

R.C. Reddy IAS Study Circle

TSPSC GROUP-1 SERVICES

SECTIONAL TEST-5

(GENERAL SCIENCE, INDIA'S ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY; SOCIETY, CULTURE, HERITAGE, ARTS AND LITERATURE OF TS ; SOCIAL EXCLUSION : RIGHTS ISSUES SUCH AS GENDER, CASTE, TRIBE, DISABILITY ETC AND INCLUSIVE POLICIES)

Key with Explanation

1. Answer: (b)

Explanation:

Europa Clipper:

- NASA is preparing the launch of Europa Clipper to explore one of Jupiter's largest moons, Europa.
 - Europa is slightly smaller than the earth's moon, with a surface made of ice. Beneath its icy shell, Europa likely harbours a saltwater ocean, which scientists expect contains over twice as much water as all the oceans here on Earth combined.
- With Europa Clipper, scientists want to investigate whether Europa's ocean could be a suitable habitat for extraterrestrial life.
 - The mission plans to do this by flying past Europa nearly 50 times to study the moon's icy shell, its surface's geology and its subsurface ocean.
- The mission will also look for active geysers spewing out from Europa.

2. Answer: (c)

Explanation:

Mission Indradhanush

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- Launched on 25 December 2014 as a special drive to vaccinate all unvaccinated and partially vaccinated children and pregnant women by 2020 under the Universal Immunization Programme.
- Since the launch of Universal Immunization Programme in 1985, full immunization coverage in India has not surpassed 65% despite all efforts. Mission Indradhanush focuses on interventions to expand to more this coverage to more than 90% children.
- Under Mission Indradhanush, the Government identified 201 high focus districts home to nearly 50% of the country's all unvaccinated or partially vaccinated children.
- As of October 2023, 12 phases have been completed covering a total of 5.06 crore children and 1.25 crore pregnant women. For the first time, in 2023, the campaign covered all districts in the country, and was extended to include children up to five years of age; previous campaigns included children up to two years only.
- The MI provides vaccination against 12 Vaccine-Preventable Diseases (VPD) i.e. diphtheria, Whooping cough, tetanus, polio, tuberculosis, hepatitis B, meningitis and pneumonia, Hemophilus influenza type B infections, Japanese encephalitis (JE), rotavirus vaccine, pneumococcal conjugate vaccine (PCV) and measles-rubella (MR). Hence, Statement 2 is incorrect.

Intensified Mission Indradhanush

- The Intensified Mission Indradhanush (IMI) was launched by the Government of India in 2017 to reach each and every child and all those pregnant women who have been left uncovered under the routine immunization program. The special drive focuses on improving immunization coverage in select districts and cities.
- The IMI 5.0 was launched in 2023 with a special focus on improving the coverage of vaccination for measles and rubella, aiming to eliminate both infections by 2023. 2023 was the first year that the campaign was conducted across all districts in the country, and was extended to include children up to five years of age.

3. Answer: (a)

Explanation:

What is GAGAN?

- About:
 - It is a Space Based Augmentation System (SBAS) jointly developed by ISRO (Indian Space Research Organisation) and AAI to provide the best possible navigational services over Indian FIR (Flight Information Region) with the capability of expanding to neighboring FIRs.
 - GAGAN is a system of satellites and ground stations that provide GPS signal corrections, giving you better position accuracy.
 - It is the first such system developed for India and neighboring countries in the equatorial region.
 - GAGAN System was certified by DGCA (Directorate General of Civil Aviation) in 2015 for Approach with Vertical Guidance (APV 1) and en-route (RNP 0.1) operations.
 - There are only four Space-Based augmentation systems available in the world namely India(GAGAN), US (WAAS) Europe (EGNOS) and Japan (MSAS).



- Services Offered:
 - Aviation, Forest management, Railways signaling, Scientific Research for Atmospheric Studies, Natural Resource and Land Management, Location based services, Mobile, Tourism.
- Coverage Area:
 - GAGAN GEO footprint expands from Africa to Australia and GAGAN system has capability to cater 45 reference stations for expansion to neighboring countries.

- GAGAN provides a civil aeronautical navigation signal consistent with International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPs) as established by the Global Navigation Satellite System (GNSS) Panel.

4. Answer: (b)

Explanation:

What is the Kodaikanal Solar Observatory?

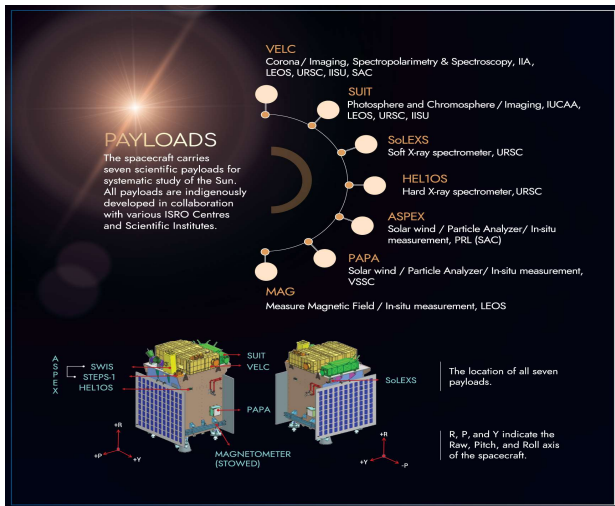
- About: The Kodaikanal Solar Observatory is a solar observatory owned and operated by the Indian Institute of Astrophysics. It was established in 1899.
 - It is on the southern tip of the Palani Hills.
 - The Evershed effect (apparent radial flow of gas observed in the penumbra (outer region) of sunspots on the Sun)was first detected at this observatory in January 1909.
- Cause of Establishment: The establishment of the Kodaikanal Solar Observatory (KoSO) in India, was motivated by the need to understand the link between solar activity and monsoons.
 - The devastating Great Drought of 1875-1877 in India highlighted the potential link between solar activity and seasonal rainfall patterns.
 - India, along with China, Egypt, Morocco, Ethiopia, southern Africa, Brazil, Columbia and Venezuela, suffered concurrent multi-year droughts during 1876-1878, later named the Great Drought, and an associated global famine that killed nearly 50 million.
 - The Famine Commission recommended establishing a solar observatory for systematic solar observations to understand this connection.
 - Charles Michie Smith, a physicist, was entrusted with finding a suitable location.
 - Kodaikanal in Tamil Nadu was chosen for its clear skies, low humidity, and minimal fog.
- Madras Observatory (Chennai, 1792): In 1792, the British East India Company established the Madras Observatory, a first of its kind in this part of the world.
 - Here, astronomical observations of the Sun, the Moon, bright stars and planets recorded during 1812-1825 were preserved in two large data volumes.
 - It was merged with the KoSO following the reorganization of all Indian observatories in April 1899.

5. Answer: (c)

Explanation:

What is Aditya-L1 Mission?

- Aditya-L1 is the first space based observatory class Indian solar mission to study the Sun from a substantial distance of 1.5 million kilometers. It will take approximately 125 days to reach the L1 point. Hence, Statement 1 is correct.
- Aditya-L1 is also ISRO's second astronomy observatory-class mission after AstroSat (2015). The mission's journey is notably shorter than India's previous Mars orbiter mission, Mangalyaan.
- Launched on September 2, 2023, the spacecraft was placed in a halo orbit around the Lagrangian point 1 (L1) of the Sun-Earth system. This Halo-Orbit Insertion (HOI) of Aditya-L1 was accomplished on January 6, 2024. Hence, Statement 2 is correct.
- Payloads:



- Objective: to provide valuable insights into the Sun's corona, photosphere, chromosphere, and solar wind, for a deeper understanding of the Sun's behavior, including its radiation, particle flow, and magnetic fields, and their impact on Earth.

Answer 6 (a)

Explanation:

What is Antiretroviral Therapy (ART)?

- About:
 - Antiretroviral therapy (ART) is a cornerstone treatment for managing HIV/AIDS, a chronic viral infection caused by the human immunodeficiency virus (HIV).
 - This therapy aims to suppress the replication of HIV in the body, thereby reducing viral load, preserving immune function, and improving the quality of life for individuals living with HIV/AIDS.
- Mechanism of Action of Antiretroviral Therapy:
 - Antiretroviral drugs target various stages of the HIV replication cycle, inhibiting viral entry into cells, reverse transcription of viral RNA into DNA, integration of viral DNA into the host genome, and viral assembly and release.
 - By disrupting these processes, ART suppresses viral replication and reduces the viral load in the body.
- Components of Antiretroviral Therapy: ART typically consists of a combination of antiretroviral drugs from different classes, including:
 - Nucleoside Reverse Transcriptase Inhibitors (NRTIs): These drugs interfere with the reverse transcription process, preventing the conversion of viral RNA into DNA. Examples include tenofovir, emtricitabine, and abacavir.
 - Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs): NNRTIs bind to and inhibit the activity of the HIV reverse transcriptase enzyme, blocking viral replication. Examples include efavirenz, nevirapine, and rilpivirine.
 - Protease Inhibitors (PIs): PIs block the activity of the HIV protease enzyme, preventing the cleavage of viral polyproteins and the maturation of infectious viral particles. Examples include ritonavir, atazanavir, and darunavir.
 - Integrase Strand Transfer Inhibitors (INSTIs): INSTIs inhibit the integration of viral DNA into the host genome, preventing the establishment of a permanent viral reservoir. Examples include raltegravir, dolutegravir, and bictegravir.

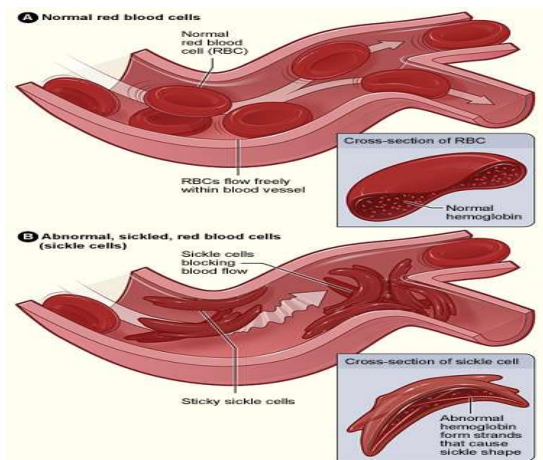
- Entry Inhibitors: Entry inhibitors block the interaction between viral proteins and host cell receptors, preventing viral entry into cells. Examples include maraviroc and enfuvirtide.
- Benefits of Antiretroviral Therapy:
 - Viral Suppression: ART reduces the viral load in the body, slowing disease progression and preserving immune function.
 - Prevention of Opportunistic Infections: By restoring immune function, ART helps prevent opportunistic infections and AIDS-related complications.
 - Improvement in Quality of Life: Effective ART allows individuals living with HIV/AIDS to lead healthier and more productive lives, reducing morbidity and mortality.
 - Prevention of Transmission: Viral suppression achieved through ART significantly reduces the risk of HIV transmission to sexual partners and vertical transmission from mother to child during pregnancy and childbirth.

Answer 7 (c)

Explanation:

What is Sickle-Cell Disorder?

- About:
 - Sickle Cell Disease (SCD) is an inherited hemoglobin disorder characterized by a genetic mutation that causes red blood cells (RBCs) to assume a sickle or crescent shape rather than their normal round shape.
 - This abnormality in RBCs results in increased rigidity, impairing their ability to circulate effectively throughout the body. Consequently, individuals with SCD often experience complications such as anaemia, organ damage, recurrent and severe pain episodes, and a shortened lifespan.
 - As per the Ministry of Health and Family Welfare, marginalised tribal populations are most vulnerable to SCD.
- Symptoms: Symptoms of sickle cell disease can vary, but some common symptoms are-
 - Chronic anaemia which leads to fatigue, weakness, and paleness.
 - Painful episodes (also known as sickle cell crisis) cause sudden and intense pain in the bones, chest, back, arms, and legs.
 - Delayed growth and puberty.
- Treatment Processes:
 - Blood Transfusions: These can help relieve anaemia and reduce the risk of pain crises.
 - Hydroxyurea: This medication can help reduce the frequency of painful episodes and prevent some of the disease's long-term complications.
 - Gene Therapy: It can also be treated by bone marrow or stem cell transplantation by methods like Clustered regularly interspaced short palindromic repeats (CRISPR).



Answer 8 (a)

Explanation:

Recently, the Indian Prime Minister laid the foundation stone of the second rocket launch port of the ISRO at Kulasekarapattinam in Tamil Nadu.

What is the Need for a New Launch port?

- Capacity and Overburdening:
 - The opening of the space sector to private players is expected to lead to a significant increase in commercial launches.
 - This surge in demand could potentially overwhelm existing launch facilities, such as the Satish Dhawan Space Centre (SDSC) SHAR (Sriharikota Range) in Sriharikota.
 - Therefore, establishing a new launch port ensures that there is sufficient capacity to accommodate the increased number of launches without overburdening existing facilities.
- Diversification of Launch Services:
 - By dedicating the SDSC SHAR primarily for bigger and heavy-lift-off missions, and creating the Kulasekarapattinam launchport for smaller payloads, the ISRO can diversify its launch services.
 - This specialisation allows for more efficient utilization of resources and infrastructure tailored to specific mission requirements.
- Support for Private Players:
 - The establishment of a new launchport provides private players with dedicated infrastructure to develop space-qualified subsystems, build satellites, and launch vehicles.
 - This encourages private investment and participation in the space sector, fostering innovation and competition.

What is the Significance of Kulasekarapattinam Launchport?

- Geographical Advantage:
 - The Kulasekarapattinam launchport provides a natural advantage to ISRO's future launches pertaining to the Small Satellite Launch Vehicle (SSLV).

- Allowing a direct southward and smaller launch trajectory for the lightweight SSLVs carrying less fuel, the Kulasekarapattinam facility will boost ISRO's attempts to enhance payload capacities.
- Optimised Trajectory:
 - Launches from Kulasekarapattinam can follow a straight southward flight path, as opposed to the longer trajectory followed by launches from the Satish Dhawan Space Centre (SDSC) SHAR, which necessitates skirting eastwards around Sri Lanka (dogleg manoeuvring).
 - This straight trajectory minimises fuel consumption, particularly crucial for SSLVs with limited onboard fuel capacity.
- Equatorial Location:
 - Like the SDSC SHAR, Kulasekarapattinam is also situated near the equator.
 - Launch sites near the equator benefit from the Earth's rotation, which imparts a significant velocity boost to rockets during liftoff.
 - This boost in velocity allows for increased payload capacity, particularly advantageous for missions aiming for geostationary orbit.

9. Answer: (d)

Explanation:

What is a Small Satellite Launch Vehicle?

- Small Satellite Launch Vehicle (SSLV) is a three stage Launch Vehicle configured with three Solid Propulsion Stages and a liquid propulsion-based Velocity Trimming Module (VTM) as a terminal stage. Hence, Statement 1 is correct.
- SSLV is capable of launching below 500kg satellites in 500km planar orbit. Hence, Statement 2 is correct.
- A planar orbit, also known as a low Earth orbit (LEO), is an orbit around the Earth that lies close to the Earth's equatorial plane. In this type of orbit, the satellite's path forms a relatively flat plane around the Earth..
- Key Features:
 - Low cost,
 - Low turn-around time,
 - Flexibility in accommodating multiple satellites, Hence, Statement 3 is correct.
 - Launch demand feasibility,
 - Minimal launch infrastructure requirements, etc.
- Significance:
 - The Era of small satellites:
 - Earlier, the bigger satellite payloads were given importance, but as the sector grew, many players emerged like businesses, government agencies, universities, and laboratories began to send satellites. Mostly all of them fall in the category of small satellites.
 - The Rise in Demand:
 - The demand for the launch of small satellites has increased at a rapid pace in the last eight to ten years, due to the ever-growing need for space-based data, communication, surveillance, and commerce.
 - Saves cost:
 - Satellite manufacturers and operators do not have the luxury of waiting months for space on a rocket or paying exorbitant trip charges.

- Therefore, Organizations are increasingly developing a constellation of satellites in space.
- Projects like SpaceX's Starlink and One Web are assembling a constellation of hundreds of satellites.
- Business Opportunity: with the rise in demand, the rockets could be launched frequently with less cost, this provides a business opportunity for space agencies like ISRO to tap the potential of the sector as most of the demand comes from companies that are launching satellites for commercial purposes.

10. Answer: (a)

Explanation:

What is the Genome India Project?

- DBT initiated the ambitious Genome India Project (GIP) on 3rd January 2020. It is led by the Centre for Brain Research at the Indian Institute of Science, Bengaluru, and involves collaboration with 20 institutions. Hence, Statement 2 is correct.
- The project involves whole-genome sequencing and data analysis of 10,000 individuals to understand disease nature in the Indian population and develop predictive diagnostic markers. Hence, Statement 1 is incorrect.
 - India's population of 1.3 billion comprises over 4,600 population groups, many of which are endogamous (Matrimony in Close Ethnic Groups), contributing to genetic diversity and disease-causing mutations.
- This huge dataset of 8 petabytes will be stored at the Indian Biological Data Centre (IBDC) in Faridabad.
 - Inaugurated in 2022, the IBDC is India's first national repository for life science data.
- Significance:
 - An India-specific genetic database is crucial because mutations like MYBPC3, linked to early cardiac arrest, are more prevalent locally than globally, affecting 4.5% of the Indian population.
 - India, boasting the world's largest genetic laboratory, plays a pivotal role in driving the country's burgeoning biology sector, which has seen exponential growth from USD 10 billion in 2014 to over USD 130 billion in 2024, shaping India's future trajectory.

11. Answer: (a)

Explanation:

NASA's First Asteroid Samples Land on Earth

- The NASA's Origins, Spectral Interpretation, Resource Identification, and Security-Regolith Explorer (OSIRIS-REx) spacecraft, launched on 8th September 2016, has successfully delivered the first asteroid samples from the near-Earth asteroid Bennu (formerly 1999 RQ36) to Earth after a seven-year journey, bringing valuable 4.5 billion-year-old samples.
- The OSIRIS-REx returned to Earth on Sept. 24, 2023, to drop off material from asteroid Bennu. The spacecraft didn't land, but continued on to a new mission, OSIRIS-APEX, to explore asteroid Apophis.
- Meanwhile, scientists hope the Bennu sample OSIRIS-REx dropped into the Utah desert will offer clues to whether asteroids colliding with Earth billions of years ago brought water and other key ingredients for life here.

12. Answer: (d)

Explanation:

What is Chandrayaan-3 Mission?

- About:
 - Chandrayaan-3 is India's third lunar mission and second attempt at achieving a soft landing on the moon's surface.
 - The mission took off from the Satish Dhawan Space Center (SDSC) in Sriharikota on July 14, 2023, at 2:35 pm.
 - It consists of an indigenous Lander module (LM), Propulsion module (PM) and a Rover with an objective of developing and demonstrating new technologies required for Inter planetary missions.
 - Hence, all Statements are correct.
- Mission Objectives of Chandrayaan-3:
 - To demonstrate Safe and Soft Landing on Lunar Surface
 - To demonstrate Rover roving on the moon and
 - To conduct in-situ scientific experiments.
- Features:
 - The six payloads on the Vikram lander and rover Pragyan remain the same as the Chandrayaan-2 mission.
 - The scientific payloads on the lander aim to study various aspects of the lunar environment. These payloads include studying lunar quakes, thermal properties of the lunar surface, changes in plasma near the surface, and accurately measuring the distance between Earth and the



moon.

- The propulsion module of Chandrayaan-3 features a new experiment called Spectro-polarimetry of Habitable Planet Earth (SHAPE).
 - SHAPE aims to search for smaller planets with potential habitability by analyzing reflected light.
- Changes and Improvements in Chandrayaan-3:
 - The landing area has been expanded, providing flexibility to land safely within a larger designated area.
 - The lander has been equipped with more fuel to enable longer-distance travel to the landing site or alternate locations.
 - The Chandrayaan-3 Lander has solar panels on four sides, instead of only two in Chandrayaan-2.

- High-resolution images from the Chandrayaan-2 orbiter are used to determine the landing location, and physical modifications have been made to enhance stability and sturdiness.
- Additional navigational and guidance instruments are on board Chandrayaan-3 to continuously monitor the Lander's speed and make the necessary corrections.
 - This includes an instrument called Laser Doppler Velocimeter, which will fire laser beams to the lunar surface to calculate the Lander's speed.
- Launch and Timeline:
 - The LVM3 M4 launcher has been successfully utilized to launch Chandrayaan-3
 - Around 16 minutes after the LVM-3 lifted off, the spacecraft separated from the rocket. It entered into an elliptic parking orbit (EPO).
 - Chandrayaan-3's journey is estimated to take approximately 42 days, with a landing scheduled for August 23, 2023 at the lunar dawn.
 - The lander and the rover will have a mission life of one lunar day (about 14 Earth days) as they work on solar energy.
 - The landing site for Chandrayaan-3 is near the lunar south pole.

13. Answer: (b)

Explanation:

What is Pegasus Spyware?

- About:
 - Pegasus spyware is a highly invasive mobile surveillance tool that can secretly infiltrate and monitor smartphones, collecting data and information from various apps and sources.
 - It was developed by the Israeli cyber-intelligence firm NSO Group, which claims to sell it only to government agencies for fighting crime and terrorism.
 - NSO emphasizes mechanisms in place to avoid targeting journalists, lawyers, and human rights defenders not involved in terror or serious crimes.
- Operating Procedure:
 - Pegasus uses “zero-click” methods to infect devices; it is a malicious software that allows spyware to be installed on a device without the device owner's consent.
 - The spyware doesn't necessitate any user actions for installation, distinguishing it from regular apps that require explicit user confirmation.
 - It can exploit vulnerabilities in apps such as WhatsApp, iMessage, or FaceTime, and send a message or a call that triggers the installation of the spyware, even if the user does not open or answer it.
 - Pegasus is a spyware that can exploit zero-day vulnerabilities to deploy spyware on Apple products.
 - A zero-day vulnerability is an undiscovered flaw or bug in an operating system that the mobile phone's manufacturer does not yet know about and so has not been able to fix.
- Targets:
 - Several investigations and reports have revealed that Pegasus spyware has been used to spy on journalists, human rights activists, lawyers, opposition leaders, and heads of state.
 - Some of the countries that have been accused of using Pegasus spyware to target their critics and enemies include Saudi Arabia, Mexico, India, Morocco, Hungary, Azerbaijan, and Rwanda.

