further, the G20 presidency could provide an opportunity to India to assume the mantle of a peacemaker on various global issues like Russia-Ukraine war, rising tension in Indo-pacific etc.
- At present, the United Nations lacks credibility, major powers like the US and the Europeans have taken sides in the proxy war in Ukraine, China remains a vicarious supporter of Russia.
- That leaves only India, which has taken a consistent and objective view of the developments while maintaining good relations with the belligerents and their supporters. India has the credibility to work behind the scenes for an end to the war in Ukraine.

Way forward **1**

With global supply chains in ruins and crisis of essential goods is brewing all over the world, India can leverage its position as a leader of global south with the focus on the issues like food security, digitization and healthcare etc

- India's objective is not to rebuild a global trade union against the North although it aims to become a bridge between the North and the South by focusing on practical outcomes rather than returning to old ideological battles.
- In recent years, Delhi has often talked of itself as a "South Western power" that is capable of building deep partnerships with the US and Europe and at the same time, championing the interests of the Global South.
- If India can translate this ambition into effective policy, there will be no contradiction between the simultaneous pursuit of universal and particular goals

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2) Explain any three of the following in detail.

a) Recombinant vaccines

b) Possible risks of GMOs

c) Somatic cell gene therapy and germ line gene therapy.

d) Cloning And Ethical Issues

a) Recombinant vaccines **15**

- A recombinant vaccine is a vaccine produced through recombinant DNA technology. This involves inserting the DNA encoding an antigen (such as a bacterial surface protein) that stimulates an immune response into bacterial or mammalian cells, expressing the antigen in these cells and then purifying it from them.

The recombinant vaccines may be broadly categorized into three groups:

1. Subunit recombinant vaccines:

- These are the components of the pathogenic organisms. Subunit vaccines include proteins, peptides and DNA.

2. Attenuated recombinant vaccines:

- These are the genetically modified pathogenic organisms (bacteria or viruses) that are made non-pathogenic and used as vaccines.

3. Vector recombinant vaccines:

- These are the genetically modified viral vectors that can be used as vaccines against certain pathogens. Some of the developments made in the production of recombinant vaccines against certain diseases are briefly described.

rDNA vaccine:

- Vaccines produced through recombinant DNA technology are called rDNA vaccines. The following steps outline the production of rDNA vaccines:-

- A recombinant DNA is formed by introducing a foreign DNA containing the gene of choice (in this case, it codes for the antigen) into the plasmid. This recombinant plasmid is then introduced into the microbe where it replicates.
- The gene causes the production of the antigen protein in the microbe which is then purified.
- The preparation is then used as vaccines after appropriate clinical trials.

Examples of rDNA vaccine

- Hepatitis B vaccine and HPV (Human Papillomavirus) vaccine for humans are examples of rDNA vaccines
- Vaccine against Influenza B and Meningitis.

b) Possible risks of GMOs

Meaning of Genetic Modification:

1. "Genetic modification" involves altering the genes of an organism, be it a plant, animal or microorganism.

- It involves direct manipulation of DNA instead of usiGMtechnologyng controlled pollination to alter the desired characteristics.

2. It is one the approaches to crop improvement, all of which aim at adding desirable genes and removing undesirable ones to produce better varieties.

Possible risks Associated with GM Crops:

1. **Ecological Concerns:** Gene flow due to cross pollination can result in development of tolerant or resistant weeds that are difficult to eradicate.

a. GM crops could lead to erosion of biodiversity and pollute gene pools of endangered plant species.

b. Genetic erosion has already occurred as the farmers have replaced the use of traditional varieties with monocultures.

2. **Loss of Nutritious Value:** As genetic modification focuses more on increasing crops' production, extending their lifespan, and deterring pests, some crops' nutritional value has sometimes been compromised as well.

- It has been reported that some genetically modified foods drastically lacked nutritional value when compared with the original variety.

3. **Threat to Wildlife:** Altering the genes of plants can also have serious effects on wildlife. For example, genetically modified plants, such as tobacco or rice, used to make plastic or pharmaceuticals, can pose a threat to mice or deer that eat crop debris after harvesting.