14. Answer: (d)

Explanation:

What does mRNA do?

- mRNA (Messenger RNA) carries important messages from our DNA (Deoxyribonucleic acid), to the cell's machinery, telling it how to make specific proteins. Hence, Statement 1 is correct.
 - Imagine DNA as a library of cookbooks filled with recipes (genes) to create different proteins.
- Our bodies need around 100,000 proteins to work properly, helping with tasks like breaking down food and performing vital chemical reactions.
- When a cell needs a specific protein, it doesn't directly read the recipe from DNA. Instead, it makes a copy called mRNA.
- This mRNA serves as a messenger, carrying the protein-making instructions. It's made up of four building blocks (A, U, C, G), forming words of only three letters.
- By reading this mRNA recipe, cells easily know how to create the required protein. Hence, Statement 2 is correct.
- Cells are quite good at recognizing, using, and then getting rid of mRNA once it's done its job.
- However, changes or mistakes in the DNA's recipe book (mutations) can mess up the mRNA instructions, leading to errors in making essential proteins, which can cause diseases.

15. Answer (a)

Explanation:

Why in News?

The Prime Minister of India inaugurated the Global Partnership on Artificial Intelligence (GPAI) Summit.

- India is the lead chair of GPAI in 2024. The GPAI is an alliance of 28 countries; the European Union adopted the 'New Delhi Declaration' of the GPAI.

What are the Key Highlights of the GPAI Summit?

- The Prime Minister of India discussed the national AI portal, highlighting the AIRAWAT initiative and raising concerns over the potential misuse of deep fake technology.
- YUVAi was prominently featured at the GPAI Summit, and the winners of the YUVAi initiative and start-ups showcased their AI models and solutions.
- The Prime Minister suggested using AI to make digital services available in local languages to increase digital inclusion.
- Responsible AI, data governance, future of work, and innovation and commercialization are the four different themes of four sessions organized in the GPAI.
- The summit also included various side events showcasing AI progress and engaging in discussions, such as industry panel discussions, workshops, research symposiums, hackathons, and the Global AI Expo.

What is the Delhi Declaration of the GPAI?

- It acknowledges the need to harness new opportunities and mitigate the risks arising from the development, deployment, and use of Artificial Intelligence (AI).
- Affirms the commitment to uphold human dignity, human rights, and democratic values.
- Emphasizes the importance of fostering trust, transparency, accountability, and inclusiveness in AI.

- Recognizes the potential of AI to contribute to the United Nations Sustainable Development Goals and address global challenges.
- Encourages international cooperation and coordination on AI research, innovation, and policy.
- Supports the development of a comprehensive framework that encompasses shared principles for safe and trusted AI.
- Endorses India's proposal to establish and maintain a Global Digital Public Infrastructure Repository (GDPIR) to share digital public goods.
 - GDPIR was established under the Ministry of Electronics and Information Technology (MeitY), to serve as an extensive repository, consolidating crucial insights and knowledge from both G20 members and guest nations.
- Calls for further dialogue on AI governance and ethics among stakeholders.

16. Answer: (a)

Explanation:

What is NavIC?

- About:
 - NavIC or the Indian Regional Navigation Satellite System (IRNSS) is designed with a constellation of 7 satellites and a network of ground stations operating 24×7. Hence, Statement 1 is correct.
 - There are a total of eight satellites however only seven remain active.
 - Three satellites in geostationary orbit and four satellites in geosynchronous orbit. Hence, Statement 2 is incorrect.
 - The constellations' first satellite (IRNSS-1A) was launched on 1st July 2013 and the eighth satellite IRNSS-1I was launched in April 2018.
 - With the seventh launch of the constellation's satellite (IRNSS-1G), IRNSS was renamed NavIC by India's Prime Minister in 2016.
 - It was recognised by the International Maritime Organization (IMO) as a part of the World-Wide Radio Navigation System (WWRNS) for operation in the Indian Ocean Region in 2020.
- Potential Uses:
 - Terrestrial, aerial and marine navigation;
 - Disaster management;
 - Vehicle tracking and fleet management (especially for mining and transportation sector);
 - Integration with mobile phones;
 - Precise timing (as for ATMs and power grids);
 - Mapping and geodetic data capture.

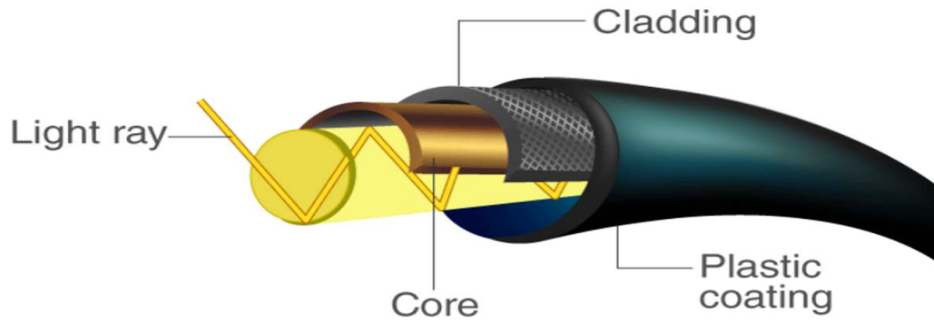
17. Answer: (a)

Explanation:

What do we know about Optical Fibre?

- About:
 - Optical fibre is the backbone of the digital infrastructure — the data is transmitted by light pulses travelling through long strands of thin fibre.
 - Metal wires are preferred for transmission in optical fibre communication as signals travel with fewer damages.
 - The optical fibre works on the principle of total internal reflection (TIR).

- Light rays can be used to transmit a huge amount of data (In case of long straight wire without any bend).
 - In case of a bend, the optical cables are designed such that they bend all the light rays inwards (using TIR).



- Benefits:
 - High Speed:
 - Fiber provides more bandwidth and has standardized performance up to 10 Gbps and beyond, something that it is impossible to achieve when using copper.
 - More bandwidth means that fiber can carry more information with far greater efficiency than copper wire.
 - Range of Transmission:
 - Since data travels in the form of light in fiber-optic cables, very little signal loss occurs during transmission and data can move at higher speeds and greater distances.
 - Not susceptible to interference:
 - Fiber-optic cable is also much less susceptible to noise and electromagnetic interference than copper wire.
 - It is so efficient, in fact, that roughly 99.7% of the signal reaches the router in most cases.
 - Durability:
 - Fiber-optic cable is completely immune to many environmental factors that affect copper cable.
 - The core is made of glass, which is an insulator, so no electric current can flow through.

18. Answer: (c)

Explanation:

What is a Patent?

- About:
 - A Patent is a statutory right for an invention granted for a limited period of time to the patentee by the Government, in exchange of full disclosure of his invention for excluding others, from making, using, selling, importing the patented product or process for producing that product for those purposes without his consent.
 - The patent system in India is governed by the Patents Act, 1970 as amended by the Patents (Amendment) Act, 2005 and the Patents Rules, 2003.
 - The Patent Rules are regularly amended in consonance with the changing environment, most recent being Patents (Amendment) Rules, 2021.
- Term of a Patent:
 - The term of every patent granted is 20 years from the date of filing of application.

- However, for applications filed under the national phase under Patent Cooperation Treaty (PCT), the term of patent will be 20 years from the international filing date accorded under PCT.
 - PCT is an international treaty with more than 150 Contracting States, making it possible to seek patent protection for an invention simultaneously in each of a large number of countries by filing an international patent application.
 - Such an application may be filed by anyone who is a national or resident of a PCT Contracting State, and generally be filed with the national patent office of the Contracting State or at the applicant's option, with the International Bureau of WIPO in Geneva.
- Criteria of Patentability:
 - An invention is patentable subject matter if it meets the following criteria,
 - It should be novel.
 - It should have inventive steps or it must be non-obvious
 - It should be capable of Industrial application.
 - It should not attract the provisions of section 3 and 4 of the Patents Act 1970.
- Scope of Patent Protection:
 - Patent protection is a territorial right and therefore it is effective only within the territory of India. There is no concept of global patent.
 - However, filing an application in India enables the applicant to file a corresponding application for the same invention in convention countries or under PCT, within or before expiry of twelve months from the filing date in India.
- Patents Act, 1970:
 - This principal law for patenting system in India came into force in the year 1972. It replaced the Indian Patents and Designs Act 1911.
 - The Act was amended by the Patents (Amendment) Act, 2005, wherein product patent was extended to all fields of technology including food, drugs, chemicals and microorganisms.
 - After the amendment, the provisions relating to Exclusive Marketing Rights (EMRs) have been repealed, and a provision for enabling grant of compulsory license has been introduced. The provisions relating to pre-grant and post-grant opposition have also been introduced.

19. Answer: (d)

Explanation:

- About Li-ion Batteries:
 - A lithium-ion battery or Li-ion battery is a type of rechargeable battery.
 - Li-ion batteries use an intercalated (Intercalation is the reversible inclusion or insertion of a molecule into materials with layered structures) lithium compound as one electrode material, compared to the metallic lithium used in a non-rechargeable lithium battery.
 - The battery consists of electrolyte, which allows for ionic movement, and the two electrodes are the constituent components of a lithium-ion battery cell.
 - Lithium ions move from the negative electrode to the positive electrode during discharge and back when charging.
- Lithium-ion Battery Applications:
 - Electronic gadgets, Tele-communication, Aerospace, Industrial applications.
 - Lithium-ion battery technology has made it the favourite power source for electric and hybrid electric vehicles.
- Disadvantages of Li-ion Batteries:

- Long charging times.
- Safety issues as instances of batteries catching fires have been there.
- Expensive to manufacture.
- While the Li-ion batteries are seen as sufficiently efficient for applications such as phones and laptops, in case of EVs, these cells still lack the range that would make them a viable alternative to internal combustion engines.

20. Answer: (d)

Explanation:

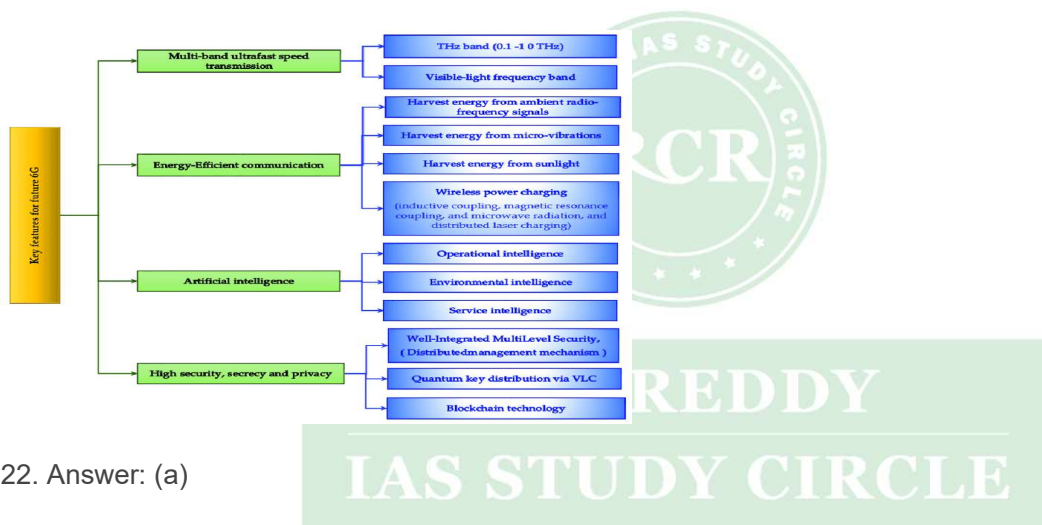
- Electrochemical Cells:
 - Electrochemical cells are devices that can convert chemical energy into electrical energy, or vice versa. Hence, Statement 1 is correct.
 - They can produce an electric current through chemical reactions, or they can use electrical energy to facilitate chemical reactions.
 - Electrochemical cells, like voltaic or galvanic cells, operate via redox reactions wherein electrons are liberated during oxidation and utilized during reduction. Hence, Statement 2 is correct.
 - A standard cell comprises two sections accommodating metal electrodes immersed in specific electrolytes.
 - The electrodes, namely the anode and the cathode, conduct electricity.
 - The anode, where oxidation occurs, and the cathode, where reduction takes place, form the fundamental components of the cell.
 - Electrons flow from the negatively charged anode to the positively charged cathode through an external circuit, providing power for a variety of uses.
 - Connecting these halves is a wire and a salt bridge, facilitating the movement of ions between them.
 - The energy carried by electrons dictates the source voltage, steering the electron flow within the circuit.
 - In ideal conditions, the source voltage is equal to the terminal voltage, ensuring an efficient power supply.
 - Advancements in cell design and materials, seen in nickel-cadmium, zinc-copper, and modern lithium-ion cells, showcase increased voltages and enhanced efficiency.

21. Answer: (d)

Explanation:

What is 6G Technology?

- 6G (Sixth-Generation Wireless) is the successor to 5G cellular technology.
- It will be able to use higher frequencies than 5G networks and provide substantially higher capacity and much lower latency (delay).
- One of the goals of 6G internet will be to support one microsecond-latency communication (delay of one-microsecond in communication). Hence, Statement 1 is correct.
 - This is 1,000 times faster - or 1/1000th the latency - than one millisecond throughput.
- It seeks to utilize the terahertz band of frequency which is currently unutilized. Hence, Statement 2 is correct.
 - Terahertz waves fall between infrared waves and microwaves on the electromagnetic spectrum.
 - These waves are extremely tiny and fragile, but there's a huge amount of free spectrum up there that would allow for spectacular data rates.



22. Answer: (a)

Explanation:

What is Perseverance Rover?

- About:
 - Perseverance is the most advanced, most expensive and most sophisticated mobile laboratory sent to Mars.
 - It is different from previous missions because it is capable of drilling and collecting core samples of the most promising rocks and soils and setting them aside in a "cache" on the surface of Mars.
 - It is the centerpiece of NASA's Mars 2020 mission which also included the small robotic and coaxial helicopter Ingenuity.
- Launch: 30th July 2020
- Landing: 18th February 2021
- Power Source:
 - A Multi-Mission Radioisotope Thermoelectric Generator (MMRTG) which converts heat from the natural radioactive decay of plutonium (Plutonium Dioxide) into electricity.

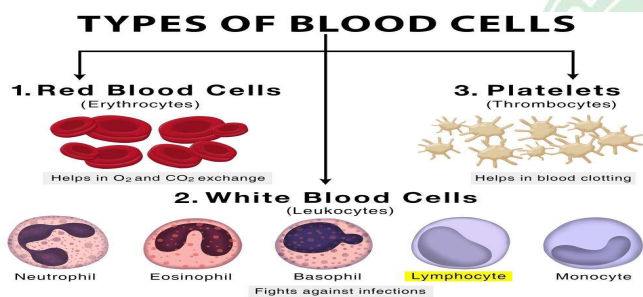
- Objectives:
 - Perseverance's primary objective is looking for signs of ancient microbial life.
 - The rover is studying and analyzing the Red Planet's regolith, rock and dust, and is the first rover to collect and cache samples.

23. Answer: (d)

Explanation:

What are T Cells?

- T cells, also known as T lymphocytes, are a type of white blood cell that play a central role in the immune response.
- T cells are involved in cell-mediated immunity, which means they help the body recognize and respond to foreign substances, such as viruses, bacteria, and abnormal cells, such as cancer cells.
- There are two major types of T cells: the helper T cell and the cytotoxic T cell.
 - As the names suggest, helper T cells 'help' other cells of the immune system, whilst cytotoxic T cells kill virally infected cells and tumors.
- Hence, all Statements are correct.



24. Answer: (c)

Explanation:

What is Genetically Modified Organism (GMO)?

- About:
 - A GMO refers to an entity, whether it's an animal, plant, or Microorganism, that has undergone modifications to its DNA using genetic engineering methods. Hence, Statement 1 is correct.
 - Across generations, specific traits have been cultivated in crops like corn, animals like cattle, and even domestic companions like dogs through selective breeding. Yet, in recent decades, the progress of biotechnology has enabled researchers to directly manipulate the genetic makeup of microorganisms, plants, and animals.
- Genetic Modification:
 - It involves altering the DNA of an organism to introduce specific traits or characteristics. There are several techniques used in genetic modification, each with its own advantages and applications.
- Usage of GMO Across World:
 - Globally, about a dozen GMO species are being farmed on a large scale. According to a report by The Royal Society, a London-based fellowship of scientists, some 28 countries allow large-scale farming of these GMO crops.

- In India, the Food Safety and Standards Act, 2006, prohibits import, manufacture, use or sale of GM food without FSSAI's approval. Hence, Statement 2 is correct.
- So far, India has allowed cultivation and import of only one GMO — cotton, a non-food crop.
 - In 2022, India also allowed commercial cultivation of GM mustard, but the move has been challenged and is pending at the Supreme Court (SC).
- Import of GMO in India:
 - The US, Brazil and Argentina are the top three countries in terms of land under GMO cultivation. They are also major exporters of foods to India.
 - Argentina and Brazil are India's top two sources of degummed soyabean oil in 2022-23.
 - Overall, the import of fresh fruit and vegetables in India has increased by 25% in the past decade, as per the Union Ministry of Commerce and Industry.

25. Answer: (d)

Explanation:

What is the Deep Ocean Mission?

- About:
 - Deep Ocean Mission (DOM) is an ambitious initiative of the Ministry of Earth Sciences (MoES) which aims to develop technologies and capabilities for deep sea exploration.
 - Also, DOM is one of nine missions under the Prime Minister's Science, Technology, and Innovation Advisory Council (PMSTIAC).
- Key Pillars of the Mission:
 - Technological Advancements for Deep-Sea Mining And Crewed Submersibles
 - Ocean Climate Change Advisory Services
 - Innovations for Deep-Sea Biodiversity Exploration and Conservation
 - Survey and Exploration of Deep-Ocean Minerals
 - Harvesting Energy and Freshwater from the Ocean
 - Establishment of an Advanced Marine Station for Ocean Biology
- Major Advancement in DOM Objectives:
 - Samudrayaan and Matsya6000: As a part of DOM, India's flagship deep ocean mission, Samudrayaan, was initiated in 2021 by the Minister of Earth Sciences.
 - Hence, Statement 2 is correct.
 - With Samudrayaan, India is embarking on a groundbreaking crewed expedition to reach a depth of 6,000 m to the ocean bed in the Central Indian Ocean.
 - This historic journey will be accomplished by Matsya6000, a deep-ocean submersible designed to accommodate a crew of three members.
 - It is constructed from a titanium alloy, the sphere is engineered to withstand pressures of up to 6,000 bar.

26. Answer: (a)

Explanation:

What is the NETRA Project & Its Advantage?

- About: 'Project NETRA' is an early warning system in space to detect debris and other hazards to Indian satellites.

- Once operational, it will give India its own capability in Space Situational Awareness (SSA) like the other space powers.
- Need: With countries launching more and more satellites, each one of them being a strategic or commercial asset, avoiding collisions could become a challenge in the future.
 - For protecting its space assets, the ISRO was forced to perform 19 Collision Avoidance Manoeuvres (CAM) in 2021.
- Modus Operandi: Under NETRA, the ISRO plans to put up many observational facilities: connected radars, telescopes, data processing units and a control centre.
- Benefits: NETRA can spot, track and catalogue objects as small as 10 cm, up to a range of 3,400 km and equal to a space orbit of around 2,000 km.
 - The NETRA effort would make India a part of international efforts towards tracking, warning about and mitigating space debris.
 - More importantly, the SSA also has a military quotient to it and adds a new ring to the country's overall security, against attacks from air, space or sea.
 - This is a vital requirement for protecting our space assets and a force multiplier.

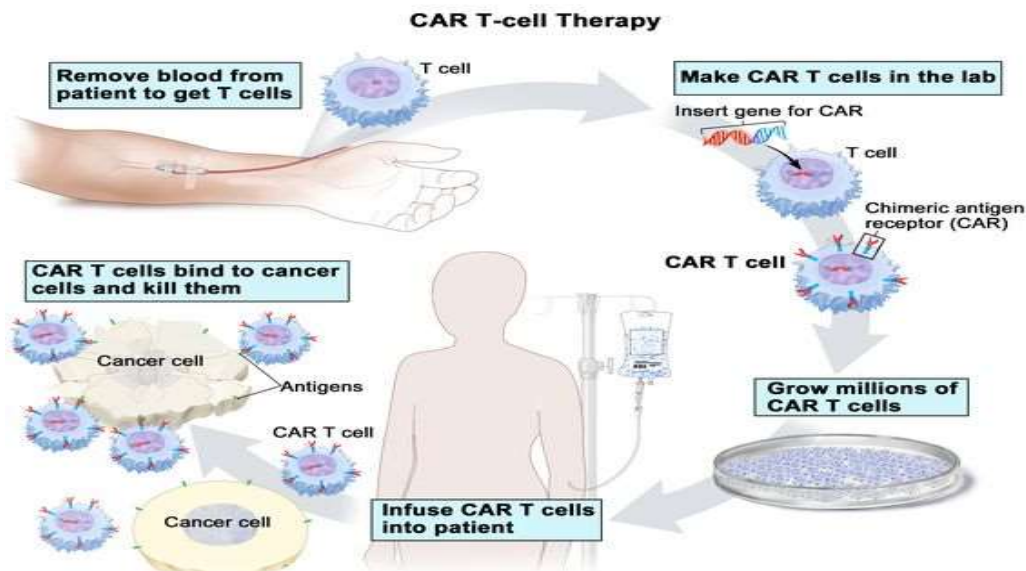
27. Answer: (b)

Explanation:

What is CAR T-cell Therapy?

- About:
 - CAR T-cell therapies are a major breakthrough in cancer treatment.
 - Unlike chemotherapy or immunotherapy which involve taking drugs, CAR T-cell therapies use a patient's own cells. They are modified in the laboratory to activate T-cells and target tumor cells.
 - CAR T-cell therapy has been approved for leukaemias (cancers arising from the cells that produce white blood cells) and lymphomas (arising from the lymphatic system).
- Procedure:
 - T cells are taken from a patient's blood and then the gene for a special receptor that binds to a certain protein on the patient's cancer cells is added to the T cells in the laboratory.
 - The special receptor is called a chimeric antigen receptor (CAR). Large numbers of the CAR T cells are grown in the laboratory and given to the patient by infusion.





- Significance:
 - CAR T-cell therapies are even more specific than targeted agents and directly stimulate the patient's immune system to fight cancer, leading to greater clinical efficacy.
 - That's why they're referred to as "living drugs."

28. Answer (a)

Explanation:

The Royal Swedish Academy of Sciences awarded the Nobel Prize in Chemistry 2023 to Mounqi G Bawendi, Louis E Brus, and Alexei I Ekimov for their groundbreaking discovery and synthesis of quantum dots.

How did Scientists Discover Quantum Dots?

- Background:
 - Traditionally, all pieces of a pure element, regardless of size, were believed to have identical properties due to the uniform distribution of electrons.
 - However, about forty years ago, scientists discovered that nanoparticles on the nanoscale, typically 1 to 100 billionths of a meter in size, exhibited distinct behaviors different from their larger counterparts of the same element, challenging this conventional belief.
- The Nobel Laureates' Contributions:
 - Alexei Ekimov: In around 1980, Alexei Ekimov was the first to observe the anomalous behavior in Copper Chloride nanoparticles.
 - He successfully manufactured these nanoparticles, showcasing their distinctive properties.
 - Louis Brus: American scientist Louis Brus made a similar discovery involving Cadmium Sulphidenanoparticles.
 - Like Ekimov, he could create these nanoparticles with altered properties.
 - Mounqi Bawendi: Mounqi Bawendi, who initially collaborated with Louis Brus, later played a pivotal role in simplifying the production methods for nanoparticles with unique characteristics.
 - His work paved the way for efficient and controlled manufacturing of nanoparticles displaying desired deviant behaviors.

- Factor Responsible for Distinctive Properties of Nanoparticles:
 - The unconventional behavior of small nanoparticles is a result of the emergence of quantum effects.
 - Despite nanoparticles being considerably larger than individual atoms, a crucial insight emerged in the 1930s, that when particles are reduced to the nanoscale, quantum effects can come into play.
 - This is primarily because, under such conditions, electrons within atoms find themselves confined within a limited space.
 - Typically, electrons move within a relatively spacious area outside the nucleus of an atom.
 - However, as particle size drastically decreases, electrons experience increasing constraints, leading to the manifestation of these peculiar quantum effects.
 - This profound understanding, as observed and demonstrated by the Nobel Laureates, Ekimov and Brus in their laboratories, resulted in the creation of nano-sized particles with distinct behaviors compared to their larger counterparts of the same element.
 - These remarkable nanoparticles, possessing unique properties, came to be known as quantum dots.
- Feature of Quantum Dots: Quantum dots are nanoscale particles, typically ranging in size from 1 to 100 nanometers. These minuscule structures possess unique properties that are governed by their size.
 - Notably, the size of quantum dots determines the colour of light they emit, with smaller dots emitting blue light and larger ones shining in yellow and red.

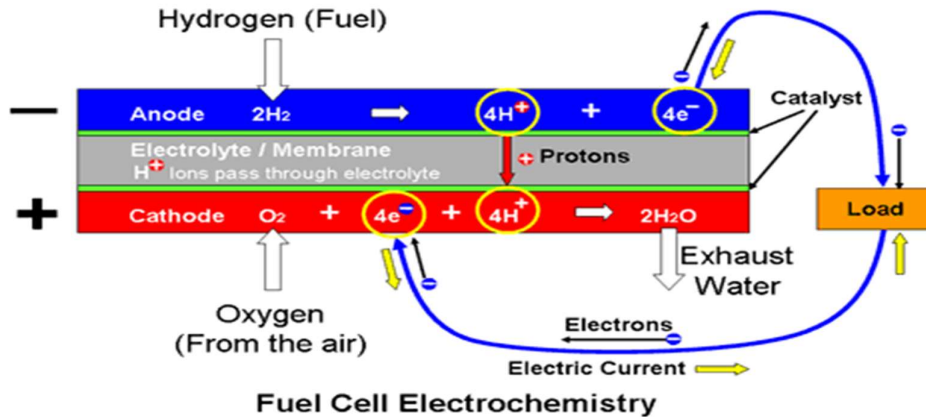
29. Answer (b)

Explanation:

What is a Green Hydrogen Fuel Cell?

- About:
 - Green Hydrogen Fuel Cells are a clean, reliable, quiet, and efficient source of high-quality electric power.
 - They use Green Hydrogen as a fuel to drive an electrochemical process that produces electricity, with water and heat as the only by-products.
- Green Hydrogen:
 - Green hydrogen is a type of hydrogen produced through a process called electrolysis, using renewable energy sources like wind or solar power.
 - It involves splitting water (H_2O) into its constituent elements, hydrogen (H_2) and oxygen (O_2), with zero greenhouse gas emissions.
- Fuel Cell:
 - A fuel cell is an electrochemical device that converts chemical energy (in this case, hydrogen) into electrical energy.
 - It consists of two electrodes (anode and cathode) separated by an electrolyte.
- The Process of Generating Electricity:
 - Green hydrogen is supplied to the anode side of the fuel cell.
 - At the anode, hydrogen molecules release electrons and become positively charged hydrogen ions (protons).
 - Electrons flow from the anode to the cathode through an external circuit, generating an electric current.
 - Oxygen from the air is supplied to the cathode.

- At the cathode, oxygen molecules combine with electrons and protons to produce water vapor (H_2O) as a byproduct.



Fuel Cell Electrochemistry

- Advantages:
 - The only byproduct of green hydrogen fuel cells is water, making them a zero-emission energy source.
 - Hydrogen fuel cell vehicles can be refueled in a matter of minutes, similar to traditional vehicles.
- Challenges:
 - Currently, the production of green hydrogen can be expensive, but ongoing research aims to reduce costs.
 - The development of a hydrogen infrastructure, including production, storage, and distribution, is essential for widespread adoption.

30. Answer (c)

Explanation:

What is the Production Linked Incentive Scheme (PLI)?

- About:
 - The PLI scheme was conceived to scale up domestic manufacturing capability, accompanied by higher import substitution and employment generation.
 - Launched in March 2020, the scheme initially targeted three industries:
 - Mobile and allied Component Manufacturing
 - Electrical Component Manufacturing and
 - Medical Devices.
 - Later, it was extended to 14 sectors.
 - In the PLI scheme, Domestic and Foreign companies receive financial rewards for manufacturing in India, based on a percentage of their revenue over up to five years.
- Targeted Sectors:
 - The 14 sectors are mobile manufacturing, manufacturing of medical devices, automobiles and auto components, pharmaceuticals, drugs, specialty steel, telecom & networking products, electronic products, white goods (ACs and LEDs), food products, textile products, solar PV modules, advanced chemistry cell (ACC) battery, and drones and drone components.
- Incentives Under the Scheme:
 - The incentives given, are calculated on the basis of incremental sales.
 - In some sectors such as advanced chemistry cell batteries, textile products and the drone industry, the incentive to be given will be calculated on the basis of sales, performance and local value addition done over the period of five years.

- The emphasis on R&D investment will also help the industry keep up with global trends and remain competitive in the international market.
- Success in Smartphone Manufacturing:
 - In FY 2017-18, mobile phone imports were USD 3.6 billion, while exports were a mere USD 334 million, resulting in a -USD 3.3 billion trade deficit.
 - By FY 2022-23, imports reduced to USD 1.6 billion, while exports surged to nearly USD 11 billion, yielding a positive net exports of USD 9.8 billion.

31. Answer: (d)

Explanation:

What is Dengue?

- About:
 - Dengue is a mosquito-borne tropical disease caused by the dengue virus (Genus Flavivirus), transmitted by several species of female mosquito within the genus Aedes, principally Aedes aegypti. Hence, Statement 1 is correct.
 - This mosquito also transmits chikungunya, yellow fever and Zika infection. Hence, Statement 2 is correct.
 - There are 4 distinct, but closely related, serotypes (separate groups within a species of microorganisms that all share a similar characteristic) of the virus that cause dengue (DEN-1, DEN-2, DEN-3 and DEN-4).
- Symptoms:
 - Sudden high fever, severe headaches, pain behind the eyes, severe bone, joint, and muscle pain, etc.
- Diagnosis and Treatment:
 - Diagnosis of dengue infection is done with a blood test.
 - There is no specific medicine to treat dengue infection.
- Status of Dengue:
 - Incidence of dengue has grown dramatically around the world in recent decades, with a vast majority of cases under-reported, according to the World Health Organization (WHO).
 - WHO estimates 39 crore dengue virus infections per year, of which 9.6 crore show symptoms.
 - According to data shared by the National Center for Vector Borne Diseases Control, India recorded 63,280 dengue cases as of September, 2022
- Controlling Dengue Using Bacteria:
 - Recently researchers from the World Mosquito Program have used mosquitoes infected with Wolbachia bacteria to successfully control dengue in Indonesia.
 - Method:
 - The scientists infected some mosquitoes with Wolbachia and then released them in the city where they bred with local mosquitoes, until nearly all mosquitoes in the area were carrying Wolbachia bacteria. This is called the Population Replacement Strategy.
 - At the end of 27 months, the researchers found that the incidence of dengue was 77% lower in areas where Wolbachia-infected mosquitoes had been released, as compared to areas without such deployments.
- Dengue Vaccine:
 - The dengue vaccine CYD-TDV or Dengvaxia was approved by the US Food & Drug Administration in 2019, the first dengue vaccine to get the regulatory nod in the US.

- Dengvaxia is basically a live, attenuated dengue virus which has to be administered in people of ages 9 to 16 who have laboratory-confirmed previous dengue infection and who live in endemic areas.
- Vaccine manufacturer Indian Immunologicals Limited (IIL) is developing India's first Dengue vaccine and has received permission for a Phase-1 trial.

32. Answer (a)

Explanation:

Hope Probe Mission:

- About:
 - The UAE's Mars Mission called 'Hope' was announced in 2015 with the aim of creating mankind's first integrated model of the Red planet's (Mars) atmosphere.
 - 'Hope' was developed by UAE scientists in the USA and was launched in July 2020 from the Tanegashima Space Centre in Japan.
- Specification:
 - The Mars Hope Probe weights just 1.5 tonnes, about the same size as an SUV. It is expected to complete one orbit around the planet every 55 hours.
 - The overall life of UAE's Mars mission is around one Martian year, which is about 687 days on Earth.
- Scientific Instruments: The Probe carries three scientific instruments:
 - Emirates eXploration Imager (EXI): A high-resolution camera.
 - Emirates Mars Ultraviolet Spectrometer (EMUS): A far-UV imaging spectrograph.
 - Emirates Mars InfraRed Spectrometer (EMIRS): It will examine temperature profiles, ice, water vapor and dust in the atmosphere of Mars.
- Expected Benefits:
 - UAE's mission will collect data on Martian climate dynamics and help scientists understand why Mars' atmosphere is decaying into space.
 - The instruments will collect different data points on the atmosphere to also gauge seasonal and daily changes.
 - Together, this will shed light on how energy and particles, like oxygen and hydrogen, move through the atmosphere of Mars.

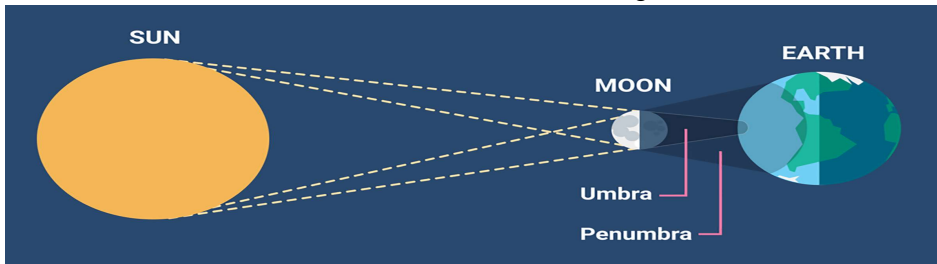
33. Answer (c)

Explanation:

What is Solar Eclipse?

- A solar eclipse is a phenomenon that occurs when the moon comes in the way of the sun's light. The moon's shadow casts itself on Earth, blocking out the sun's light (as seen from Earth). Hence, Statement 1 is correct.

- The moon's shadow has two parts: a central region (umbra) and an outer region (penumbra). Depending upon which part of the shadow passes over the Earth, one of three types of solar eclipses could be observed:
 - Total Solar Eclipse- The entire central portion of the sun is blocked out by the moon.
 - Partial Solar Eclipse- Only part of the sun's surface is blocked out.
 - Annular Solar Eclipse- The sun is covered in such a way that only a small ring-like sliver of light is seen from the sun's disc. This ring is known as the ring of fire.
 - An annular eclipse happens when the moon is farthest from Earth. As the moon is farther away from Earth, it seems smaller and is unable to block the entire view of the sun, because of which the ring-like structure could be observed.



34. Answer (b)

Explanation:

- In 2022, ISRO set up the System for Safe and Sustainable Operations Management (IS 4 OM) to continually monitor objects posing collision threats, predict the evolution of space debris, and mitigate the risk posed by space debris.
- ISRO also carried out 21 collision avoidance manoeuvres of Indian operational space assets in 2022 to avoid collisions with other space objects.
- ISRO has also set up a Centre for Space Debris Research to monitor and mitigate the threat of space debris.
- 'Project NETRA' is also an early warning system in space to detect debris and other hazards to Indian satellites.

35. Answer (a)

Explanation:

Why in News

The Government of India has sanctioned 670 Electric buses in the states of Maharashtra, Goa, Gujarat and Chandigarh and 241 Charging Stations in Madhya Pradesh, Tamil Nadu, Kerala, Gujarat and Port Blair under Phase-II of FAME India Scheme.

Key Points

- Background:

- FAME India is a part of the National Electric Mobility Mission Plan. Main thrust of FAME is to encourage electric vehicles by providing subsidies.
- The FAME India Scheme is aimed at incentivising all vehicle segments.
- Two phases of the scheme:
 - Phase I: started in 2015 and was completed on 31st March, 2019
 - Phase II: started from April, 2019, will be completed by 31st March, 2022
- The scheme covers Hybrid & Electric technologies like Mild Hybrid, Strong Hybrid, Plug in Hybrid & Battery Electric Vehicles.
- Monitoring Authority: Department of Heavy Industries, the Ministry of Heavy Industries and Public Enterprises.
- Fame India Scheme has four focus Areas:
 - Technology development
 - Demand Creation
 - Pilot Projects
 - Charging Infrastructure
- Objectives of FAME Scheme:
 - Encourage faster adoption of electric and hybrid vehicles by way of offering upfront Incentive on purchase of Electric vehicles.
 - Establish a necessary charging Infrastructure for electric vehicles.
 - To address the issue of environmental pollution and fuel security.
- Salient Features of Phase II:
 - Emphasis on electrification of the public transportation that includes shared transport.
 - This phase aims to support, through subsidies, approximately 7000 e-Buses, 5 lakh e-3 Wheelers, 55000 e-4 Wheeler Passenger Cars and 10 lakh e-2 Wheelers.
 - In 3-Wheel (W) and 4-Wheel (W) segment incentives will be applicable mainly to vehicles used for public transport or registered for commercial purposes.
 - In the 2-Wheel (W) segment, the focus will be on the private vehicles.
 - To encourage advanced technologies, the benefits of incentives will be extended to only those vehicles which are fitted with advanced batteries like a Lithium Ion battery and other new technology batteries.
 - The scheme proposes for establishment of charging infrastructure, whereby about 2700 charging stations will be established in metros, other million plus cities, smart cities and cities of Hilly states across the country so that there will be availability of at least one charging station in a grid of 3 km x 3 km.
 - Establishment of Charging stations are also proposed on major highways connecting major city clusters.
 - On such highways, charging stations will be established on both sides of the road at an interval of about 25 km each.

36. Answer (a)

Explanation:

What is Bharat 6G Project

- About:

- India's 6G project will be implemented in two phases, the first one from 2023 to 2025 and the second one from 2025 to 2030. Hence, Statement 1 is incorrect.
- The government has also appointed an apex council to oversee the project and focus on issues such as standardization, identification of the spectrum for 6G usage, create an ecosystem for devices and systems, and figure out finances for research and development, among other things.
 - A key focus of the council will be on new technologies such as Terahertz communication, radio interfaces, tactile internet, artificial intelligence for connected intelligence, new encoding methods and waveforms chipsets for 6G devices.
- Phases:
 - In phase one, support will be provided to explorative ideas, risky pathways and proof-of-concept tests.
 - Ideas and concepts that show promise and potential for acceptance by the global peer community will be adequately supported to develop them to completion, establish their use cases and benefits, and create implementational IPs and testbeds leading to commercialisation as part of phase two.
- Objective:
 - It aims to enable India to become a leading global supplier of intellectual property, products and solutions of affordable 6G telecom solutions and identify priority areas for 6G research based on India's competitive advantages. Hence, Statement 2 is correct.
- Significance:
 - The project will provide an R&D platform to start-ups, researchers, industry and other broadband wireless applications in India like e-Governance, smart cities, rural Broadband or other Digital India initiatives under Atmanirbhar Bharat.

37. Answer (c)

Explanation:

What is Artemis Mission?

- NASA's Artemis mission is touted as the next generation of lunar exploration, and is named after the twin sister of Apollo from Greek mythology.
 - Artemis is also the goddess of the moon.
 - It is the first in a series of increasingly complex missions that will enable human exploration to the Moon and Mars.
- With the Artemis programme, NASA aims to land humans on the moon by 2024, and it also plans to land the first woman and first person of colour on the moon.
- NASA will establish an Artemis Base Camp on the surface and a gateway (the lunar outpost around the Moon) in lunar orbit to aid exploration by robots and astronauts.
 - The gateway is a critical component of NASA's sustainable lunar operations and will serve as a multi-purpose outpost orbiting the moon.
- Other space agencies are also involved in the Artemis programme.
 - Canadian Space Agency has committed to providing advanced robotics for the gateway,
 - The European Space Agency will provide the International Habitat and the ESPRIT module, which will deliver additional communications capabilities among other things.
 - The Japan Aerospace Exploration Agency plans to contribute habitation components and logistics resupply.

38. Answer (c)

Explanation:

What is the International Space Station (ISS)?

- The ISS is the most complex international scientific and engineering project in history and the largest structure humans have ever put into space.
- This high-flying satellite is a laboratory for new technologies and an observation platform for astronomical, environmental and geological research.
- As a permanently occupied outpost in outer space, it serves as a stepping stone for further space exploration.
- The space station flies at an average altitude of 400 kilometers above Earth. It circles the globe every 90 min. at a speed of about 28,000 kph. Hence, Statement 1 is incorrect.
- In one day, the station travels about the distance it would take to go from Earth to the moon and back.
- The space station can rival the brilliant planet Venus in brightness and appears as a bright moving light across the night sky.
- It can be seen from Earth without the use of a telescope by night sky observers who know when and where to look. Hence, Statement 2 is correct.
- Five different space agencies representing 15 countries built the USD 100-billion International Space Station and continue to operate it today. Hence, Statement 3 is correct.
- The International Space Station was taken into space piece-by-piece and gradually built in orbit.
 - It consists of modules and connecting nodes that contain living quarters and laboratories, as well as exterior trusses that provide structural support, and solar panels that provide power.
 - The first module, Russia's Zarya module, launched in 1998.
- The first space station crews were three-person teams, though after the tragic Columbia shuttle disaster the crew size temporarily dropped to two-person teams.
- The space station reached its full six-person crew size in 2009 as new modules, laboratories and facilities were brought online.
- Current plans call for the space station to be operated through at least 2020. NASA has requested an extension until 2024.

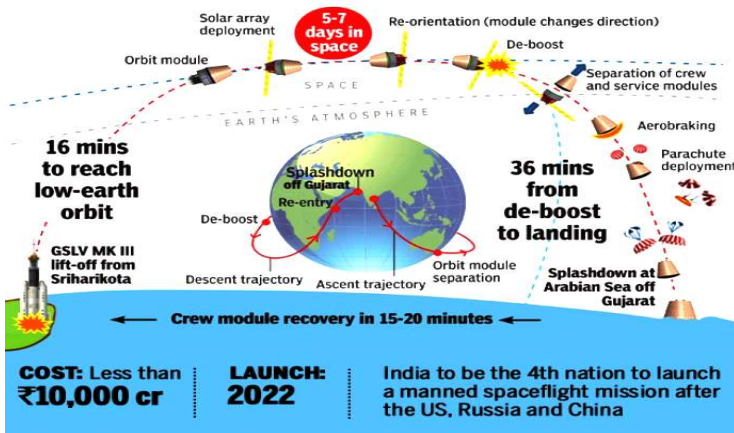
39. Answer (c)

Explanation:

Gaganyaan is a mission by the Indian Space Research Organisation (ISRO).

- Under the Gaganyaan schedule:
 - Three flights will be sent into orbit.
 - There will be two unmanned flights and one human spaceflight.
- The Gaganyaan system module, called the Orbital Module will have three Indian astronauts, including a woman. Hence, Statement 1 is correct.
- It will circle Earth at a low-earth-orbit at an altitude of 300-400 km from earth for 5-7 days. Hence, Statement 2 is correct.