4. **Risk of Toxicity:** Due to the nature of the product changes after genetic modification it becomes an alien for human metabolism.

a. Sometimes, newer proteins in transgenic crops that are not consumed as food can become allergens and pose a risk of toxicity.

c) Somatic cell gene therapy and germ line gene therapy.

What is somatic gene therapy and germ line gene therapy?

1. Somatic gene therapy: transfer of a section of DNA to any cell of the body that doesn't produce sperm or eggs. Effects of gene therapy will not be passed onto the patient's children. Germline gene therapy: transfer of a section of DNA to cells that produce eggs or sperm.

2. Germline gene therapy is when DNA is transferred into the cells that produce reproductive cells, eggs or sperm, in the body. This type of therapy allows for the correction of disease-causing gene variants that are certain to be passed down from generation to generation.

What are the Similarities Between Somatic and Germline Gene Therapy?

- Both Somatic and Germline Gene therapies involve altering of defective genes or introducing of healthy genes.
- Both therapies use gene transformation methods.

What is the Difference Between Somatic and Germline Gene Therapy?

Somatic vs Germline Gene Therapy	
Somatic Gene therapy refers to the alteration of the genome of somatic cells by transferring therapeutic genes.	Germline Gene therapy refers to the alterations of the genome of the germ cell by introducing therapeutic genes.
Type of Cells Involved	
Somatic gene therapy uses Somatic cells.	Germline gene therapy uses Germ cells such as sperm cells and egg cells.
Reproducibility	
Alterations done by somatic gene therapy are non-reproducible. Hence, do not pass to the next generation.	Alterations done by germline gene therapy are reproducible. Hence, pass into the next generation.
Transformation Technical Approaches	
Techniques used in somatic gene therapy are relatively simple. Hence, can be performed under in vitro conditions.	Techniques are very complex since it involves fetal samples.
Ethical Issues Involved	
Less or no ethical issues exist regarding somatic gene therapy.	High ethical considerations are existing for germline gene therapy.
Conservativeness	
Somatic gene therapy is more conservative.	Germline gene therapy is less conservative.

d) Cloning And Ethical Issues

Cloning

Arguments in favour of cloning:

- The main ethical argument in favour of cloning is the betterment that it can bring to the human society.

1. Formulating appropriate approaches to child development:

- An important unresolved problem in psychology is how human beings acquire their traits of character. Are such traits derived mainly from one's biological make-up or are the outcomes of the environment in which one is raised or the result of chance factors? Children will grow into healthy, happy adults and be able to realize their potential.

2. Creating clones with high potential:

- Factors which contribute to creativity such as tenacity, concentration, determination and self- belief can be created to some extent through a right combination of heredity and environment.

3. Customized offsprings:

- Many parents desire that their children should have specific talents or traits. They may want their children to have scientific or artistic talents in some directions. In some measure, cloning can produce such offspring.

4. Fighting infertility:

- In future, cloning can be a solution to infertile couples. But as we noted, at present cloning is prohibited for such reproductive purposes. It raises many intriguing ethical issues. But in principle it is a way for infertile couples to have a child biologically related to them.

5. Saving lives, healthcare benefits:

- Though reproductive cloning is illegal, therapeutic cloning for creating replacement tissues or 'body spare parts' holds great promise. An embryo can be created for generating an organ for transplant. By cloning an individual who has no major debilitating or psychological problems like depression, healthy and happy individuals can be produced.

Arguments against cloning:

1. **Undermines uniqueness:**

- Cloning deprives the clone of the right to be a genetically unique individual. It impairs the uniqueness of the individual, and is intrinsically immoral. However, philosophers disagree on this point.

2. **An open future argument:**

- Another objection to cloning relies on what may be called 'an open future argument' or 'right to ignorance of a certain sort'. According to this argument, the future of a clone appears to him or her like a rerun of an earlier life. It resembles a refurbished model.
- The clone may lose feelings of novelty or miss elements of surprise which are part of normal life. He may have a sense of following a well-worn path in life. Knowledge of the life experience of the original person, his successes and failures in life, will constrain the clone's future; it will shut out many experimental life moves he could have made.

3. **Alarmist future possibilities:**

- These can be termed as 'brave new world' anxieties. Aldous Huxley, in his novel Brave New World, envisaged a future society in which different social categories such as proletarians, clerks, intellectual workers and political leaders are genetically created as test-tube babies. They are pre-programmed, and each fits snugly into his social station, experiencing no complaints or grievances. Cloning can theoretically be used for similar sinister purposes. One may Xerox many Hitlers or murderous soldiers for savage regimes. These fears belong more to science fiction than to any possible reality.

4. **Violation of individual personal autonomy:**

- Once a clone is created with various predispositions, he will no longer develop into a free, spontaneous being.

5. **Homogenous humanity:**

- Writers also point to some other risks of cloning. It can reduce diversity among human beings which nature has created, and lead to some form of human monocultures. Cloning is tantamount to not exercising procreation rights but to manufacturing human beings which can never be justified.
- Cloning is open to danger that people may be cloned without their knowledge or consent. Cloning messes up family relationships. If a woman bears her husband's clone, is he the father to the son she bears or its twin brother?

6. **Religious Belief and Control**

- Cloning goes against the basic belief of certain religions that only God has created life and its various forms in nature. Humans cannot act as "God". Even when genetically identical twins are born, their embryo splits spontaneously or randomly to give a new unique genetic combination. Cloning involves a controlled split of the embryo to produce a tailor-made genetic makeup.

7. **Relationships and Individuality**

- Cloning creates a new human, yet strips him off his individuality. A man, along with his clone can never be dignified as a single identity. The uniqueness attributed to humans from God might be at stake. The replication of an individual is a major blow to his most distinct feature – his identity.

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3) What has been India's performance and achievements in the field of supercomputing? Analyse.

Introduction **2**

- A supercomputer is a computer with a high level of performance as compared to a general-purpose computer. The performance of a supercomputer is commonly measured in floating-point operations per second (FLOPS) instead of million instructions per second (MIPS). Since 2017, there are supercomputers which can perform

Characteristics of Supercomputer **2**

- These types of computers are able to solve large amounts of calculations, and complicated calculations as well.
- Multiple users are capable of accessing the supercomputer at same time.
- It Is more expensive so ordinary users cannot purchase that computer.
- Use for special areas where there is a high amount and complicated calculations.
- Having huge storage capacity.

India's performance and achievements in the field of supercomputing **8**

- India's supercomputer program was started in late 1980s because Cray supercomputers could not be imported into India due to an arms embargo imposed on India, as it was a dual-use technology and could be used for developing nuclear weapons.
- This led to setting up the Centre for Development of Advanced Computing (C-DAC) in March 1988 with the clear mandate to develop an indigenous supercomputer to meet high-speed computational needs.
- PARAM 8000, considered to be India's first supercomputer was indigenously built in 1991 by the Centre for Development of Advanced Computing (C-DAC).
- Presently, Pratyush, a Cray XC40 system – an array of computers that can deliver a peak power of 6.8 petaflops, installed at the Indian Institute of Tropical Meteorology (IITM), Pune, is the fastest supercomputer in India. Launched in January 2018, it is the fourth fastest High Performance Computer (HPC) dedicated to climate modelling in the world.
- The government launched National Supercomputing Mission to connect national academic and R&D institutions with a grid of over 70 high-performance computing facilities.
- Recently NSM's first indigenously built supercomputer 'ParamShivay' WAS inaugurated at Indian Institute of Technology, BHU, Varanasi.
- India's three systems on TOP500 list ranking are:
- Pratyush (Indian Institute of Tropical Meteorology) – 53rd rank
- Mihir (National Centre for Medium Range Weather Forecasting) – 86th rank
- INC1 – Lenovo C1040 (Software Company (M)) – 428th rank
- India plans to indigenously develop 60 supercomputers over the next three years, Under National Supercomputing mission (NSM). India has lagged behind in the race of building supercomputers despite being a leader in the IT enabled services (ITES). Hence, National Supercomputing Mission is a step in the right direction.

Challenges **2**

1. There has been a continuous delay in implementing programme·
2. India lacks highly skilled workforce for supercomputer development.
3. India needs to work on policies to attract talent from all over the world as well as retaining the indigenously available talent through financial and other incentives.
4. India is facing a funding crunch for the mission.
5. While India's stronghold is in the field of software development, it has to depend on imports to procure the hardware components required for building supercomputers

Conclusion **1**

- Supercomputers are strategic in the most important sense, namely, the creation of an ecosystem that extends well beyond the boundaries of science and technology and has the capacity to transform the country. However appropriate infrastructure – both digital as well as physical is very much needed. Hence for India to become a knowledge-driven, multi-trillion-dollar economy, which is able to support cutting-edge science, investment in supercomputing is a necessity.