MANNED MISSION



- Payloads:
 - The payload will consist of:
 - Crew module - spacecraft carrying human beings.
 - Service module - powered by two liquid propellant engines.
 - It will be equipped with emergency escape and emergency mission abort.
- Launch:
 - GSLV Mk III, also called the LVM-3 (Launch Vehicle Mark-3,) the three-stage heavy lift launch vehicle, will be used to launch Gaganyaan as it has the necessary payload capability.
- Training in Russia:
 - In June 2019, the Human Space Flight Centre of the ISRO and the Russian government-owned Glavkosmos signed a contract for the training, which includes Russian support in the selection of candidates, their medical examination, and space training.
 - The candidates will study in detail the systems of the Soyuz manned spaceship, as well as be trained in short-term weightlessness mode aboard the Il-76MDK aircraft.
 - The Soyuz is a Russian spacecraft. The Soyuz carries people and supplies to and from the space station.
 - The Il-76MDK is a military transport plane specially designed for parabolic flights of trainee astronauts and space tourists.
- Significance:
 - It will help in enhancement of science and technology levels in the country and help inspire youth.
 - Gaganyaan will involve numerous agencies, laboratories, disciplines, industries and departments.
 - It will help in improvement of industrial growth.
 - Recently, the Government has announced a new organisation, IN-SPACE, part of reforms to increase private participation in the space sector.
 - It will help in development of technology for social benefits.

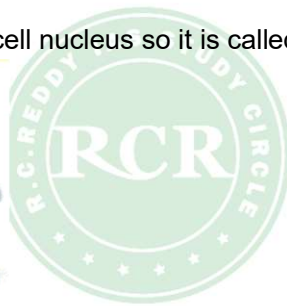
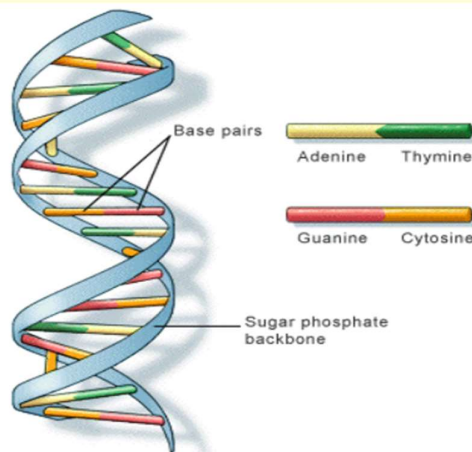
- It will help in improving international collaboration.
 - One International Space Station (ISS) put up by multiple countries may not be enough. Regional ecosystems will be needed and Gaganyaan will focus on regional needs: food, water and energy security.

40. Answer: (d)

Explanation:

What is Deoxyribonucleic Acid (DNA)?

- Deoxyribonucleic acid (DNA) is an organic molecule with a complex molecular structure.
- DNA molecule's strands are made up of a long chain of monomer nucleotides. It is arranged in a double helix structure.
- James Watson and Francis Crick discovered that DNA is a double-helix polymer in 1953.
- It is essential for the transfer of the genetic characteristic of the living being from one generation to the other generation.
- The majority of DNA is found in the cell nucleus so it is called nuclear DNA.



C.REDDY
STUDY CIRCLE

- DNA stores data in the form of a code made up of four Nitrogenous bases.
 - Purines:
 - Adenine (A)
 - Guanine (G)
 - Pyrimidines
 - Cytosine (C)
 - Thymine (T)

41: Answer: (c)

Explanation:

What Is Ethanol?

- About:
 - It is one of the principal biofuels, which is naturally produced by the fermentation of sugars by yeasts or via petrochemical processes such as ethylene hydration.

- It is a domestically produced alternative fuel most commonly made from corn. It is also made from cellulosic feedstocks, such as crop residues and wood.
- Ethanol as Fuel:
 - The use of ethanol as a fuel for internal combustion engines, either alone or in combination with other fuels, has been given much attention mostly because of its possible environmental and long-term economical advantages over fossil fuel.
 - Ethanol can be combined with petrol in any concentration up to pure ethanol (E100).
 - Anhydrous ethanol (ethanol without water) can be blended with petrol in varying quantities to reduce the consumption of petroleum fuels, as well as to reduce air pollution.

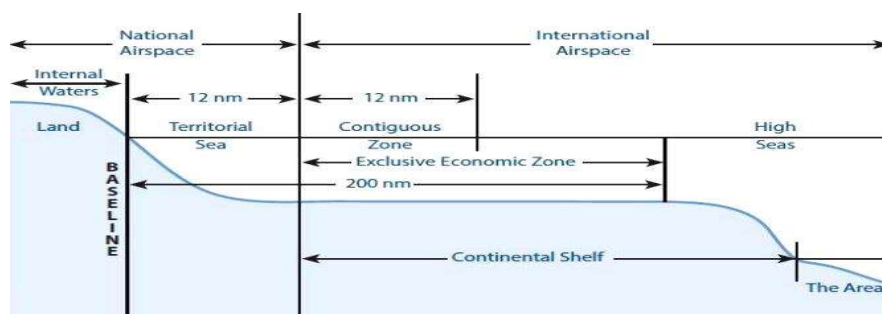
What are India's Other Initiatives regarding Biofuels?

- Ethanol Blending Programme:
 - It is aimed at reducing the country's dependence on crude oil imports, cutting carbon emissions and boosting farmers' incomes.
 - The Government of India has advanced the target for 20% ethanol blending in petrol (also called E20) to 2025 from 2030.
 - India has already achieved the target of 10% ethanol blending in petrol with the country's ethanol production increasing to 400 crore litres.
- The National Policy on Biofuels–2018:
 - It provides an indicative target of 20% ethanol blending under the Ethanol Blended Petrol (EBP) Programme by 2030.
- E-100 Pilot Project:
 - TVS Apache two-wheelers are designed to run on E80 or pure ethanol (E100).
- Pradhan Mantri JI-VAN Yojana, 2019:
 - The scheme aims to create an ecosystem for setting up commercial projects and boost Research and Development in the 2G Ethanol sector.
- Repurpose Used Cooking Oil (RUCO):
 - The Food Safety and Standards Authority of India (FSSAI) has launched this initiative that will enable collection and conversion of used cooking oil to biodiesel.

42. Answer: (b)

Explanation:

Maritime Zones



- Baseline:
 - It is the low-water line along the coast as officially recognized by the coastal state.
- Internal Waters:

- Internal waters are waters on the landward side of the baseline from which the breadth of the territorial sea is measured.
- Each coastal state has full sovereignty over its internal waters as like its land territory. Examples of internal waters include bays, ports, inlets, rivers and even lakes that are connected to the sea.
- There is no right of innocent passage through internal waters.
 - The innocent passage refers to the passing through the waters which are not prejudicial to peace and security. However, the nations have the right to suspend the same.
- Territorial Sea:
 - The territorial sea extends seaward up to 12 nautical miles (nm) from its baselines. Hence, Statement 1 is correct.
 - A nautical mile is based on the circumference of the earth and is equal to one minute of latitude. It is slightly more than a land measured mile (1 nautical mile = 1.1508 land miles or 1.85 km).
 - The coastal states have sovereignty and jurisdiction over the territorial sea. These rights extend not only on the surface but also to the seabed, subsoil, and even airspace.
 - But the coastal states' rights are limited by the innocent passage through the territorial sea.
- Contiguous Zone:
 - The contiguous zone extends seaward up to 24 nm from its baselines. Hence, Statement 2 is correct.
 - It is an intermediary zone between the territorial sea and the high seas.
 - The coastal state has the right to both prevent and punish infringement of fiscal, immigration, sanitary, and customs laws within its territory and territorial sea.
 - Unlike the territorial sea, the contiguous zone only gives jurisdiction to a state on the ocean's surface and floor. It does not provide air and space rights.
- Exclusive Economic Zone (EEZ):
 - Each coastal State may claim an EEZ beyond and adjacent to its territorial sea that extends seaward up to 200 nm from its baselines.
 - Within its EEZ, a coastal state has:
 - Sovereign rights for the purpose of exploring, exploiting, conserving and managing natural resources, whether living or nonliving, of the seabed and subsoil.
 - Rights to carry out activities like the production of energy from the water, currents and wind.
 - Unlike the territorial sea and the contiguous zone, the EEZ only allows for the above-mentioned resource rights. It does not give a coastal state the right to prohibit or limit freedom of navigation or overflight, subject to very limited exceptions.
- High Seas:
 - The ocean surface and the water column beyond the EEZ are referred to as the high seas.
 - It is considered as "the common heritage of all mankind" and is beyond any national jurisdiction.
 - States can conduct activities in these areas as long as they are for peaceful purposes, such as transit, marine science, and undersea exploration.

43. Answer: (d)

Explanation:

Supercapacitor

- Supercapacitor is a next-generation energy storage device. They are also known as ultracapacitors.

- It has significant advantages such as high power density, long durability, and ultrafast charging characteristics as compared to conventional capacitors and Lithium-Ion batteries (LIB).
- Main components of supercapacitors include electrode, electrolyte, separator, and the current collector.
- The electrode and electrolyte are the pivotal components, which directly determine the electrochemical behaviour of the supercapacitors.
 - The manufacturing cost of electrode materials, as well as electrolytes account for a major portion of the supercapacitor manufacturing cost.
 - An electrode is a solid electric conductor that is used to take an electric current to or from a source of power.
 - An electrolyte is a substance that produces an electrically conducting solution when dissolved in a polar solvent, such as water.

44. Answer: (a)

Explanation:

What is Diabetes?

- About:
 - Diabetes is a Non-Communicable Disease (NCD) that occurs either when the pancreas does not produce enough insulin (a hormone that regulates blood sugar, or glucose), or when the body cannot effectively use the insulin it produces.
- Types of Diabetes:
 - Type 1 Diabetes:
 - It is also known as juvenile diabetes (as it mostly affects children of age 14-16 years), this type occurs when the pancreas makes little or no insulin.
 - Insulin is a hormone the body uses to allow sugar (glucose) to enter cells to produce energy.
 - It is predominantly diagnosed in children and adolescents. Although the prevalence is less, it is much more severe than type 2.
 - Type 2 Diabetes:
 - It affects the way the body uses insulin. While the body still makes insulin.
 - Type 2 diabetes can occur at any age, even during childhood. However, this type of diabetes occurs most often in middle-aged and older people.
 - Gestational Diabetes:
 - This type occurs in women during pregnancy when the body sometimes becomes less sensitive to insulin. Gestational diabetes does not occur in all women and usually resolves after giving birth.
- Impacts of Diabetes:
 - It affects the five major organs namely, Kidney, Heart, Blood vessels, Nervous System, and Eyes (retina).
- Factors Responsible:
 - Factors that lead to increase in diabetes are an unhealthy diet, lack of physical activity, harmful use of alcohol, overweight/obesity, tobacco use, etc.
- Initiatives to Tackle Diabetes:
 - National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS).
 - World Diabetes Day
 - Global Diabetes Compact

45. Answer: (c)

Explanation:

Vitamin B12

- Vitamin B12, also known as cyanocobalamin, is synthesized by most bacteria and algae with the help of enzymes.
 - No species of plants have the enzymes necessary for vitamin B12 synthesis. It is synthesized in microorganisms that enter the human food chain through incorporation into food of animal origin. Hence, Statement 1 is correct.
 - It is also crucial to the normal function of the brain and the nervous system. Hence, Statement 2 is correct.
- Deficiency of Vitamin B12 causes pernicious anaemia. It is rarely caused due to lack of Vitamin B12 in the diet but because of the absence of the intrinsic factor in the stomach leading to failure of absorption of Vitamin B12.

Folic Acid

- Folate is the natural form of vitamin B9, water-soluble and naturally found in many foods. It is also added to foods and sold as a supplement in the form of folic acid.
- Folic acid needs to be taken by pregnant women before conception.
 - Deficiency of folic acid in pregnant women leads to Neural Tube Defects in the baby such as Spina Bifida.
 - Spina bifida is a condition that affects the spine and is usually apparent at birth.
- India & Southeast Asia & some parts of Africa have the highest cases of neural Tube defects (4.7-9 per 1000 in Punjab & Haryana).
 - In the developed world, it is less than 1 per 1000.

46. Answer: (d)

Explanation:

- Pokhran- I:
 - About:
 - By the 1970s, India was capable of conducting a nuclear bomb test.
 - Pokhran-I was India's first nuclear bomb test conducted on May 18, 1974, at the Pokhran Test Range in Rajasthan.
 - It was code-named Smiling Buddha and officially described as a "peaceful nuclear explosion" with "few military implications".
 - India became the 6th country in the world to possess nuclear weapons capability after the US, Soviet Union, Britain, France and China.
 - Implications of Test:
 - The tests faced near-universal condemnation and significant sanctions especially from US and Canada.
 - It hindered India's progress in nuclear technology and slowed down its nuclear journey.
 - Domestic political instability, such as the Emergency of 1975 and opposition to nuclear weapons also hindered progress.
 - After Pokhran-I:

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- The 1980s saw a resurgence of interest in nuclear weapons development due to Pakistan's progress.
 - India increased funding for its missile program and expanded its plutonium stockpiles.
 - Pokhran-II:
 - About:
 - Pokhran-II refers to a sequence of five nuclear bomb test explosions conducted by India on between 11-13th May 1998 at Rajasthan's Pokhran desert.
 - Code name - Operation Shakti, this event marked India's 2nd successful attempt.
 - Significance:
 - Pokhran-II cemented India's status as a nuclear power.
 - It demonstrated India's ability to possess and deploy nuclear weapons, thus enhancing its deterrence capabilities.
 - The Indian government led by Prime Minister Atal Bihari Vajpayee officially declared itself as a state possessing nuclear weapons following Pokhran-II.
 - Implication:
 - While the tests in 1998 also invited sanctions from some countries (like the US), the condemnation was far from universal like in 1974.
 - In context of India's fast-growing economy and market potential, India was able to stand its ground and thus cement its status as a dominant nation state.

47. Answer: (a)

Explanation:

What are Artificial Sweeteners?

- About:
 - Artificial sweeteners are sugar substitutes that are used as alternatives to natural sugars.
 - These sweeteners are chemically synthesized and provide a sweet taste without the high calorie content of regular sugar.
 - They are commonly used in various food and beverage products, including diet sodas, sugar-free desserts, and low-calorie snacks.
 - Some examples of artificial sweeteners are saccharin, aspartame, acesulfame potassium (Ace-K), sucralose, neotame, and advantame.
- Benefits:
 - Artificial sweeteners offer benefits for weight management, diabetes control, tooth decay prevention, and provide safe options for individuals with phenylketonuria (PKU), a genetic disorder, due to their low or zero-calorie content, minimal impact on blood sugar levels, non-fermentable nature, and absence of phenylalanine.
- Negative Impacts:
 - Controversial Health Effects:
 - Some studies suggest potential negative health effects of artificial sweeteners, such as an increased risk of metabolic disorders, and disrupted gut microbiota. However, scientific evidence remains inconclusive.
 - Digestive Issues:
 - Some people may experience digestive discomfort, such as bloating, gas, or diarrhea, after consuming products containing artificial sweeteners.

48. Answer: (a)

Explanation:

What is Carbon Dating?

- About:
 - Carbon dating is a widely used method to establish the age of organic materials, things that were once living.
 - Living things have carbon in them in various forms.
 - The dating method is based on the fact that Carbon-14 (C-14) is radioactive, and decays at a well-known rate.
 - C-14 is an isotope of carbon with an atomic mass of 14.
 - The most abundant isotope of carbon in the atmosphere is C-12.
 - A very small amount of C-14 is also present.
 - The ratio of C-12 to C-14 in the atmosphere is almost static and is known.
- Half Life:
 - Plants get their carbon through photosynthesis; animals get it mainly through food. Because plants and animals get their carbon from the atmosphere, they too acquire C-12 and C-14 in roughly the same proportion as is available in the atmosphere.
 - When they die, their interactions with the atmosphere stop. While C-12 is stable, the radioactive C-14 reduces to one half of itself in about 5,730 years — known as its 'half-life'.
 - The changing ratio of C-12 to C-14 in the remains of a plant or animal after it dies can be measured and can be used to deduce the approximate time when the organism died.
- Age Determination of Inanimate Things:
 - Carbon dating cannot be applied in all circumstances. It cannot be used to determine the age of non-living things like rocks, for example.
 - Also, the age of things that are more than 40,000-50,000 years old cannot be arrived at through carbon dating.
 - This is because after 8-10 cycles of half-lives, the amount of C-14 becomes almost very small and is almost undetectable.
- For determining the age of inanimate things, instead of carbon, decays of other radioactive elements that might be present in the material become the basis for the dating method.
 - These are known as Radiometric Dating Methods. Many of these involve elements with half-lives of billions of years, which enable scientists to reliably estimate the age of very old objects.

49. Answer: (d)

Explanation:

What are MicroLEDs ?

- About:
 - MicroLED technology is based on the use of sapphires, which are known for their ability to shine on their own indefinitely.
 - The technology involves the use of tiny light-emitting diodes (LEDs) that are packed tightly together to create a bright and high-quality display.
 - Unlike OLED displays, microLED displays use inorganic material such as gallium nitride.
 - A microLED is as small as cutting a centimetre of hair into 200 smaller pieces. Each of these microLEDs are semiconductors that receive electric signals.

- Once these microLEDs are gathered, they form a module. Several modules are then combined to form screens.
- Benefits:
 - Brighter screens with better colour reproduction and viewing angles.
 - Limitless scalability, as microLED displays are resolution-free, bezel-free, ratio-free, and even size-free.
 - The ability to freely resize the screen in any form for practical usage.
 - Self-emissive microLEDs that individually produce red, green, and blue colours without needing backlighting or colour filters.
- Challenges:
 - Manufacturing Complexity: The process of manufacturing microLEDs is highly complex, and it requires precise control over many variables to produce high-quality displays.
 - Cost: The cost of manufacturing microLED displays is currently very high, and it may take some time for the technology to become affordable enough for widespread adoption.
 - Power Consumption: MicroLEDs require a lot of power to operate, which can make them less energy-efficient than other display technologies.

Answer 50 (c)

Explanation:

What is the India Semiconductor Mission?

- About:
 - The ISM was launched in 2021 with a total financial outlay of Rs76,000 crore under the aegis of the Ministry of Electronics and IT (MeitY). Hence, Statement 1 is correct.
 - It is part of the comprehensive program for developing a sustainable semiconductor and display ecosystem in the country. Hence, Statement 2 is correct.
 - The programme aims to provide financial support to companies investing in semiconductors, display manufacturing and design ecosystem.
 - Envisioned to be led by global experts in the Semiconductor and Display industry, ISM will serve as the nodal agency for efficient, coherent and smooth implementation of the schemes.
- Components:
 - Scheme for setting up of Semiconductor Fabs in India:
 - It provides fiscal support to eligible applicants for setting up of Semiconductor Fabs which is aimed at attracting large investments for setting up semiconductor wafer fabrication facilities in the country.
 - Scheme for setting up of Display Fabs in India:
 - It provides fiscal support to eligible applicants for setting up of Display Fabs which is aimed at attracting large investments for setting up TFT LCD / AMOLED based display fabrication facilities in the country.
 - Scheme for setting up of Compound Semiconductors / Silicon Photonics / Sensors Fab and Semiconductor Assembly, Testing, Marking and Packaging (ATMP) / OSAT facilities in India:
 - The Scheme provides a fiscal support of 30% of the Capital Expenditure to the eligible applicants for setting up of Compound Semiconductors / Silicon Photonics (SiPh) / Sensors (including MEMS) Fab and Semiconductor ATMP / OSAT (Outsourced Semiconductor Assembly and Test) facilities in India.
 - Design Linked Incentive (DLI) Scheme:
 - It offers financial incentives, design infrastructure support across various stages of development and deployment of semiconductor design for Integrated Circuits (ICs),

Chipsets, System on Chips (SoCs), Systems & IP Cores and semiconductor linked design.

- Vision:
 - To build a vibrant semiconductor and display design and innovation ecosystem to enable India's emergence as a global hub for electronics manufacturing and design.
- Significance:
 - ISM is of paramount importance to organize efforts for promoting semiconductors and display industry in a more structured, focused, and comprehensive manner.
 - It will formulate a comprehensive long-term strategy for developing semiconductors & display manufacturing facilities and semiconductor design ecosystem in the country.
 - It will facilitate the adoption of trusted electronic through secure semiconductors and display supply chains, including raw materials, specialty chemicals, gasses, and manufacturing equipment.
 - It will enable a multi-fold growth of Indian semiconductor design industry by providing requisite support in the form of Electronic Design Automation (EDA) tools, foundry services and other suitable mechanisms for early-stage startups.
 - It will also promote and facilitate indigenous Intellectual Property (IP) generation and encourage, enable and incentivize Transfer of Technologies (ToT).
 - ISM will enable collaborations and partnership programs with national and international agencies, industries and institutions for catalyzing collaborative research, commercialization and skill development.

51. Answer: (c)

Explanation:

What is Sustainable Aviation Fuel (SAF)?

- About:
 - Sustainable Aviation Fuel (SAF), also referred to as bio-jet fuel, is created using domestically developed methods using cooking oil and oil-rich seeds from plants. Hence, Statement 1 is correct.
 - The SAF samples produced by the institutes are undergoing strict testing at the US Federal Aviation Administration Clearinghouse to meet the standards required for the ASTM D4054 certification from ASTM International.
- Sources of Production:
 - The CSIR-IIP has created fuel using different materials, such as non-edible and edible oils, as well as used cooking oil.
 - They used various sources, including palm stearin, sapium oil, palm fatty acid distillates, algae oil, karanja, and jatropha. Hence, Statement 2 is correct.
- Benefits of SAF Scaling in India:
 - Scaling up the production and use of SAF in India can bring several benefits, including reducing GHG emissions, improving air quality, enhancing energy security, creating jobs in the renewable energy sector, and promoting sustainable development.
 - It can also help the aviation industry meet its environmental targets and contribute to global efforts to combat climate change.
 - Biofuel for aviation can be mixed with regular jet fuel and used together. Compared to traditional fuel, it has lower sulfur content, which can decrease air pollution and support India's goal of achieving Net Zero emissions.

52. Answer: (a)

Explanation:

What is NewSpace India Ltd (NSIL)?