4) How Indian Bio Research Institutions have grown to fulfill the vaccine need across the world? And also explain the favorable environment to achieve it?

India is pharmacy of world **15**

Introduction

- India is the world leader in manufacturing before COVID – 19
- Especially during pandemic, India topped the vaccine production
- India pharmaceutical companies supply more than 50% of global demand for different vaccines.

Institutions involved in Vaccine production

- Serum Institute of India – Pune
- Biological Ltd

- Bharat Biotech – Hydrebad
- Dr.Reddy's laboratories

Initiatives

- Vaccine for all
- Govt of India emphasize on ways to vaccinate eligible person in India as quickly and also help other countries.

Favorable Environment to achievement

1. Low cost product

- Production of vaccine at low cost due to availability of technology

2. High number of clinical trials

- Due to high number of trial, effective vaccination is produced.

3. India's pool of man power

- India is largest population of young population, so available of skilled Human resources.

4. Raw material Availability

- Due to excess availability of Raw materials leads to surplus vaccine production.

5) Estimate the recent activities taken by TamilNadu government to spread the magnificence of Tamil to the world.

Steps of TamilNadu government to spread the magnificence of Tamil to the world **15**

1. Conducting Chess Olympiad in TamilNadu

- 2022
- All parts of the world (or) all nations
- Participate in Chess Olympiad conducted in TamilNadu
- Mahabalipuram – Place – Famous to explore the Tamil Culture

2. G – 20 meeting

- G – 20 meeting presiding to conduct
- All countries participate
- Explore tamil language and tamil culture

3. Inviting of Foreign Minister

- Foreign and other countries minister's came
- Explore Tamil Language and tamil culture

4. Foreign Direct investment

- Investors meet recently in Coimbature, TamilNadu
- TamilNadu – Hub of foreign, investors meet
- Achieve $1 trillion economy
- SDG – 17 – Public private partnership

5. Education

- Providing education to all students from alien
- Learn tamil from our state

6. Online tamil learning

- People from other countries are able to learn tamil from online
- Tamil is the fulfilling language to learn easy and communicate
- Language learned through online, Tamil is the first place.

7. Tamil Virtual University

- Training program and provide learning to other alliens
- Made tamil as world wide Dravidian language

By Tamil Development Department

- Tamil Chair – Harvard University – US
- 5 Crore by TN
- Tamil Virtual University
- Tamilthagalaatrupudi
- Semozhi Maanadu
- Tamil Palm leaf manuscript – Digitalize across the world – Budget – 2022 – 23
- Agaramuthali Thittam – TN Dictionary
- Tamil Development & Culture – Budget 2022 – 23 – Etymologist Dictionary
- Semozhi TamilAaivu Award

Conclusion

- In 19th century Robert, CardWell – 1853 says Tamil is the first language in the world and also called tamil as the Dravidian language.

6) Pudhumai Penn is a "revolutionary plan" that "is going to be path breaking and revolutionary in the next few years because of the wisdom to concentrate on modern times." Explain.

Pudhumai Pen Scheme **1**

1) A man's great education is a glory to him alone, but a woman's education brings glory to the family. Apart from that, for a society to progress, female education is very important. For a woman to be equal to men she must be educated.

2) Therefore, the government of Tamil Nadu has launched the MuvalurRamamirthamAmmaiyar Memorial Higher Education assurance scheme called "**Pudhumai Pen**" on 05.09.2022 across Tamil Nadu.

3) The scheme aims to help 6 lakh women annually and has a budget allocation of Rs 698 crore.

Need **1**

- Last year, according to the "Performance Quality Index 2019-2020" report by the Union Education Ministry, Tamil Nadu ranked last among the southern states in terms of learning outcomes and quality. Also, according to the ASER 2018 report, one in four 8th class students in Tamil Nadu could not read 2nd class level texts and only 50% of the same class could do division. So programs like "Pudhumai Pen" are needed to improve the education quality in Tamil Nadu.

Aim **1**

- The scheme was launched with the aim of increasing the higher education enrolment rate of female students completed schooling in government schools by providing financial assistance.

Salient features: **1**

1) The scheme encourages parents of female students to promote their daughter's higher education rather than marrying them off at an early age.

2) Under the scheme Rs.1000 scholarship will be given to 25% of the female students enrolled for higher education across Tamil Nadu.

3) The scholarship is directly credited to the student's bank accounts. Students are being issued debit cards too.

4) For 2022, it is reported that around 3 lakh girl students have applied under this scheme. It is envisaged that 9,981 government school girl students who enroll in engineering courses for the year 2022 under the 7.5 percent reservation will be given higher education assistance of Rs.1000 per month.

Eligibility Criteria **1**

1) Following are the basic eligibility requirements for this scheme

2) Applicant must be a citizen of India residing in the state of Tamil Nadu.

3) Applicant must be a student. That too should have studied in a government school from 6th to 12th standard.

4) Applicant must be a female to avail benefits from this scheme.

5) This scheme is not applicable for distance education and open university students.

Issues in women education: **5**

1. **Gap in upper primary and secondary schooling:** While female enrolment has increased rapidly since the 1990s, there is still a substantial gap in upper primary and secondary schooling.
2. **High drop-out rates:** Increased female enrolment is, compromised by persistently high rates of drop-out and poor attendance of girls relative to boys. Girls also constitute a large proportion of out-of-school children.
3. **Inter-state variations:** There are also considerable inter-state variations in gender parity. While the greatest surges in female enrolment have been achieved in the most educationally disadvantaged states such as Bihar and Rajasthan, these states still have a long way to go to catch up with the better performing states of Kerala, Tamil Nadu and Himachal Pradesh.
4. **Son preference:** Some studies suggest that girls are over-represented in the government schools, demonstrating continuing son preference where boys (highlighted in economic survey 2018) are educated in private and better schools which are of (perceived) better quality.

Impact of Pudhumai Penn Scheme on women education **4**

- Different from other schemes, the Pudhumai Penn Scheme focuses on providing financial assistance, encouraging female students to

continue their education, and preventing parents and guardians from allowing daughters to marry young.

- The Puthumai Penn Scheme is going to usher in a new era of innovation within the next few years due to its foresight to focus on current circumstances.
- Female students who are pursuing an education until they have either graduated or earned a certificate or diploma, regardless of their field, will receive a monthly cash award of Rs 1,000.
- This program helps young women gain confidence because it is common knowledge that female students in our nation are discouraged from pursuing education.
- The scheme has a budget of Rs 698 crore and aims to assist 6 lakh females annually.
- Money would be deposited into student bank accounts right away under Pudhumai Penn to guarantee their education.
- This means that only the children and the bank will act as intermediaries when receiving money.
- The plan empowers women and discourages child marriage.
- Anything that would damage their pride should not be accepted.
- Throughout the initial phase of the plan, 613 students received debit cards.
- When it comes to the scheme's initial phase, approximately 6,500 students currently enrolled in engineering, science, and arts institutions in the Tiruchi district will benefit.

Conclusion **1**

1) Women's education is critical to the country's entire development. It's similar to an effective medicine that may know how to cure a patient and recover their health. A well-educated lady is capable of managing both her personal and professional lives. The physical and intellectual growth of the child is the moral goal of education. Education's true objective is to provide students with "full knowledge" or "greater information."

2) Women education is an important tool to achieve gender equality. For a long time women have been deprived of their rights. By pacing woman education India can achieve the goal of social development and economic progress.In this aspect, The Pudhumai Penn Scheme also known as **Moovalur Ramamirtham Scheme** was is a revolutionary scheme and is going to prove to be a pioneer and revolutionary in future.

7) "Too much of anything and too little of anything are always dangerous" In this context,Explain the Endocrine Glands and Disorders.

Introduction **1**

- The Endocrine system is a powerful network of various glands. They have a great impact on other organ systems and their functions. The chemicals secreted by endocrine glands called hormones. Hormones can manipulate or change various cell activities in such a way that they can make us as tall as a tree and as short as an herb. Hence, hormone level needs to maintain at equilibrium.