- About:
 - NSIL is a Central Public Sector Enterprise of the Government of India.
 - It was established in 2019 under the administrative control of the Department of Space. Hence, Statement 1 is correct.
 - NSIL is the commercial arm of Indian Space Research Organisation (ISRO) with the primary responsibility of enabling Indian industries to take up high technology space related activities. Hence, Statement 2 is correct.
 - Headquarters: Bengaluru. Hence, Statement 3 is incorrect.
- Mission:
 - Owning satellites for Earth Observation and Communication applications and providing space-based services
 - Building satellites and launching them as per demand
 - Providing Launch Services for satellite belonging to customer
 - Building launch vehicles through Indian Industry and launch as per satellite customer requirement
 - Space based Services related to Earth Observation and Communication satellites on commercial basis
 - Satellite building through Indian Industry
 - Technology Transfer to Indian Industry

53. Answer: (a)

Explanation:



Recently, the Ministry of Women and Child Development has launched the 2nd phase of the SAMVAD programme on the completion of one year after the program's launch.

- The programme is aimed at mental health outreach for children who are abandoned and orphaned, child survivors of trafficking, or in conflict with law.
- Earlier, the government had announced a special "PM-CARES for Children" scheme for all those orphaned due to Covid-19.

Key Points

- Stands for: Support, Advocacy & Mental health interventions for children in Vulnerable circumstances and Distress (SAMVAD).
- Funded By: The initiative is funded by the Ministry of Women and Child Development.
- Implementing Body: It is led by the National Institute of Mental Health and Neuro Sciences (NIMHANS).
 - The NIMHANS is the apex centre of mental health and neuroscience education. It operates autonomously under the Ministry of Health and Family Welfare.
 - Recently, on the request of the Ministry of Home Affairs, NIMHANS, issued a set of guidelines on the management of mental health issues of the prisoners and prison staff.

- Purpose:
 - It is a national initiative and integrated resource that works in child protection, mental health and psychosocial care of children in difficult circumstances.
 - It encompasses a specialized training curriculum on childhood trauma, interventions for children in conflict with the law, forensics in child and adolescent psychiatry and mental health.
 - Education and mental health support to children with special needs, protection and care in the context of adoption.
 - The initiative is providing coping mechanisms for children in distress by training close to 1 lakh stakeholders comprising Child Protection Functionaries, tele-counsellors, educators, law professionals among others.
- Integration with Local Bodies: The initiative aims to foster care and integration of child protection and mental health in the Panchayati Raj systems in aspirational districts across the country to facilitate awareness generation and improve service delivery at the grassroots level.

54. Answer: (c)

Explanation:

What is LockBit Ransomware?

- About:
 - LockBit, formerly known as “ABCD” ransomware, is a type of computer virus that blocks user access to computers or its files and demands a ransom.
 - The virus first appeared in September 2019 and is called a "crypto virus", because it asks for payment in cryptocurrency to unlock the files.
 - LockBit is usually used to attack companies or organizations that can afford to pay a lot of money to get their files back.
 - The people behind LockBit have a website on the dark web where they recruit members and release information about victims who refuse to pay.
 - LockBit has been used to target companies in many different countries, including the U.S., China, India, Ukraine, and Europe.
- Modus Operandi:
 - It hides its harmful files by making them look like harmless image files. The people behind LockBit trick people into giving them access to the company's network by pretending to be someone trustworthy.
 - Once they're in, LockBit disables anything that could help the company recover their files and puts a lock on all the files so that they can't be opened without a special key that only the LockBit gang has.
 - Victims are then left with no choice but to contact the LockBit gang and pay up for the data, which the gang may sell on the dark web - whether the ransom is paid or not.
- LockBit Gang:
 - The LockBit gang is a group of cybercriminals who use a ransomware-as-a-service model to make money.
 - They create custom attacks for people who pay them and then split the ransom payment with their team and affiliates.
 - They are known for being very prolific and avoiding attacking Russian systems or countries in the Commonwealth of Independent States to avoid getting caught.

55. Answer: (d)

Explanation:

What is National Quantum Mission?

- About:
 - It'll be implemented by the Department of Science & Technology (DST) under the Ministry of Science & Technology. Hence, Statement 1 is correct.
 - The mission planned for 2023-2031 aims to seed, nurture, and scale up scientific and industrial R&D and create a vibrant & innovative ecosystem in Quantum Technology (QT).
 - With the launch of this mission, India will be the seventh country to have a dedicated quantum mission after the US, Austria, Finland, France, Canada and China. Hence, Statement 2 is correct.
- Salient features of NQM:
 - It will target developing intermediate scale quantum computers with 50-100 physical qubits in 5 years and 50-1000 physical qubits in 8 years.
 - Just like bits (1 and 0) are the basic units by which computers process information, 'qubits' or 'quantum bits' are the units of process by quantum computers.
 - The mission will help develop magnetometers with high sensitivity for precision timing (atomic clocks), communications, and navigation.
 - It will also support design and synthesis of quantum materials such as superconductors, novel semiconductor structures and topological materials for fabrication of quantum devices.
 - The mission will also help developing:
 - Satellite based secure quantum communications between ground stations over a range of 2000 km within India.
 - Long distance secure quantum communications with other countries
 - Inter-city quantum key distribution over 2000 km
 - Multi-node Quantum network with quantum memories
 - Four Thematic Hubs (T-Hubs) would be set up in top academic and National R&D institutes on the domains of Quantum Technology:
 - Quantum computation
 - Quantum communication
 - Quantum Sensing & Metrology
 - Quantum Materials & Devices
- Significance:
 - This will accelerate QT led economic growth and make India one of the leading nations in the development of Quantum Technologies & Applications (QTA) ranging from healthcare and diagnostics, defence, energy and data security.
 - It will work towards indigenously building quantum-based computers which are far more powerful and are able to solve the most complex problems in a highly secure manner.

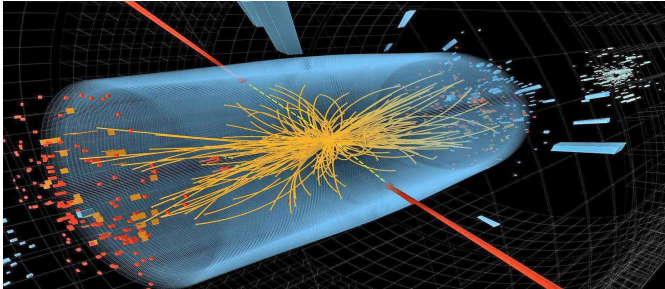
56. Answer: (d)

Explanation:

What is LHC?

- About:

- The LHC is a huge experiment that collides two beams of particles to study physics at very high energies. It's the largest science experiment in the world and is operated by CERN (European Organisation for Nuclear Research). Hence, Statement 1 is correct.
- The LHC is a circular pipe that is 27 km long and is located on the Franco-Swiss border near Geneva, Switzerland. Hence, Statement 2 is correct.
- It consists of two D-shaped magnetic fields created by almost 9,600 magnets.
- Working Mechanism:
 - Protons, which are subatomic particles made up of quarks and gluons, are accelerated inside the LHC using these magnets.
 - Quarks and gluons are subatomic particles that make up protons and neutrons. Quarks come in six different "flavors": up, down, charm, strange, top, and bottom. Gluons are particles that "glue" quarks together inside protons and neutrons through the strong nuclear force.
 - Protons are not the only particles accelerated in the LHC.
 - By switching the direction of the magnetic field rapidly, protons can be accelerated through the beam pipe.
 - Other components help to focus the particles and keep them from hitting the pipe's walls.
 - The protons eventually move at 99.999999% of the speed of light.



- Significance:
 - At such high energies, the LHC can create conditions that existed only fractions of a second after the Big Bang.
 - Scientists use detectors placed along the beam pipe to observe the interactions of the accelerated particles, which can reveal new insights into the nature of matter and the universe.
 - The LHC has already discovered the Higgs boson in 2012 and confirmed their findings in 2013, which is a particle that gives other particles mass.
 - The LHC also helps to test theories in particle physics, such as supersymmetry and extra dimensions.

57. Answer: (b)

Explanation:

What is LIGO-India Project?

- About:
 - The project aims to detect gravitational waves from the universe.
 - The Indian LIGO would have two perpendicularly placed 4-km long vacuum chambers, that constitute the most sensitive interferometers in the world.
 - It is expected to begin scientific runs from 2030.
- Location:
 - It will be located in the Hingoli district of Maharashtra, about 450 km east of Mumbai.
- Purpose and Significance:

- It will be the fifth node of the planned network and will bring India into a prestigious international scientific experiment.
- It will make India a unique platform that brings together the frontiers of science and technology of the quantum and the cosmos.
- Benefits of LIGO-India:
 - The LIGO-India project would have several spin-off benefits to Indian science, apart from making India an integral part of one of the most prestigious international scientific experiments.
 - The observatory is expected to enable dramatic returns in astronomy and astrophysics, as well as leapfrog Indian science and technology in cutting-edge frontiers of great national relevance.

58. Answer: (c)

Explanation:

What is a Cryogenic Engine?

- About:
 - A cryogenic engine/ cryogenic stage is the last stage of space launch vehicles which makes use of Cryogenics. Hence, Statement 1 is incorrect.
 - Cryogenics - the study of the production and behaviour of materials at extremely low temperatures (below -150°C) to lift and place the heavier objects in space.
 - It uses Liquid Oxygen (LOx) and Liquid Hydrogen (LH_2) as propellants. Hence, Statement 2 is correct.
 - They are one of the hardest to develop and so far only 6 countries have these launch vehicles - the US, China, Russia, France, Japan, and India. Hence, Statement 3 is correct.
 - India's heaviest launch vehicles – GSLV and GSLV Mk III – use cryogenic fuel in the upper stage of the launch vehicle.
- Advantages:
 - It is more efficient and provides more thrust for every kilogram of propellant it burns compared to solid and earth-storable liquid propellant rocket stages.
 - Using a cryogenic upper stage instead of a solid fuel stage enhances the payload carrying capacity of a rocket.
 - Both fuels (LOx and LH_2) are environment-friendly compared to other solid, semi-cryogenic and hypergolic propellants used in the rocket industry.
- Disadvantage:
 - It is technically a much more complex system as against solid/earth-storable liquid propellant stages due to the usage of propellants at extremely low temperatures and the associated thermal and structural problems.

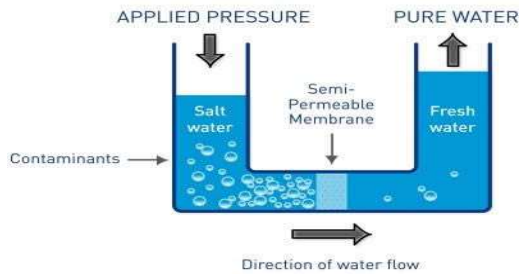
59. Answer: (b)

Explanation:

What is Desalination Plant?

- A desalination plant turns salt water into water that is fit to drink.
 - Desalination is the process of removing salts from water to produce water that meets the quality (salinity) requirements of different human uses.
- Most commonly used technology for the process is reverse osmosis.

REVERSE OSMOSIS



- An external pressure is applied to push solvents from an area of high-solute concentration to an area of low-solute concentration through a semi-permeable membrane.
- The microscopic pores in the membranes allow water molecules through but leave salt and most other impurities behind, releasing clean water from the other side.
- These plants are mostly set up in areas that have access to sea water.

60. Answer: (d)

Explanation:

What are the Key points of the MT-1 Satellite?

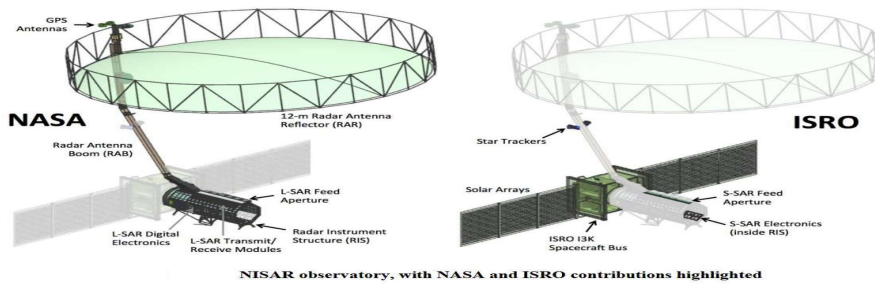
- About:
 - It is an Indo-French Earth Observation Satellite, which was launched in October 2011 for carrying out tropical weather and climate studies
 - The main objective of this mission is to understand the life cycle of convective systems that influence the tropical weather and climate and their role in the associated energy and moisture budget of the atmosphere in tropical regions.
 - With its circular orbit inclined 20° to the equator, it is a unique satellite for climate research that aided scientists seeking to refine prediction models.
- Payloads:
 - Microwave Analysis and Detection of Rain and Atmospheric Structures (MADRAS), an Imaging Radiometer developed jointly by CNES (Centre National d'études Spatiales), France and ISRO;
 - Sounder for Probing Vertical Profiles of Humidity (SAPHIR), from CNES;
 - Scanner for Radiation Budget (ScaRaB), from CNES;
 - Radio Occultation Sensor for Vertical Profiling of Temperature and Humidity (ROSA), procured from Italy.

61. Answer: (a)

Explanation:

Recently, NISAR (NASA-ISRO Synthetic Aperture Radar) has received a send-off ceremony at the NASA's Jet Propulsion Laboratory (JPL) in California, USA.

- NISAR will be the first radar of its kind in space to systematically map Earth, using two different radar frequencies (L-band and S-band) to measure changes in our planet's surface less than a centimeter across.



What is the NISAR Mission?

- About:
 - NISAR has been built by space agencies of the US and India under a partnership agreement signed in 2014.
 - It is expected to be launched in January 2024 from Satish Dhawan Space Centre into a near-polar orbit.
 - The satellite will operate for a minimum of three years.
 - It is a Low Earth Orbit (LEO) observatory.
 - NISAR will map the entire globe in 12 days.
- Features
 - It is a 2,800 kilograms satellite consisting of both L-band and S-band Synthetic Aperture Radar (SAR) instruments, which makes it a dual-frequency imaging radar satellite.
 - While NASA has provided the L-band radar, GPS, a high-capacity solid-state recorder to store data, and a payload data subsystem, ISRO (Indian Space Research Organisation) has provided the S-band radar, the Geosynchronous Satellite Launch Vehicle (GSLV) launch system and spacecraft.
 - S band radars operate on a wavelength of 8-15 cm and a frequency of 2-4 GHz. Because of the wavelength and frequency, they are not easily attenuated. This makes them useful for near and far range weather observation.
 - It has a 39-foot stationary antenna reflector, made of a gold-plated wire mesh; the reflector will be used to focus “the radar signals emitted and received by the upward-facing feed on the instrument structure.
 - By using SAR, NISAR will produce high-resolution images. SAR is capable of penetrating clouds and can collect data day and night regardless of the weather conditions.
 - NASA requires the L-band radar for its global science operations for at least three years. Meanwhile, ISRO will utilise the S-band radar for a minimum of five years.

62. Answer: (d)

Explanation:

What is Integrated Guided Missile Development Programme (IGMDP)?

- About:
 - IGMDP was launched by the Ministry of Defense to research and develop a comprehensive range of missiles. Hence, Statement 1 is correct.
 - The project started in 1982–1983 under the leadership of Dr APJ Abdul Kalam. Hence, Statement 2 is correct.
 - This Programme made Dr APJ Abdul Kalam the missile man of India.
 - The integrated guided missile programme was complete in 2008.
- Five Missiles Developed under the IGMDP:
 - PRITHVI (Short range surface-to-surface ballistic missile)
 - AGNI (Medium to intercontinental surface-to-surface missile)
 - TRISHUL (Short range low-level surface-to-air missile)
 - AKASH (Surface-to-air missile having a range of up to 25 Km and multi-target handling system)
 - NAG (Third generation “fire & forget”, “top attack” anti-tank missile)

63. Answer: (d)

Explanation:

What are Trans Fats?

- About:
 - Trans fat, or trans-fatty acids, are unsaturated fatty acids that come from either natural or industrial sources.
 - Naturally-occurring trans-fat come from ruminants (cows and sheep).
 - Industrially-produced trans-fat is formed in an industrial process that adds hydrogen to vegetable oil converting the liquid into a solid, resulting in “partially hydrogenated” oil (PHO).
 - Hence, all Statements are correct.



- Impacts:
 - Trans fats have been linked to an increased risk of heart disease, as they can raise bad cholesterol (LDL) levels in the blood and lower good cholesterol (HDL) levels.
 - They can also contribute to the development of other health conditions such as diabetes and obesity.
- Challenges in Eliminating Trans Fat:
 - Trans fats are a cheap and easy way to stabilise and extend the shelf life of food products, which is why they are widely used by food manufacturers.
 - Many small and medium-sized food manufacturers may not have the resources or technical expertise to reformulate their products to remove trans fats.
 - Trans fats are often used in food service and restaurant settings, which can be harder to regulate than retail food products.

- Changing consumer habits and taste preferences can be difficult, as people have become accustomed to the taste and texture of foods that contain trans fats.
- Some countries or regions may have limited infrastructure and resources to monitor and enforce the ban of trans fats.
- Initiatives to Eliminate Trans Fat:
 - India:
 - Eat Right Movement: Launched in 2018, the programme is built on two broad pillars of 'Eat Healthy' and 'Eat Safe'.
 - Swachh Bharat Yatra: A Pan-India cyclothon, was launched under the movement to educate citizens on issues of food safety, combating food adulteration and healthy diets.
 - Heart Attack Rewind: It is a 30-second public service announcement which was broadcasted in 17 languages on social media platforms.
 - The objective of the campaign was to warn citizens about the health hazards of consuming trans fats and offer strategies to avoid them through healthier alternatives.
 - The Food Safety and Standards Authority of India (FSSAI) has stated that all food items should contain less than 2% of trans fat from Jan 2022.
 - Global:
 - WHO released REPLACE, a step-by-step guide for the elimination of industrially-produced trans-fatty acids from the global food supply.
 - REPLACE provides six strategic actions to ensure the prompt, complete, and sustained elimination of industrially-produced trans fats from the food supply:
 - REview dietary sources of industrially-produced trans fats and the landscape for required policy change.
 - Promote the replacement of industrially-produced trans fats with healthier fats and oils.
 - Legislate or enact regulatory actions to eliminate industrially-produced trans fats.
 - Assess and monitor trans fats content in the food supply and changes in trans-fat consumption in the population.
 - Create awareness of the negative health impact of trans fats among policymakers, producers, suppliers, and the public.
 - Enforce compliance of policies and regulations.

64. Answer: (a)

Explanation:

What is James Webb Space Telescope?

- About:
 - The telescope is the result of an international collaboration between NASA, the European Space Agency (ESA) and the Canadian Space Agency which was launched in December 2021. Hence, Statement 1 is correct.
 - It is currently at a point in space known as the Sun-Earth L2 Lagrange point, approximately 1.5 million km beyond Earth's orbit around the Sun. Hence, Statement 2 is incorrect.
 - The Lagrange Point 2 is one of the five points in the orbital plane of the Earth-Sun system.

- Named after Italian-French mathematician Josephy-Louis Lagrange, the points are in any revolving two-body system like Earth and Sun, marking where the gravitational forces of the two large bodies cancel each other out.
 - Objects placed at these positions are relatively stable and require minimal external energy or fuel to keep themselves there, and so many instruments are positioned here.
 - It's the largest, most powerful infrared space telescope ever built.
 - It's the successor to Hubble Telescope.
 - It can see backwards in time to just after the Big Bang by looking for galaxies that are so far away that the light has taken many billions of years to get from those galaxies to our telescopes
- Objectives:
 - It will examine every phase of cosmic history: from the Big Bang to the formation of galaxies, stars, and planets to the evolution of our own Solar System.
 - The goals for the Webb can be grouped into four themes.
 - The first is to look back around 13.5 billion years to see the first stars and galaxies forming out of the darkness of the early universe.
 - Second, to compare the faintest, earliest galaxies to today's grand spirals and understand how galaxies assemble over billions of years.
 - Third, to see where stars and planetary systems are being born.
 - Fourth, to observe the atmospheres of extrasolar planets (beyond our solar system), and perhaps find the building blocks of life elsewhere in the universe.

65. Answer: (b)

Explanation:

What is Shukrayaan I Mission?

- About:
 - Shukrayaan I will be an Orbiter Mission. Its scientific payloads currently include a high-resolution Synthetic Aperture Radar (SAR) and a ground-penetrating radar.
 - SAR would examine Venus' surface, despite the clouds around the planet, which lowers visibility.
 - It refers to a technique for producing high-resolution images. Because of the precision, the radar can penetrate clouds and darkness, which means that it can collect data day and night in any weather.
 - The mission is expected to study Venus's geological and volcanic activity, emissions on the ground, wind speed, cloud cover, and other planetary characteristics from an elliptical orbit. Hence, Statement 1 is correct.
 - Shukrayaan-I will be launched on either GSLV Mk II or GSLV Mk III, the latter allows more instruments or fuel to be carried, according to ISRO. Hence, Statement 2 is incorrect.
- Objectives:
 - Investigation of surface process and shallow subsurface stratigraphy. Until now, no prior observation of the sub-surface of Venus has been done.
 - Stratigraphy is a branch of geology in which rock layers and layering are studied.
 - Study of the structure, composition and dynamics of the atmosphere.
 - Investigation of Solar wind interaction with Venusian ionosphere.
- Significance:

- It will help to learn how Earth-like planets evolve and what conditions exist on Earth-sized exoplanets (Planets that orbit a star other than our sun).
- It will help in modelling Earth's climate and serves as a cautionary tale on how dramatically a planet's climate can change.

66. Answer: (a)

Explanation:

What is GM Mustard?