Endocrine glands include **3**

1) Adrenal glands: Two glands that sit on top of the kidneys that release the hormone cortisol.
2) Hypothalamus: A part of the lower middle brain that tells the pituitary gland when to release hormones.
3) Ovaries: The female reproductive organs that release eggs and produce sex hormones.
4) Islet cells in the pancreas: Cells in the pancreas control the release of the hormones insulin and glucagon.
5) Parathyroid: Four tiny glands in the neck that play a role in bone development.
6) Pineal gland: A gland found near the center of the brain that may be linked to sleep patterns.
7) Pituitary gland: A gland found at the base of brain behind the sinuses. It is often called the "master gland" because it influences many other glands, especially the thyroid. Problems with the pituitary gland can affect bone growth, a woman's menstrual cycles, and the release of breast milk.
8) Testes: The male reproductive glands that produce sperm and sex hormones.
9) Thymus: A gland in the upper chest that helps develop the body's immune system early in life.

10) Thyroid: A butterfly-shaped gland in the front of the neck that controls metabolism.

Endocrine Glands and Disorders **1**

- "Too much of anything and too little of anything are always dangerous". The term the hormone imbalance also explains the same. In the case of hormones, an excess of the hormone may lead to some diseases, too little hormone also causes disease. The endocrine glands itself has a feedback mechanism to counteract the hormone imbalance but sometimes it fails and leads to some disorders or diseases.

Causes of Endocrine Disorders **1**

Two categories:

1) Endocrine disease that results when a gland produces too much or too little of an endocrine hormone, called a hormone imbalance.

2) Endocrine disease due to the development of lesions (such as nodules or tumors) in the endocrine system, which may or may not affect hormone levels.

Few of them are as follow **8**

1) Dwarfism

- Growth hormone secreted by the pituitary gland is responsible for dwarfism or shortness. When pituitary produces an insufficient amount of growth hormone, it retards the height of an individual.

2) Acromegaly

- Acromegaly is also known as gigantism. It is also a growth hormone-related disorder. In contrast to dwarfism, gigantism is the outcome of the excess secretion of growth hormone by the pituitary.

3) Cretinism

- It is an endocrine disorder caused due to deficiency of thyroid hormones. Cretinism is a type of hypothyroidism that occurs in infants or kids. It leads to mental and physical growth impairment.

4) Goitre

- When the level of thyroid hormone is too high in blood, it shows symptoms like excess sweating, weight loss, etc. It also leads to the amplification (swelling) of the thyroid gland. This condition is known as goiter. It is either due to iodine deficiency or hyperthyroidism or hypothyroidism.

5) Graves' disease

- Also known as exophthalmic goiter- a type of hyperthyroidism. It is an autoimmune disorder which is commonly found in kids. In this condition, thyroid gland becomes overactive and secretes too much thyroid hormones.

6) Diabetes mellitus

- The endocrine part of pancreas produces two hormones for the balancing blood glucose level; they are – glucagon and insulin. Diabetes mellitus, commonly known as diabetes is a condition in which blood glucose level is high due to insufficient secretion of insulin. Excessive thirst, weight loss, frequent urination are certain symptoms of the disease.

7) Addison's disease

- This is a condition which shows symptoms of extreme weakness and fatigue, dehydration, etc. Addison's disease (adrenal insufficiency) is a hormonal disorder which explains the inefficiency of the adrenal cortex to produce its hormones like corticosteroids.

8) Cushing's disease.

- Overproduction of a pituitary gland hormone leads to an overactive adrenal gland. A similar condition called Cushing's syndrome may occur in people, particularly children, who take high doses of corticosteroid medications.

9) Hypopituitarism.

- The pituitary gland releases little or no hormones. It may be caused by a number of different diseases. Women with this condition may stop getting their periods.

10) Multiple endocrine neoplasia I and II (MEN I and MEN II).

- These rare, genetic conditions are passed down through families. They cause tumors of the parathyroid, adrenal, and thyroid glands, leading to overproduction of hormones.

11) Polycystic ovary syndrome (PCOS).

- Overproduction of androgens interfere with the development of eggs and their release from the female ovaries. PCOS is a leading cause of infertility.