- DMH-11 is an indigenously developed transgenic mustard. It is a genetically modified variant of Herbicide Tolerant (HT) mustard.
- DMH-11 is a result of a cross between Indian mustard variety 'Varuna' and East European 'Early Heera-2' mustard.
- It contains two alien genes ('barnase' and 'barstar') isolated from a soil bacterium called *Bacillus amyloliquefaciens* that enable breeding of high-yielding commercial mustard hybrids.
- Barnase in Varuna induces a temporary sterility because of which it can't naturally self-pollinate. Barstar in Heera blocks the effect of barnase allowing seeds to be produced.
- DMH-11 has shown approximately 28% more yield than the national check and 37 % more than the zonal checks and its use has been claimed and approved by the GEAC.
 - "Bar gene" maintains the genetic purity of hybrid seed.

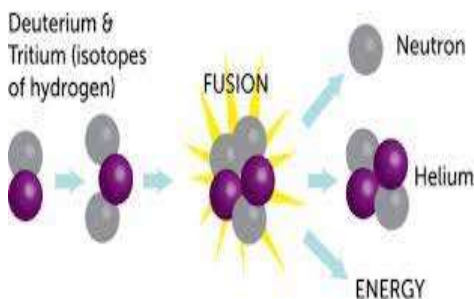
67. Answer: (d)

Explanation:

What is Fusion?

- Fusion is a different, but more powerful, way of harnessing the immense energy trapped in the nucleus of an atom.
- In fusion, nuclei of two lighter elements are made to fuse together to form the nucleus of a heavier atom.
- A large amount of energy is released in both these processes, but substantially more in fusion than fission.
- This is the process that makes the Sun and all other stars shine and radiate energy.
- Hence, all Statements are correct.

Nuclear Fusion



What are Advantages of Nuclear Fusion?

- **Abundant Energy:**
 - Fusing atoms together in a controlled way releases nearly four million times more energy than a chemical reaction such as the burning of coal, oil or gas and four times as much as nuclear fission reactions (at equal mass).
 - Fusion has the potential to provide the kind of baseload energy needed to provide electricity to the cities and the industries.
- **Sustainability:**
 - Fusion fuels are widely available and nearly inexhaustible. Deuterium can be distilled from all forms of water, while tritium will be produced during the fusion reaction as fusion neutrons interact with lithium.
- **No CO₂:**
 - Fusion doesn't emit harmful toxins like carbon dioxide or other greenhouse gases into the atmosphere. Its major by-product is helium: an inert, non-toxic gas.
- **No long-lived Radioactive Waste:**
 - Nuclear fusion reactors produce no high activity, long-lived nuclear waste.
- **Limited Risk of Proliferation:**
 - Fusion doesn't employ fissile materials like uranium and plutonium (Radioactive tritium is neither a fissile nor a fissionable material).
- **No Risk of Meltdown:**
 - It is difficult enough to reach and maintain the precise conditions necessary for fusion—if any disturbance occurs, the plasma cools within seconds and the reaction stops.

68. Answer: (a)

Explanation:

What is End-to-End Encryption?

- **About:**
 - End-to-end encryption is a communication process that encrypts data being shared between two devices.
 - It prevents third parties like cloud service providers, internet service providers (ISPs) and cybercriminals from accessing data while it is being transferred.
- **Mechanism:**
 - The cryptographic keys used to encrypt and decrypt the messages are stored on the endpoints.
 - The process of end-to-end encryption uses an algorithm that transforms standard text into an unreadable format.
 - This format can only be unscrambled and read by those with the decryption keys, which are only stored on endpoints and not with any third parties including companies providing the service.
- **Usage:**
 - E2EE has long been used when transferring business documents, financial details, legal proceedings, and personal conversations.
 - It can also be used to control users' authorisation when accessing stored data.
 - End-to-end encryption is used to secure communications.
 - It is also used to secure passwords, protect stored data and safeguard data on cloud storage.

What are the Advantages of E2EE?

- **Security in Transit:**

- End-to-end encryption uses public key cryptography, which stores private keys on the endpoint devices. Messages can only be decrypted using these keys, so only people with access to the endpoint devices are able to read the message.
- Safety from Third Parties:
 - E2EE ensures that user data is protected from unwarranted parties including service providers, cloud storage providers, and companies that handle encrypted data.
- Tamper-Proof:
 - With E2EE, the decryption key does not have to be transmitted; the recipient will already have it.
 - If a message encrypted with a public key gets altered or tampered within transit, the recipient will not be able to decrypt it, so the tampered contents will not be viewable.
- Compliance:
 - Many industries are bound by regulatory compliance laws that require encryption-level data security.
 - E2EE can help organizations protect that data by making it unreadable.

69. Answer: (c)

Explanation:

What is Vikram S?

- Background: The rocket has been developed by Indian space technology startup Skyroot Aerospace. It is named after Vikram Sarabhai, the founder of India's space programme.
- Technology Used: It is a single-stage sub-orbital launch vehicle that would carry three customer payloads.
 - Sub-orbital flights are those vehicles that are travelling slower than the orbital velocity – meaning it is fast enough to reach outer space but not fast enough to stay in an orbit around the Earth.
 - It has been built using advanced technologies including carbon composite structures and 3D-printed components.
- Significance: It would help test and validate the majority of the technologies in the Vikram series of space launch vehicles.
 - Skyroot has been working on three different Vikram rocket versions.
 - The Vikram-I can launch with 480 kilograms of payload, whereas the Vikram-II is designed to do so with 595 kilos and Vikram-III has a 500 km Low Inclination Orbit launch capability with 815 kg.

70. Answer: (d)

Explanation:

What is a DART mission?

- About:
 - DART is a low-cost spacecraft.
 - It has two solar arrays and uses hydrazine propellant for maneuvering the spacecraft.
 - It also carries about 10 kg of xenon which will be used to demonstrate the agency's new thrusters called NASA Evolutionary Xenon Thruster–Commercial (NEXT-C) in space.
 - NEXT-C gridded ion thruster system provides a combination of performance and spacecraft integration capabilities that make it uniquely suited for deep space robotic missions.

- The spacecraft carries a high-resolution imager called Didymos Reconnaissance and Asteroid Camera for Optical Navigation (DRACO).
 - Images from DRACO will be sent to Earth in real-time and will help study the impact site and surface of Dimorphos (the target asteroid).
- DART will also carry a small satellite or CubeSat named LICIACube (Light Italian CubeSat for Imaging of Asteroids).
 - LICIACube is expected to capture images of the impact and the impact crater formed as a result of the collision.
- Objectives:
 - The mission is to test the new technology to be prepared in case an asteroid heads towards Earth in the future.
 - The aim is to test the newly developed technology that would allow a spacecraft to crash into an asteroid and change its course.
 - The target of the spacecraft is a small moonlet called Dimorphos (Greek for “two forms”).
 - Dimorphos orbits a larger asteroid named Didymos (Greek for “twin”).
 - It is a suicide mission and the spacecraft will be completely destroyed.

71. Answer: (c)

Explanation:

About Stem Cell Therapy (SCT)

- SCT, also known as regenerative medicine and bone marrow transplant, promotes the repair response of diseased, dysfunctional or injured tissue using stem cells or their derivatives.
 - Researchers grow stem cells in a lab. These stem cells are manipulated to specialize into specific types of cells, such as heart muscle cells, blood cells or nerve cells.
 - The specialized cells can then be implanted into a person
- Two of the most common types of stem cell transplants are:
 1. Autologous transplantation uses the patient’s own stem cells.
 2. Allogeneic transplantation where stem cells come from a donor.

72. Answer: (d)

Explanation:

What is Dark Matter?

- Dark matter is made up of particles that do not have a charge.
 - So, these particles are “dark”, namely because they do not emit light, which is an electromagnetic phenomenon, and “matter” because they possess mass like normal matter and interact through gravity.
- The visible universe we see is the result of various interactions among the four Fundamental forces acting upon the particles, namely-
 - Strong nuclear force
 - Weak nuclear force
 - Electromagnetic force
 - Gravitation

- Only 5% of the entire visible universe is made up of all matter and the rest of 95% is dark matter and dark energy.
 - So far gravitational force is less understood as its extremely weak force, and that's why it's not easy to detect any particle which interacts with gravitational force.

What is Dark Energy?

- Dark Energy is a theorized type of energy that exerts a negative, repulsive force, acting in the opposite direction of gravity.
 - It has been proposed to explain the observed features of distant types of supernovae, which reveal the universe expanding at an accelerated rate.
 - Dark Energy, like Dark Matter, is inferred from measurements of gravitational interactions between celestial objects rather than explicitly observed.

73. Answer: (b)

Explanation:

What Do We Know about GigaMesh?

- The solution has been developed by Astrome.
 - The startup is supported by AI & Robotics Technology Park (ARTPARK), the Technology Innovation Hub (TIH) at the Indian Institute of Science (IISc).
- It's a network solution which will wirelessly provide fibre-like backhaul capacity and paves the road for 5G.
- It is the world's first multi-beam E-band Radio that is able to communicate from one tower to multiple towers simultaneously while delivering multi GBPS throughput to each of these towers.
- A single GigaMesh device can provide up to forty links with 2+ Gbps capacity, communicating up to a range of ten kilometers.
- Gigamesh features multiple point-to-point communication in E-Band, lowering cost and is driven by software to make it easy to deploy, maintain and repair remotely.

74. Answer: (c)

Explanation:

Responsible AI for Youth Programme

- Aims:
 - The Program is designed to reach out to students from Government schools pan India and provide them with an opportunity to become part of the skilled workforce in an inclusive manner. Hence, Statement 1 is correct.
 - It aims to help reduce the skill gap, while enabling youth to create meaningful social impact solutions. Hence, Statement 2 is correct.
 - It also intends to provide a platform for relevant AI skill-sets and access to required AI tool-sets to make youth digitally ready for the future.
- Description:

- The Program has been created and launched by the Ministry of Electronics & IT in collaboration with Intel India, with support from the Ministry of Human Resource Development.
- The National Programme is open to students of classes 8-12 from Central and State government-run schools (including KVS, NVS, JNV) from across the country.
- The Program will be implemented in a phase-wise manner and in its first phase, each State will nominate 10 teachers as per the eligibility criteria.
 - These teachers will be provided sessions aimed to help them understand the premise and identify 25-50 potential students for the Program.
 - The identified students will attend online training sessions on AI and will learn to identify social impact projects that may be created using AI.
 - Further, top 20 innovative projects will be selected by an independent committee of experts and provided opportunities to showcase at relevant platforms.

75. Answer: (a)

Explanation:

What are the Key Highlights about Prithvi-II Missile?

- About:
 - Prithvi-II is an indigenously developed Surface-to-Surface Missile Short-Range Ballistic Missile (SRBM), which has a range of around 250 km-350km and can carry a one tonne payload.
 - Prithvi II class is a single-stage liquid-fueled missile that has warhead mounting capability of 500 kg-1000kg.
 - The missile is a proven system and is capable of striking targets with a very high degree of precision.
 - The state-of-the-art missile uses an advanced inertial guidance system with manoeuvring trajectory to hit its target.
 - It was initially developed for the Indian Air Force as its primary user and was later inducted into the Indian Army as well.
 - While the missile was inducted into India's Strategic Forces Command for the first time in 2003, it was the first missile developed under the IGMDP.
- Developed by:
 - Defence Research and Development Organisation (DRDO) of India under its Integrated Guided Missile Development Programme (IGMDP).

76. Answer: (b)

Explanation:

What is the Tiangong Space Station?

- The Tiangong space station is a Chinese space station being built in low Earth orbit between 340 and 450 kilometers above the earth.
 - It is part of China Manned Space Program and is the country's first long-term space station.
- China is going to operationalize its new Tiangong multi-module space station for at least ten years.
- China launched an unmanned module named "Tianhe", or "Harmony of the Heavens" for its permanent space station in 2021 that it plans to complete by the end of 2022.
- Tianhe core module is the first module to launch the Tiangong space station module.

77. Answer: (d)

Explanation:

Unified Payments Interface (UPI):

- It is an advanced version of Immediate Payment Service (IMPS)- round-the-clock funds transfer service to make cashless payments faster, easier and smoother.
- UPI is a system that powers multiple bank accounts into a single mobile application (of any participating bank), merging several banking features, seamless fund routing & merchant payments into one hood.
- UPI is currently the biggest among the National Payments Corporation of India (NPCI) operated systems including National Automated Clearing House (NACH), Immediate Payment Service (IMPS), Aadhaar enabled Payment System (AePS), Bharat Bill Payment System (BBPS), RuPay etc.
- The top UPI apps today include PhonePe, Paytm, Google Pay, Amazon Pay and BHIM, the latter being the Government offering.
- As part of an agreement, India's UPI will be linked to Singapore's PayNow.
- NPCI launched UPI with 21 member banks in 2016.
- Achievements:
 - Digital transactions through UPI recorded phenomenal growth during the pandemic year 2020-21 and several countries have evinced interest to learn from Indian experience so that they could replicate the model.
 - The value of transactions made using the UPI crossed USD100 billion in a month for the first time in October, 2021 according to data from the NPCI, further cementing its position as India's most popular digital payments system.
 - India's digital payments industry is likely to grow from Rs. 2,153 trillion at 27% Compounded Annual Growth Rate (CAGR) to Rs. 7,092 trillion by 2025.
 - The growth is likely to come on the back of strong use cases of merchant payments, government policies including Jan Dhan Yojana, personal data protection bill along with the growth of MSMEs, growth of millennials and high smartphone penetration.
- Challenges:
 - The threat of cybercrime in the global banking and financial services industry has increased amid the coronavirus pandemic.
 - E.g. Malicious Software Cerberus
 - Fraudulent claims, chargebacks, fake buyer accounts, promotion/coupon abuse, account takeover, identity theft, card detail theft and triangulation frauds are emerging as challenges.

78. Answer: (c)

Explanation:

What is PACER Scheme?

- PACER encompasses the following six components.

- Construction of polar research vessel
- Construction of the third research base in Antarctica
- Indian scientific endeavours in the Arctic
- Polar expeditions-Antarctica
- Southern Ocean Expedition
- It is implemented through the National Centre for Polar and Ocean Research (NCPOR).

What are the Major Works under this Scheme?

- Understanding of Biogeochemical Processes: Field-based studies were conducted in the lakes of Larsemann Hills, East Antarctica for the understanding of biogeochemical processes in supraglacial environments.
- IndARC System: The IndARC mooring system along with the Hydrophone system was successfully retrieved and deployed in Kongsfjorden, Svalbard.
- Research Studies in Himalayas: Glaciological field campaigns were carried out in six benchmark glaciers in Chandra basin of Lahaul-Spiti region of Western Himalaya.
 - Winter snow accumulation over the glaciers was recorded using snow pits and snow corners.
- Automatic Weather Station (AWS) Systems: Two new Automatic Weather Station (AWS) systems were installed at Baralacha La, a high elevation site in the arid Spiti region to strengthen infrastructure across the Chandra basin.
- Southern Ocean Expedition :The 11th Indian Southern Ocean Expedition was executed successfully

79. Answer: (c)

Explanation:

Launched in 2018, the Ocean Services, Modelling Application, Resources and Technology (O-SMART) Scheme is aimed at promoting ocean research and setting up early warning weather systems. It encompasses 7 sub-schemes, namely:

- Ocean Technology, Ocean Modelling and Advisory Services (OMAS),
- Ocean Observation Network (OON),
- Ocean Non-Living Resources, Marine Living Resources and Ecology (MLRE),
- Coastal Research and Operation and Maintenance of Research Vessels.

These sub-schemes are being implemented by autonomous or attached institutes of the Ministry, viz. National Institute of Ocean Technology (NIOT), Chennai; Indian National Center for Ocean Information Services (INCOIS), Hyderabad; National Centre for Polar and Ocean Research (NCPOR), Goa, Center for Marine Living Resources and Ecology (CMLRE), Kochi; and National Centre for Coastal Research (NCCR), Chennai as well as involving other national institutes.

Context: On January 5, 2024, the Cabinet approved the scheme “PRITHvi Vgyan (PRITHVI)” of the Ministry of Earth Sciences, for implementation during the period 2021-26 at an overall cost of Rs 4,797 crore. Aimed at strengthening long-term observations of the atmosphere, ocean, geosphere, cryosphere and solid earth to record the vital signs of the earth system and change, the scheme encompasses five ongoing sub-schemes, namely:

1. Atmosphere & Climate Research-Modelling Observing Systems and Services (ACROSS),

2. Ocean Services, Modelling Application, Resources and Technology (O-SMART),
3. Polar Science and Cryosphere Research (PACER),
4. Seismology and Geosciences (SAGE) and
5. Research, Education, Training and Outreach (REACHOUT).

80. Answer: (a)

Explanation:

Based on the recommendations of Dhebar Commission (1960-61) which is the first SC/ST commission set up under Article 339, the Government, in 1975, created a separate category of 'Primitive Tribal Groups', less developed among the tribes and in 2006, renamed them as 'Particularly Vulnerable Tribal Groups (PVTGs)'. The criteria for identifying PVTGs are: 1) Pre-agrarian technology, 2) Low literacy, 3) Economic backwardness, 4) A declining or stagnant population. They are found in scattered, remotest and most inaccessible areas of the country.

Till now, the Government identified 75 PVTGs spread over 17 States and one UT (2011 Census) in some of the most inaccessible areas in the country. A book, The Particularly Vulnerable Tribal Groups in India: Privileges and Predicaments, published by the Anthropological Survey of India in 2016, states that the highest number of PVTGs are found in Odisha (15), followed by undivided Andhra Pradesh (12), Bihar and Jharkhand (9), Madhya Pradesh and Chhattisgarh (7), Tamil Nadu (6) and Kerala and Gujarat (5 each).

The last Census that counted all 75 PVTGs was the 2001 Census, which put their total number around 27.6 lakh. According to the 2001 Census, the PVTGs that have more than 1 lakh population are Saharias and Baigas in undivided Madhya Pradesh, Katkaria/kathodi and Kolam in Maharashtra, Riang in Tripura, Hill Kharia and Mal Paharia in Jharkhand and Irullas in Tamil Nadu. The PVTGs that have more than 50000 population are Konda Reddis and Dongaria Khond in undivided Andhra Pradesh, etc. while the PVTGs that have less than 1000 population are Birjia in Bihar, Sentinelese, Great Andamanese, Onge, Jarawa and Shompen in Andaman & Nicobar Islands.

Recently, Bharia PVTG in Madhya Pradesh and Kamar and Baiga tribe in Chhattisgarh were granted Habitat Rights under the Forest Rights Act, 2006.

81. Answer: (c)

Explanation:

Initiatives taken for eradication of child labour

- India ratified ILO Convention 182 on Worst Forms of Child Labour and Convention 138 on the Minimum Age of Employment.
- Child Labour (Prohibition and Regulation) Amendment Act 2016:

Prohibit employment of Children below 14 years in all employment and also with provisions for prohibition on employment of adolescents (14-18 Years) in the scheduled hazardous occupations and processes.

- National Child Labour Project (NCLP) Scheme: Under it, Special Schools/Rehabilitation Centres for the rehabilitation of child labourers are opened.

o It is a Central Sector scheme under the Ministry of Labour and Employment.

- PENCiL (Platform for Effective Enforcement for No Child Labour) Portal: It has become a pivotal tool in rescuing and rehabilitating victims of child labour.

o It is managed by Ministry of Labour and Employment.

- Bachpan Bachao Andolan (Save the Childhood Movement): An NGO that helped liberate more than 85,000 children in India from exploitation- through education and rehabilitation.

82. Answer: (b)

Explanation:

MTP (Amendment) Act 2021 allows termination of pregnancy in following cases:

- Upto 20 weeks: Available to all on the advice of one doctor.
- For 20 to 24 weeks: Available only in specific categories of women cases subject to advice of two doctors. Categories of women include survivors of rape or incest, change of marital status during ongoing pregnancy, risk to life of pregnant woman or of grave injury to her physical or mental health, risk of abnormalities to child, differently abled women, minors, and pregnancy in humanitarian settings or disaster or emergencies.
- Beyond 24 weeks: Available only on grounds of foetal abnormalities on advice of a medical board. • In 2022, SC ruled that for sole purpose of MTP Act, the meaning of rape must include marital rape.
- Further, SC also extended the right to safe and legal abortion upto 24 weeks to unmarried and single women.

83. Answer: (b)

Explanation:

Initiatives taken to promote women in STEM

- I-STEM (Indian Science Technology and Engineering facilities Map): By the Office of Principal Scientific Advisor provides a platform to provide Research infrastructure and Labs that can be availed by users across India.
- Women in Engineering, Science, and Technology (WEST): A new I-STEM initiative to empower women to contribute to the science, technology, and innovation ecosystem.

- Vigyan Jyoti: By the Department of Science & Technology to create a level-playing field for the meritorious girls in high school to pursue STEM.
- Knowledge Involvement Research Advancement through Nurturing (KIRAN): Scheme of Department of Science & Technology encourages women scientists in the field of S&T.
- Gender Advancement for Transforming Institutions (GATI): It seeks to bring institutional reforms to facilitate women in STEM and medicine disciplines at all levels.
- Consolidation of University Research for Innovation and Excellence (CURIE): It provides support to women universities in improving their R&D facilities.
- Biotechnology Career Advancement and Reorientation Programme (BioCARE): By Department of Biotechnology for Career Development of employed/ unemployed women Scientists for whom it will be the first extramural research grant.

84. Answer: (d)

Explanation:

Initiatives taken for Transgender community

- SMILE (Support for Marginalised Individuals for Livelihood and Enterprise): An umbrella scheme for socio-economic development of transgenders, includes two sub-schemes o Comprehensive Rehabilitation for Welfare of Transgender Persons, and o Comprehensive Rehabilitation of persons engaged in the act of Begging.
- National Portal for Transgender Persons launched by Ministry of Social Justice & Empowerment (MoSJE).
- Garima Greh: A Shelter Home for Transgender Persons.

85. Answer: (b)

Explanation:

What are EMRS?

- About:
 - EMRS is a scheme for making model residential schools for Indian tribals (ST- Scheduled Tribes) across India. It started in the year 1997-98. Hence, Statement 1 is correct.
 - The Eklavya Model Residential School in Shinde (Nashik) has been planned by the Ministry Tribal Affairs to give impetus to quality education in nearby tribal areas.
 - The EMR School follows the CBSE curriculum. Hence, Statement 2 is incorrect.
 - Eklavya Model Residential Schools are being developed to impart quality education to tribal students, with an emphasis on not only academic education but all-round development of tribal students.

- At present, there are 384 functional schools spanned across the country established at par with Navodaya Vidyalaya with focus on special state-of-the-art facilities for preserving local art and culture besides providing training in sports and skill development.
- Coverage:
 - As per existing EMRS Guidelines of 2010, at least one EMRS is to be set up in each Integrated Tribal Development Agency (ITDA) / Integrated Tribal Development Project (ITDP) having 50% ST population in the area.
 - As per the budget 2018-19, every block with more than 50% ST population and at least 20,000 tribal persons, will have an Eklavya Model Residential School by the year 2022.

86. Answer: (a)

Explanation:

Right of Persons with Disabilities Act 2016

- Disability has been defined based on an evolving and dynamic concept.
- The types of disabilities have been increased from 7 to 21. The act added mental illness, autism, spectrum disorder, cerebral palsy, muscular dystrophy, chronic neurological conditions, speech and language disability, thalassemia, hemophilia, sickle cell disease, multiple disabilities including deaf blindness, acid attack victims and Parkinson's disease which were largely ignored in earlier act. In addition, the Government has been authorized to notify any other category of specified disability.
- It increases the quantum of reservation for people suffering from disabilities from 3% to 4% in government jobs and from 3% to 5% in higher education institutes.
- Every child with benchmark disability between the age group of 6 and 18 years shall have the right to free education. Government funded educational institutions as well as the government recognized institutions will have to provide inclusive education.
- Stress has been given to ensure accessibility in public buildings in a prescribed time frame along with Accessible India Campaign.
- The Chief Commissioner for Persons with Disabilities and the State Commissioners will act as regulatory bodies and Grievance Redressal agencies, monitoring implementation of the Act.
- A separate National and State Fund be created to provide financial support to the persons with disabilities.

87. Answer: (c)

Explanation:

- Status of Beggars In India:
 - According to the Census 2011, total number of beggars in India is 4,13,670 (including 2,21,673 males and 1,91,997 females) and the number has increased from the last census.
 - West Bengal tops the chart followed by Uttar Pradesh and Bihar at number two and three respectively. Lakshadweep merely has two vagrants according to the 2011 census. Hence, Statement 1 is correct.
 - Among the union territories, New Delhi had the largest number of beggars 2,187 followed by 121 in Chandigarh. Hence, Statement 2 is correct.
 - Among the northeastern states, Assam topped the chart with 22,116 beggars, while Mizoram ranked low with 53 beggars.

- Recently, the Supreme Court has agreed to examine a plea for decriminalising begging which has been made an offence in various states under Prevention of Begging Act.

88. Answer: (a)

Explanation:

What is NEP 2020?

- About:
 - The NEP 2020 aims at making “India a global knowledge superpower”. It is only the 3rd major revamp of the framework of education in India since independence.
 - The two earlier education policies were brought in 1968 and 1986.
- Salient Features:
 - Ensuring Universal Access at All Levels of schooling from pre-primary school to Grade 12.
 - Ensuring quality early childhood care and education for all children between 3-6 years.
 - New Curricular and Pedagogical Structure(5+3+3+4) corresponds to the age groups of 3-8, 8-11, 11-14, and 14-18 years respectively.
 - It covers four stages of schooling: Foundational Stage (5 years), Preparatory Stage (3 years), Middle Stage (3 years), and Secondary Stage (4 years).
 - No hard separations between arts and sciences, between curricular and extra-curricular activities, between vocational and academic streams;
 - Emphasis on promoting multilingualism and Indian languages
 - Setting up of a new National Assessment Centre, PARAKH (Performance Assessment, Review, and Analysis of Knowledge for Holistic Development)
 - A separate Gender Inclusion fund and Special Education Zones for disadvantaged regions and groups.

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89. Answer: (d)

Explanation:

Pradhan Mantri Schools for Rising India (PM-SHRI) Yojana?

- About:
 - It is a centrally sponsored scheme for upgradation and development of more than 14500 Schools across the country.
 - It aims at strengthening the selected existing schools from amongst schools managed by Central Government/ State/ UT Government/ local bodies.
- Significance:
 - It will showcase all components of the National Education Policy 2020 and act as exemplar schools and also offer mentorship to other schools in their vicinity. Hence, all Statements are correct.
 - The aim of these schools will not only be qualitative teaching, learning and cognitive development, but also creating holistic and well-rounded individuals equipped with key 21st century skills.

- Pedagogy adopted in these schools will be more experiential, holistic, integrated, play/toy-based, inquiry-driven, discovery-oriented, learner-centred, discussion-based, flexible and enjoyable.
- Focus will be on achieving proficiency in learning outcomes of every child in every grade. Assessment at all levels will be based on conceptual understanding and application of knowledge to real life situations and will be competency-based.
- These schools will be equipped with modern infrastructure including labs, smart classrooms, libraries, sports equipment, art room etc. which is inclusive and accessible.
- These schools shall also be developed as green schools with water conservation, waste recycling, energy-efficient infrastructure and integration of organic lifestyle in curriculum.

90. Answer: (b)

Explanation:

What is the Performance Grading Index for Districts (PGI-D)?

- About:
 - PGI-D assesses the performance of the school education system at the district level by creating an index for comprehensive analysis. Hence, Statement 1 is correct.
 - The PGI-D assessed district-level performance in school education based on the data collected from various sources, including Unified District Information System for Education Plus (UDISE +), National Achievement Survey (NAS), 2017 and data provided by respective districts.
 - Since 2017-18, MoE has released five annual reports that provide insights on status of school education in States and UTs.
- Grades:
 - The report has 10 grades under which districts are categorized,
 - Daksh: Highest grade (above 90%)
 - Utkarsh: 81%-90%
 - Ati-Uttam: 71%-80%
 - Uttam: 61%-70%
 - Prachesta-1: 51%-60%
 - Prachesta-2: 41%-50%
 - Prachesta-3: 31%-40%
 - Akanshi-1: 21% to 30%
 - Akanshi-2: 11% to 20%
 - Akanshi-3: Lowest (less than 10%)
 - Hence, Statement 2 is incorrect.
- Indicators:
 - The PGI-D structure comprises total weight age of 600 points across 83 indicators, which are grouped under 6 categories viz., Outcomes, Effective Classroom Transaction, Infrastructure Facilities & Student's Entitlements, School Safety & Child Protection, Digital Learning and Governance Process.
- Significance:
 - The PGI-D report is expected to assist state education departments in identifying gaps at the district level and improving performance in a decentralized manner.
 - By prioritizing areas for intervention, districts can work towards reaching the highest grade and enhancing overall education quality.

91. Answer: (a)

Explanation:

Recently, the Ministry of Human Resource Development (MHRD) has released guidelines on digital education titled 'PRAGYATA'.

- The guidelines have been prepared by the National Council of Educational Research and Training (NCERT).
- These are only advisory in nature and state governments can formulate their own rules, based on local needs.
- The guidelines include eight steps of online/digital learning i.e. Plan- Review- Arrange- Guide- Yak (talk)- Assign- Track- Appreciate.

Key Points

- Digital Access:
 - Over 25 crore students across the country have been out of school since mid-March 2020. (owing to Covid-19 pandemic). The guidelines acknowledge that these students live in households which fall into different categories:
 - Those who have computers or smartphones with 4G internet access.
 - Those with smartphones but limited or no internet access.
 - Those with television with cable or DTH.
 - Those with a radio set or a basic mobile phone with FM radio.
 - And those with no communication devices at all.
 - It emphasised the aim of digital classrooms is not to try and recreate Face-to-Face (F2F) classroom over the internet.
- Need for Survey: It advises schools to first survey the digital infrastructure available with teachers as well as students, the levels of parental involvement before making decisions about the mode of teaching.
 - Therefore, schools must also make arrangements to reach students who do not have access to any digital infrastructure at home.
- Duration: For kindergarten, nursery and pre-school, only 30 minutes of screen time per day for interacting with parents is recommended.
 - Schools can hold live online classes for a maximum of 1.5 hours per day for Classes 1-8, and 3 hours per day for Classes 9-12.
- Synchronous or Real-time Communication: This is real-time teaching and learning that can happen collaboratively at the same time with a group of online learners or individuals, and teachers allowing instant feedback, e.g. online teaching through video conference, audio conference, using satellite or telecommunication facilities.
 - However, schools should not assume that teaching-learning through it is the only requirement in order to support effective digital learning.
- Asynchronous Learning: Apart from live classes, it offered a number of recommendations for asynchronous learning with tools to allow students to download lessons or listen to radio and TV programmes, communicate through Whatsapp and SMS, study on their own and undertake creative projects.

- Health Issues: Children exposed to digital technologies or gadgets for a longer time are prone to severe health issues.
 - Hence sitting with digital gadgets for longer hours or their excess use can be avoided by designing age appropriate schedules.
- Cyber Safety: It also recommends ethical practices including precautions and measures for maintaining cyber safety.

92. Answer: (d)

Explanation:

What is BBBP?

- About:
 - It was launched in January 2015 with the aim to address sex selective abortion and the declining child sex ratio which was at 918 girls for every 1,000 boys in 2011.
 - This is a joint initiative of the Ministry of Women and Child Development, Ministry of Health and Family Welfare and Ministry of Human Resource Development.
 - The programme is being implemented across 405 districts in the country.
 - Hence, all Statements are correct.
- Main Objectives:
 - Prevention of gender-biased sex-selective elimination.
 - Ensuring survival & protection of the girl child.
 - Ensuring education and participation of the girl child.
 - Protecting rights of Girl children.
- Performance Analysis:
 - Sex Ratio at Birth:
 - Sex Ratio at Birth (SRB) has improved by 16 points from 918 (2014-15) to 934 (2019-20), as per the Health Management Information System (HMIS) data.
 - Notable Examples (Districts):
 - Mau (Uttar Pradesh) from 694 (2014-15) to 951 (2019-20),
 - Karnal (Haryana) from 758 (2014-15) to 898 (2019-20),
 - Mahendergarh (Haryana) from 791 (2014-15) to 919 (2019-20), etc.
 - Health:
 - ANC Registration: Percentage of 1st Trimester ANC (AnteNatal Care) Registration has shown an improving trend from 61% in 2014-15 to 71% in 2019-20.
 - Institutional Deliveries: Percentage of Institutional Deliveries has shown an improving trend from 87% in 2014-15 to 94% in 2019-20.
 - Education:
 - Gross Enrolment Ratio (GER): GER of girls in the schools at secondary level has improved from 77.45 (2014-15) to 81.32 (2018-19) as per Unified District Information System for Education (UDISE) provisional data.
 - Toilet for girls: Percentage of schools with functional separate toilets for girls has shown improvement from 92.1% in 2014-15 to 95.1% in 2018-19.
 - Attitudinal Change:
 - The BBBP scheme has been able to bring the focus on important issue of female infanticide, lack of education amongst girls and deprivation of their rights on a life cycle continuum.
 - BetiJanmotsav is one of the key programmes celebrated in each district.

93. Answer: (a)

Explanation:

Recently, Tracking Universal Health Coverage: 2023 Global Monitoring report was jointly released by WHO and World Bank.

Universal Health Coverage

- UHC means that all people have access to a full range of quality health services without financial hardship.
- It covers the full continuum of essential health services, from health promotion to prevention, treatment, rehabilitation and palliative care.
- Key Dimensions of UHC: Accessibility, Affordability, and Quality.

Initiatives taken to achieve Universal Health Coverage

- Ayushman Bharat Yojana aims to undertake interventions to holistically address health at primary, secondary and tertiary level.
- Ayushman Bharat Digital Mission (ABDM) to improve equitable access to quality healthcare by encouraging use of technologies such as telemedicine and enabling national portability of health services.
- National Health Policy 2017 aims at achieving UHC and delivering quality health care services to all at affordable cost.
- Intensified Mission Indradhanush focusses on reaching zero-dose children aged between 0 and 5 years and pregnant women who might have missed any vaccine doses in the national immunisation schedule.

94. Answer: (b)

Explanation:

Poshan Abhiyan?

- About
 - Launched in December 2017, POSHAN Abhiyaan (National Nutrition Mission) aims to reduce stunting, undernutrition, anemia (among young children, women and adolescent girls) and reduce low birth weight by 2%, 2%, 3% and 2% per annum respectively by 2020.
 - POSHAN Abhiyaan aims to ensure service delivery and interventions by use of technology, behavioural change through convergence and lays-down specific targets to be achieved across different monitoring parameters.
 - Under the Abhiyaan, Swasth Bharat Preraks will be deployed one in each district for coordinating with district officials and enabling fast and efficient execution of the Abhiyaan across the country. Swasth Bharat Preraks would function as catalyst for fast tracking the implementation of the Abhiyaan.
- POSHAN 2.0:
 - About:

- The government has amalgamated various programmes with similar objectives such as Supplementary Nutrition Programme and POSHAN Abhiyaan under one umbrella—Mission POSHAN 2.0—for creating synergies in operations and adopting an integrated approach in the nutrition services mechanism.
 - Components:
 - Convergence: The Abhiyaan is to ensure convergence of all nutrition related schemes of MWCD on the target population. The Abhiyaan will ensure convergence of various programmes.
 - ICDS-CAS: Software based tracking of nutritional status will be done.
 - Behavioral change: The Abhiyaan will be run as a Jan Andolan where mass involvement of people is desired. A community-based event will happen once a month to create awareness and address issues.
 - Incentives: Front line workers will be given incentives for performance.
 - Training and Capacity Building: Incremental Learning Approach will be adopted to teach 21 thematic modules. The training will be given by Master Trainers to front line workers.
 - Grievance Redressal: A call centre will be set up for ease of access to solutions to any issues faced.

95. Answer: (a)

Explanation:

Recently, World Health Organization (WHO) released a report 'Burden of disease attributable to unsafe drinking-water, sanitation and hygiene (WASH)'.

About WASH

- WASH is a collective term for Water, Sanitation and Hygiene relating to Access to safe drinking water, Improved sanitation facilities and maintaining basic level of hygiene.
- SDG 6 (Clean Water and Sanitation) aims to ensure availability and sustainable management of water and sanitation for all.
- Report stated that in 2019, use of safe WASH services could have prevented 2.5% of all deaths and 2.9% of all Disability-Adjusted Life years (DALYs) globally.
- Current Status of India, as per UNICEF o Number of people defecating in open in India has reduced significantly by an estimated 450 million people.

o Inadequate WASH services in health facilities contributes to high neonatal mortality rate, which is currently around 24 deaths per 1000 live births.

- UNICEF released a report titled 'Triple Threat Report' which examined "triple burden" of Water, Sanitation and Hygiene (WASH) related threats faced by children.
- Triple threat/burden defined as
 1. Less than 50% access to at least basic water or sanitation services.
 2. Within top 20 countries, highest burden of deaths attributable to unsafe WASH among children under 5.

3. Within top 25% of countries facing highest risk of climate and environmental hazards in UNICEF's Children's Climate Risk Index (CCRI).

96. Answer: (b)

Explanation:

In the Global Hunger Index 2023, India ranked 111th out of 125 countries, indicating a serious level of hunger. Hence, Statement 1 is incorrect.

- Neighboring countries, such as Pakistan (102nd), Bangladesh (81st), Nepal (69th), and Sri Lanka (60th), scored better than India.

What is the Global Hunger Index ?

- About:
 - The Global Hunger Index (GHI) is a peer-reviewed report, published on an annual basis by Concern Worldwide and Welthungerhilfe.
 - Hence, Statement 2 is correct.
 - The GHI is a tool designed to comprehensively measure and track hunger at global, regional, and national levels, reflecting multiple dimensions of hunger over time.
 - The GHI score is calculated on a 100-point scale reflecting the severity of hunger - 0 is the best score (implies no hunger) and 100 is the worst.

Note: Concern Worldwide is an international humanitarian organization dedicated to tackling poverty and suffering in the world's poorest countries.

- Welthungerhilfe is a private aid organization in Germany. It was established in 1962, as the German section of the "Freedom from Hunger Campaign".
- Calculation:
 - Each country's GHI score is calculated based on a formula that combines four indicators that together capture the multidimensional nature of hunger:
 - Undernourishment: The share of the population whose caloric intake is insufficient;
 - Child Stunting: The share of children under the age of five who have low height for their age, reflecting chronic undernutrition;
 - Child Wasting: The share of children under the age of five who have low weight for their height, reflecting acute undernutrition; and
 - Child Mortality: The share of children who die before their fifth birthday, reflecting in part the fatal mix of inadequate nutrition and unhealthy environments.
- Alignment with Sustainable Development Goals(SDG):
 - The prevalence of undernourishment is an indicator for SDG 2.1, focusing on ensuring access to safe, nutritious, and sufficient food for all.
 - Child stunting and wasting rates are indicators for SDG 2.2, aiming to end all forms of malnutrition.
 - Reducing preventable child deaths is an SDG 3.2 goal.

97. Answer: (c)

Explanation:

What is the Eat Right Movement?

- It is an initiative of FSSAI to transform the country's food system in order to ensure safe, healthy and sustainable food for all Indians. Its tagline is 'Sahi Bhojan, Behtar Jeevan'.
- It is aligned to the National Health Policy 2017 with its focus on preventive and promotive healthcare and flagship programmes like Ayushman Bharat, POSHAN Abhiyaan, Anaemia Mukta Bharat and Swachh Bharat Mission.
- Eat Right India adopts a judicious mix of regulatory, capacity building, collaborative, and empowerment approaches to ensure that our food is suitable both for the people and the planet.

What are the Related Initiatives?

- State Food Safety Index:
 - FSSAI has developed it to measure the performance of States on five parameters of food safety - Human Resources and Institutional Data, Compliance, Food Testing - Infrastructure and Surveillance, Training & Capacity Building and Consumer Empowerment.
- Eat Right Awards:
 - Instituted by FSSAI to recognize the contribution of food companies and individuals to empower citizens to choose safe and healthy food options.
- Eat Right Mela:
 - Organised by FSSAI, it is an outreach activity for citizens to nudge them towards eating right.

98. Answer: (a)

Explanation:

- National Food Security Act, 2013 (NFSA): It marks a paradigm shift in the approach to food security from welfare to rights based approach.
 - NFSA covers 75% of the rural population and 50% of the urban population under:
 - Antyodaya Anna Yojana: It constitute the poorest of-the-poor, are entitled to receive 35 kg of foodgrains per household per month.
 - Priority Households (PHH): Households covered under PHH category are entitled to receive 5 kg of foodgrains per person per month.
 - Hence, Statement 1 is incorrect.
 - The eldest woman of the household of age 18 years or above is mandated to be the head of the household for the purpose of issuing ration cards. Hence, Statement 2 is correct.
 - In addition, the act lays down special provisions for children between the ages of 6 months and 14 years old, which allows them to receive a nutritious meal for free through a widespread network of Integrated Child Development Services (ICDS) centres, known as Anganwadi Centres.

99. Answer: (b)

Explanation:

What do we need to know about Mission Shakti?

- About:
 - 'Mission Shakti' was launched during the 15th Finance Commission period 2021-22 to 2025-26.
 - Mission Shakti is an integrated women empowerment programme is launched as an umbrella scheme for the safety, security and empowerment of women for implementation.
- Components:
 - Sambal:
 - It is for Safety and Security of Women.
 - It consists of schemes of One Stop Centre (OSC), Women Helpline (WHL), Beti Bachao Beti Padhao (BBBP), with a new component of Nari Adalats - women's collectives to promote and facilitate alternative dispute resolution and gender justice in society and within families.
 - Samarthya:
 - It is for Empowerment of Women.
 - It consists of erstwhile schemes of Ujjwala, Swadhar Greh and Working Women Hostel have been included with modifications.
 - In addition, the existing schemes of National Creche Scheme for children of working mothers and Pradhan Mantri Matru Vandana Yojana (PMMVY) under umbrella Integrated Child Development Services ICDS have now been included in Samarthya.
 - A new component of Gap Funding for Economic Empowerment has also been added in the Samarthya Scheme.

100. Answer: (d)

Explanation:

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What is Swachh Bharat Missiyon-Urban?

- About:
 - Swachh Bharat Mission-Urban (SBM-U) was launched on October 2, 2014, by the Ministry of Housing and Urban Affairs as a national campaign to promote cleanliness, sanitation, and proper waste management in urban areas. Hence, Statement 1 is correct.
 - It aimed to make cities and towns across India clean and free from open defecation. Hence, Statement 2 is correct.
- Swachh Bharat Mission-Urban 1.0:
 - The first phase of SBM-U focused on achieving the target of making urban India ODF by providing access to toilets and promoting behavioral change.
 - SBM-U 1.0 was successful in achieving the target and 100% of urban India was declared ODF.
- Swachh Bharat Mission-Urban 2.0 (2021-2026):
 - SBM-U 2.0, announced in Budget 2021-22, is the continuation of SBM-U first phase.
 - The second phase of SBM-U aimed to go beyond ODF to ODF+, and ODF++, and focus on making urban India garbage-free.
 - It emphasized sustainable sanitation practices, waste management, and the promotion of a circular economy.

- Achievements:
 - Open Defecation Free (ODF):
 - Urban India has become Open Defecation Free (ODF), with all 4,715 Urban Local Bodies (ULBs) completely ODF.
 - 3,547 ULBs are ODF+ with functional and hygienic community and public toilets, and 1,191 ULBs are ODF++ with complete faecal sludge management.
 - 14 cities are certified Water+, which entails treatment of wastewater and its optimum reuse.
 - Waste Processing:
 - Waste Processing in India has gone up by over 4 times from 17% in 2014 to 75% in 2023, aided through 100% door-to-door waste collection in 97% wards and source segregation of waste being practised by citizens across almost 90% wards in all ULBs in the country.
 - Garbage Free Cities:
 - The Garbage Free Cities (GFC)-Star rating protocol launched in January 2018 has increased from only 56 cities in the first year to 445 cities till date, with an ambitious target of having at least 1,000 3-star GFC by October 2024.
 - The 2023-24 budget has reinforced India's commitment to building a circular economy through an enhanced focus on scientific management of dry and wet waste.