Conclusion **1**

- Our **endocrine system** requires the same substances as the remainder of our organism to function properly. We must exercise, eat well, and then see our doctor regularly. Speak with the medical provider when people possess a family record of hyperglycemia, thyroid issues, or PCOS.
- Treating these situations can help people prevent severe hormone imbalances, which can result in health concerns. Stress, diseases, and being exposed to certain chemicals may all damage our endocrine system, regardless of our age. Furthermore, genes plus lifestyle factors might raise our likelihood of developing an endocrine illness such as hypothyroidism, kidney disease, or osteoporosis.

8) What is Geographical Index? List out some products which have got recent index in TamilNadu.

Introduction **1**

- Geographical Indication (GI) is a sign used on a product that originates from a specific geographical location. The product must possess reputation and qualities of the place of origin. GI are generally registered on products produced by rural, marginal and indigenous communities over generations that have garnered massive reputation at the international and national level due to some of its unique qualities. GI tag gives the right to only those registered users the right to use the product name, and prevents others from using the product name that does not meet the standards prescribed.

Geographical Indications – Type of Products **2**

GI tags are used on the following types of products.

1. Handicrafts – Examples would be Madhubani Paintings, Mysore Silk
2. Food items – Example would be TirupatiLaddu, Rasgulla.
3. Wine & Drinks – Example would be Champagne, Cognac of France; Scotch Whisky of UK, Tequila of Mexico.
4. Industrial Products
5. Agricultural Products – Basmati Rice

- Aspirants would find this topic very helpful while preparing for the IAS Exam
- Geographical Indications – Laws & Treaties
- There are many laws and treaties enacted by the World Intellectual Property Organisation (WIPO) and World Trade Organisation (WTO) for the protection of Geographical Indications.

WIPO **1**

- 3 main Treaties enacted for protection of Geographical Indications under WIPO are listed below.

1. Paris Convention
2. Madrid Agreement
3. Lisbon Agreement

WTO **1**

- The main Agreement under WTO for protection of Geographical Indications is listed below.

1. Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement

Geographical Indications – Law passed in India **10**

- Government of India enacted Geographical Indications of Goods (Registration and Protection) Act, 1999. This act came into force in September, 2003.

Tamil Nadu

Sl.No	Geographical Indication	Type
1.	Salem Fabric	Handicraft
2.	Kancheepuram Silk	Handicraft
3.	BhavaniJamakkalam	Handicraft
4.	Madurai Sungudi	Handicraft
5.	Coimbatore Wet Grinder	Manufactured
6.	Thanjavur Paintings	Handicraft
7.	Temple Jewellery of Nagercoil	Handicraft
8.	Thanjavur Art Plate	Handicraft
9.	E. I. Leather	Manufactured
10.	Salem silk	Handicraft
11.	Kovai Cora Cotton	Handicraft
12.	Arani Silk Handicraft	Handicraft
13.	Swamimalai Bronze Icons	Handicraft
14.	Eathomozhy Tall Coconut	Agricultural
15.	Thanjavur Doll Handicraft	Handicraft
16.	Nilgiri(Orthodox) Logo	Agricultural
17.	Virupakshi Hill Banana	Agricultural
18.	Sirumalai Hill Banana	Agricultural
19.	Madurai Malli	Agricultural
20.	PattamadaiPai ('Pattamadai Mat')	Handicraft
21.	NachiarkoilKuthuvilakku ('Nachiarkoil Lamp')	Handicraft
22.	Chettinad Kottan	Handicraft
23.	Toda Embroidery t	Handicraft
24.	ThanjavurVeenai	Handicraft
25.	Malabar Pepper	Agricultural
26.	Thanjavur Art Plate Logo	Handicraft
27.	Swamimalai Bronze Icons Logo	Handicraft
28.	Temple Jewellery of Nagercoil Logo	Handicraft
29.	Mahabalipuram Stone Sculpture	Handicraft
30.	Erode Manjal(Erode Turmeric)	Agricultural
31.	Thirubuvanam Silk Sarees	Handicraft
32.	Kodaikanal Malai Poondu	Agricultural
33.	Palani Panchamirtham	Food Stuff
34.	Dindigul Locks	Manufactured
35.	Kandangi Sarees	Handicraft
36.	Sirivilliputtur Palakova	Foodstuff
37.	Kovilpatti Kadalai Mittai	Foodstuff
38.	Thanjavur Pith Works	Handicraft
39.	Arumbavur Wood Carvings	Handicraft