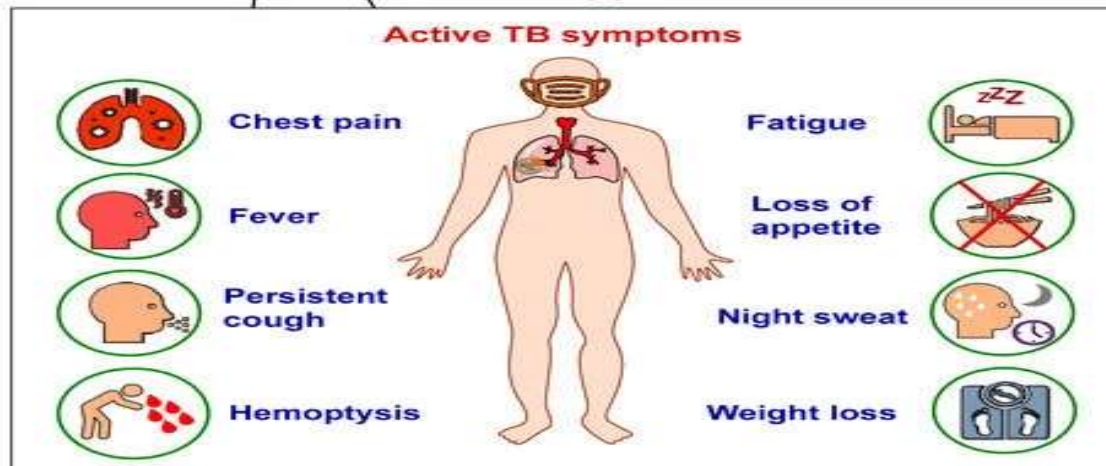
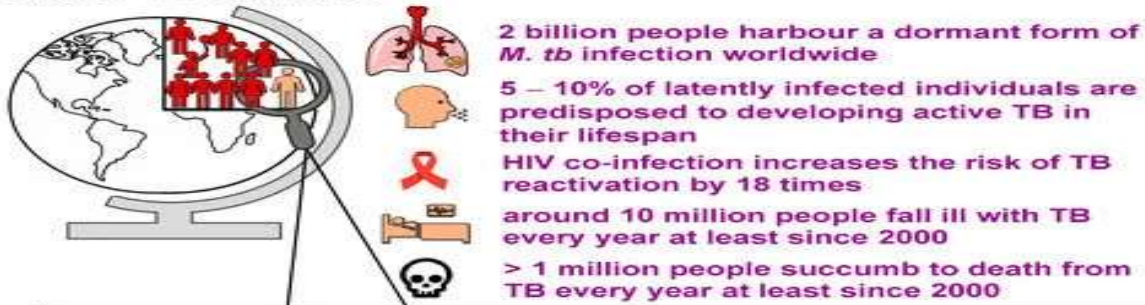
101. Answer: (a)

Explanation:

What is Tuberculosis (TB)?

- About:
 - TB is caused by a bacterium called Mycobacterium tuberculosis, belonging to the Mycobacteriaceae family consisting of about 200 members.
 - Some of Mycobacteria cause diseases like TB and Leprosy in humans and others infect a wide range of animals.
 - In humans, TB most commonly affects the lungs (pulmonary TB), but it can also affect other organs (extra-pulmonary TB). Hence, Statement 2 is incorrect.
 - TB is a very ancient disease and has been documented to have existed in Egypt as early as 3000 BC. It is a treatable and curable disease.
- Infection Prevalence:
 - Every year, 10 million people fall ill with TB. Despite being a preventable and curable disease, 1.5 million people die from TB each year – making it the world's top infectious killer.
 - TB is the leading cause of death of people with HIV and also a major contributor to antimicrobial resistance.
 - Most of the people who fall ill with TB live in low- and middle-income countries, but TB is present all over the world. About half of all people with TB can be found in 8 countries: Bangladesh, China, India, Indonesia, Nigeria, Pakistan, Philippines and South Africa.

Global TB statistics



- Treatment:
 - TB is treated with a standard 6-month course of 4 antimicrobial drugs that are provided with information, supervision and support to the patient by a health worker or trained volunteer.
 - Anti-TB medicines have been used for decades and strains that are resistant to 1 or more of the medicines have been documented in every country surveyed.
 - Multidrug-resistant tuberculosis (MDR-TB) is a form of TB caused by bacteria that do not respond to isoniazid and rifampicin, the 2 most powerful, first-line anti-TB drugs. MDR-TB is treatable and curable by using second-line drugs such as Bedaquiline.
 - Extensively drug-resistant TB (XDR-TB) is a more serious form of MDR-TB caused by bacteria that do not respond to the most effective second-line anti-TB drugs, often leaving patients without any further treatment options.

102. Answer: (b)

Explanation:

Recently, the World Health Organization (WHO) has released a report titled-The Global Status Report on Road Safety 2023, revealing critical findings and insights regarding road traffic fatalities and safety across the globe.

What are the Key Highlights of the Report?

- Road Traffic Fatalities:
 - Road traffic deaths worldwide decreased by 5% between 2010 and 2021, totaling 1.19 million fatalities annually.
 - 108 UN member nations reported a drop in road traffic deaths during this period.
 - India witnessed a 15% increase in fatalities, rising from 1.34 lakh in 2010 to 1.54 lakh in 2021.
- Countries with Significant Reductions:

- Ten countries succeeded in reducing road traffic deaths by over 50%: Belarus, Brunei Darussalam, Denmark, Japan, Lithuania, Norway, Russian Federation, Trinidad and Tobago, United Arab Emirates and Venezuela.
- Thirty-five more countries made notable progress, reducing deaths by 30% to 50%.
- Regional Distribution of Deaths:
 - 28% of global road traffic deaths occurred in the WHO South-East Asia Region, 25% in the Western Pacific Region, 19% in the African Region, 12% in the Region of the Americas, 11% in the Eastern Mediterranean Region, and 5% in the European Region.
 - Low- and middle-income countries bear a disproportionate burden, with 90% of deaths occurring in these nations despite having only 1% of the world's motor vehicles.
- Vulnerable Road Users:
 - 53% of all road traffic fatalities are vulnerable road users, including pedestrians (23%), riders of powered two- and three-wheelers (21%), cyclists (6%), and users of micro-mobility devices (3%).
 - Pedestrian deaths rose by 3% to 274,000, while cyclist deaths increased by nearly 20% to 71,000 between 2010 and 2021.
 - However, deaths among car and other 4-wheeled light vehicle occupants slightly decreased, making 30% of global fatalities.
- Progress on Safety Standards and Policies:
 - Just six countries have laws that meet WHO best practice for all risk factors (speeding, drink-driving, and use of motorcycle helmets, seatbelts and child restraints) while 140 countries (two-thirds of UN Member States) have such laws for at least one of these risk factors.
 - A limited number of countries have legislation covering key vehicle safety features and require safety inspections for road users.
- Call for Action:
 - Global Motor-Vehicle Fleet Growth is expected to double by 2030, urging the need for robust safety regulations and infrastructure improvements.
 - The report sets a baseline for efforts to meet the United Nations Decade of Action 2021–2030 target to halve road traffic deaths by 2030.

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103. Answer: (d)

Explanation:

The Parliament passed the Transgender Persons (Protection of Rights) Bill, 2019.

Key Features

- Definition of a transgender person: The Bill defines a transgender person as one whose gender does not match the gender assigned at birth. It includes transmen and trans-women, persons with intersex variations, gender-queers, and persons with socio-cultural identities, such as kinnar and hijra. Hence, Statement 1 is correct.
- Certificate of identity: A transgender person may make an application to the District Magistrate for a certificate of identity, indicating the gender as 'transgender'. Hence, Statement 2 is correct.
- Prohibition against discrimination: The Bill prohibits discrimination against a transgender person, including denial of service or unfair treatment in relation to:
 - Education, employment, healthcare.
 - Access to or enjoyment of goods, facilities, opportunities available to the public.

- Right to movement, right to reside, rent, or otherwise occupy property.
- Opportunity to hold public or private office.
- Access to a government or private establishment in whose care or custody a transgender person is.
- Health care
 - The Bill also seeks to provide rights of health facilities to transgender persons including separate HIV surveillance centres, and sex reassignment surgeries.
 - It also states that the government shall review medical curriculum to address health issues of transgender persons, and provide comprehensive medical insurance schemes for them.
- It calls for establishing a National Council for Transgender persons (NCT).
- Punishment: It states that the offences against transgender persons will attract imprisonment between six months and two years, in addition to a fine.

104. Answer: (b)

Explanation:

Recently, during the United Nations General Assembly's (UNGA) 78th session, the World Health Organization (WHO) released a report titled "Global report on hypertension: The race against a silent killer."

- It is the first-ever report by the WHO on the worldwide implications of hypertension, commonly referred to as high blood pressure.

What are the Key Highlights of the Report?

- A Global Epidemic:
 - One in three adults across the world suffers from hypertension.
 - The number of hypertension cases has doubled from 650 million to a staggering 1.3 billion between 1990 and 2019.
 - Hypertension affects approximately 33% of adults aged 30-79 worldwide.
 - Approximately four out of every five people with hypertension are not adequately treated.
- India's Hypertension Burden:
 - India alone has an estimated 188.3 million adults aged 30–79 years grappling with hypertension.
 - The prevalence of high blood pressure in India is slightly lower than the global average of 31%.
 - To reach a 50% control rate, India needs to ensure that an additional 67 million people with hypertension receive effective treatment.
 - If the progress scenario were achieved, 4.6 million deaths due to high blood pressure would be averted by 2040.
- Inadequate Treatment:
 - About 80% of individuals with hypertension do not receive adequate treatment.
 - Effective hypertension treatment has the potential to prevent 76 million deaths, 120 million strokes, 79 million heart attacks, and 17 million cases of heart failure by 2050.
- Disparities in Treatment Coverage:
 - Treatment coverage for hypertension exhibits significant disparities among countries, with high-income nations having a more favourable coverage rate.
 - The WHO region of the US leads with a 60% coverage rate, while the African region lags behind at 27%.
 - More than three-quarters of adults with hypertension live in low- and middle-income countries.
- The Urgency of Timely Treatment:

- Nearly 30% of individuals with uncontrolled hypertension exhibit blood pressure measurements above the threshold warranting urgent treatment.
 - Globally, the percentage of adults aged 30–70 taking medication for hypertension has doubled from 22% in 1990 to 42% in 2019.
- Effective treatment coverage has quadrupled during the same period, reaching 21%.
- The WHO's Call to Action:
 - The WHO calls for prioritising the prevention, early detection, and effective management of hypertension as part of national health benefit packages.
- Recommendations:
 - There is a need to strengthen hypertension control programs that remain under-prioritized and acutely underfunded.
 - Strengthening hypertension control must become an integral part of every country's journey toward universal health coverage.

105. Answer: (a)

Explanation:

What is the PRET Initiative?

- About:
 - The Preparedness and Resilience for Emerging Threats (PRET) Initiative was launched by the World Health Organization (WHO) and operates under the aegis of the International Health Regulations (IHR), 2005, which is a critical international legal instrument for managing public health emergencies.
 - The initiative was announced at the Global Meeting for Future Respiratory Pathogen Pandemics held in Geneva, Switzerland.
- Aim:
 - It focuses on improving pandemic preparedness for groups of pathogens based on their mode of transmission.
- Three Tiers of Pandemic Preparedness: It recognizes that there are three tiers of systems and capacities relevant to pandemic preparedness:
 - those that are cross-cutting for all or multi-hazards
 - those that are relevant for groups of pathogens (respiratory, arboviruses etc.)
 - those that are specific to a pathogen.
- Coordinating Efforts:
 - As part of its efforts, the WHO convenes an informal coordination forum known as the Respiratory Pathogens Partners Engagement Forum (R-PEF) which enables WHO and partners to exchange information on planned activities and other developments on planned activities.

106. Answer: (c)

Explanation:

Recently, the Government of India launched a mobile app, MANAS (Mental Health and Normalcy Augmentation System) to promote mental wellbeing across age groups.

MANAS was endorsed as a national program by the Prime Minister's Science, Technology, and Innovation Advisory Council (PM-STIAC).

PM-STIAC: It is an overarching Council that facilitates the Principal Scientific Adviser's Office to assess the status in specific science and technology domains, comprehend challenges in hand, formulate specific interventions, develop a futuristic roadmap and advise the Prime Minister accordingly.

Key Points

- About:
 - It is a comprehensive, scalable, and national digital wellbeing platform and an app developed to augment mental well-being of Indian citizens. Hence, Statement 1 is correct.
 - It integrates the health and wellness efforts of various government ministries, scientifically validated indigenous tools with gamified interfaces developed/researched by various national bodies and research institutions.
 - It is based on life skills and core psychological processes, with universal accessibility, delivering age-appropriate methods and promoting positive attitude focusing on wellness.
- Developed By:
 - National Institute of Mental Health and Neuro Sciences (NIMHANS) Bengaluru, Armed Forces Medical College (AFMC) Pune and Centre for Development of Advanced Computing(C-DAC)Bengaluru.
- Beneficiaries:
 - Catering to the overall wellbeing of people of all age groups, the initial version of MANAS focuses on promoting positive mental health in the age group of 15-35 years. Hence, Statement 2 is correct.
- Aim:
 - To build a healthier and happier community, to empower it to nurture its innate potential for building a Swasth and Atmanirbhar Bharat.
- Motto of MANAS:
 - Uttam Mann, Saksham Jan.

107. Answer: (b)

Explanation:

What is The Big Catch-Up Initiative?

- About:
 - It was launched by the WHO, UNICEF, Bill & Melinda Gates Foundation along with Immunization Agenda 2030 and many other global and national health partners, a targeted global effort to boost vaccination.
- Aim:
 - It aims to protect populations from vaccine-preventable outbreaks like -measles, diphtheria, polio and yellow fever - save children's lives and strengthen national health systems.
- Main Focus:
 - The initiative will pay special attention to the 20 countries — Afghanistan, Angola, Brazil, Cameroon, Chad, DPRK, DRC, Ethiopia, India, Indonesia, Nigeria, Pakistan, Philippines,

Somalia, Madagascar, Mexico, Mozambique, Myanmar, Tanzania and Vietnam which are home to a majority of the children who have missed their vaccine doses.

- Salient Features of the Plan:
 - Strengthening health care workforces
 - Improving health service delivery
 - Building trust and demand for vaccines within communities
 - Addressing gaps and obstacles to restoring immunisation
- Need:
 - More than 100 countries registered a drop in immunisation levels as the pandemic burdened health services as well as disrupted imports and exports of medical supplies.
 - Access to healthcare was further compounded by strict lockdown measures, travel restrictions and depleting financial and human resources.
 - India is among the 20 countries in the world where around 75% of children have missed essential immunisation against preventable but critical diseases in 2021.
- India's Efforts for Vaccination:
 - As a result of the pandemic, immunisation efforts have been hampered, and some countries have already begun showing considerable progress.
 - India managed to record a strong recovery in essential vaccines in 2022

108. Answer: (c)

Explanation:

What is CERVAVAC?

- About:
 - It is India's first indigenously developed quadrivalent human papillomavirus (qHPV)vaccine that is said to be effective against four strains of the virus - Type 6, Type 11, Type 16 and Type 18.
 - A quadrivalent vaccine is a vaccine that works by stimulating an immune response against four different antigens, such as four different viruses or other microorganisms.
 - CERVAVAC is based on VLP (Virus-Like Particles), similar to the Hepatitis B vaccination.
- Approval:
 - The vaccine has received the Drugs Controller General of India's approval and has been cleared by the government advisory panel NTAGI for use in the public health programme.
- Significance:
 - It has a significant potential to eliminate cervical cancer and it would be helpful if included in national HPV vaccination efforts and offered at a lower cost than existing vaccinations.
 - The vaccine is extremely effective only when it's administered before the first sexual intercourse.

What is Cervical Cancer?

- Cervical cancer develops in a woman's cervix. It is the 4th most common type of cancer among women, globally and 2nd most common among women in India.
 - India contributes the largest share of the global cervical cancer burden; nearly 1 in every 4 deaths globally due to cervical cancer (as per The Lancet study).
- Almost all cervical cancer cases (99%) are linked to infection with high-risk HPV, an extremely common virus transmitted through sexual contact.
 - Effective primary (HPV vaccination) and secondary prevention approaches (screening for and treating precancerous lesions) will prevent most cervical cancer cases.

- When diagnosed, cervical cancer is one of the most successfully treatable forms of cancer, as long as it is detected early and managed effectively.
 - Cancers diagnosed in late stages can also be controlled with appropriate treatment and palliative care.
 - With a comprehensive approach to prevent, screen and treat, cervical cancer can be eliminated as a public health problem within a generation.

109. Answer: (d)

Explanation:

Global Gender Gap Report:

- About:
 - It was first published in 2006 by the WEF.
 - It benchmarks 156 countries on their progress towards gender parity in four dimensions:
 - Economic Participation and Opportunity,
 - Educational Attainment,
 - Health and Survival and
 - Political Empowerment.
 - Over the Index, the highest possible score is 1 (equality) and the lowest possible score is 0 (inequality).
- Aim:
 - To serve as a compass to track progress on relative gaps between women and men on health, education, economy and politics. Through this annual yardstick, the stakeholders within each country are able to set priorities relevant in each specific economic, political and cultural context.
- India's Position:
 - Overall Ranking:
 - India is now one of the worst performers in South Asia, it is now ranked 140 among 156 countries.
 - In South Asia, Bangladesh ranked 65, Nepal 106, Pakistan 153, Afghanistan 156, Bhutan 130 and Sri Lanka 116.
 - India had ranked 112th among 153 countries in the Global Gender Gap Index 2020.
 - Political Empowerment:
 - India has declined on the political empowerment index as well by 13.5 percentage points, and a decline in the number of women ministers, from 23.1% in 2019 to 9.1% in 2021.
 - However, it has still performed relatively well compared to other countries, ranking at 51 in women's participation in politics.
 - Education Attainment:

- In the index of education attainment, India has been ranked at 114.
 - Economic Participation:
 - The report notes that the economic participation gender gap actually widened in India by 3% this year.
 - The share of women in professional and technical roles declined further to 29.2%.
 - The share of women in senior and managerial positions also is at 14.6% and only 8.9% firms in the country have top female managers.
 - The estimated earned income of women in India is only one-fifth of men's, which puts the country among the bottom 10 globally on this indicator.
 - In Pakistan and Afghanistan, the income of an average woman is below 16% of that of an average man, while in India it is 20.7%.
 - Health and Survival index:
 - On this India has fared the worst, ranking at 155.
 - The only country to have fared worse is China.
 - The report points to a skewed sex ratio as the major factor.
 - It says the ratio can be attributed to norms of son preference and gender-biased prenatal sex-selective practices.
 - China and India together account for about 90 to 95% of the estimated 1.2 to 1.5 million missing female births annually worldwide due to gender-biased prenatal sex selective practices.

110. Answer: (d)

Explanation:

What is Open Defecation Free Status?

- ODF: An area can be notified or declared as ODF if at any point of the day, not even a single person is found defecating in the open.
- ODF+: This status is given if at any point of the day, not a single person is found defecating and/or urinating in the open, and all community and public toilets are functional and well maintained.
- ODF++: This status is given if the area is already ODF+ and the faecal sludge and sewage are safely managed and treated, with no discharging or dumping of untreated faecal sludge and sewage into the open drains, water bodies or areas.

111. Answer: (b)

Explanation:

What is a PRI?

- Panchayati Raj Institution (PRI) is a system of rural local self-government in India.
- Local Self Government is the management of local affairs by such local bodies who have been elected by the local people.

- PRI was constitutionalized through the 73rd Constitutional Amendment Act, 1992 to build democracy at the grass roots level and was entrusted with the task of rural development in the country.
- In its present form and structure PRI has completed 26 years of existence. However, a lot remains to be done in order to further decentralization and strengthen democracy at the grass root level.

112. Answer: (b)

Explanation:

What is MHA 2017?

- About:
 - This Act defined mental illness as “a substantial disorder of thinking, mood, perception, orientation, or memory that grossly impairs judgment, behaviour, capacity to recognize reality or ability to meet the ordinary demands of life, mental conditions associated with the abuse of alcohol and drugs.
 - It also provides the right of patients to access facilities that include rehabilitation services in the hospital, community, and home, sheltered and supported accommodation.
 - It regulates the research on PMI (Person with Mental Illness) and the use of neurosurgical treatments.
- Rights under MHA:
 - Right to Make an Advance Directive (Patient can state on how to be treated or not to be treated for the illness during a mental health situation).
 - Right to Access to Healthcare Services.
 - Right to free of cost healthcare services.
 - Right to live in a community.
 - Right to protection from cruel, inhuman and degrading treatment.
 - Right not to be treated under prohibited treatment.
 - Right to equality and non-discrimination.
 - Right to information.
 - Right to confidentiality.
 - Right to legal aid and complain.
- Attempt to Commit Suicide not an Offence:
 - A person who attempts to commit suicide will be presumed to be “suffering from severe stress” and shall not be subjected to any investigation or prosecution. Hence, Statement 1 is correct.
- The act envisages the establishment of Central Mental Health Authority and State Mental Health Authority. Hence, Statement 2 is incorrect.

113. Answer: (b)

Explanation:

What is the National Action for Mechanized Sanitation Ecosystem (NAMASTE) Scheme?

- About:
 - It was launched in 2022 as a Central Sector Scheme.
 - The scheme is being undertaken jointly by the Ministry of Housing and Urban Affairs and the Ministry of Social Justice & Empowerment (MoSJE) and aims to eradicate unsafe sewer and septic tank cleaning practices and ensure that no sanitation workers manually engage in sewer and septic tank cleaning operations.

- The components of the scheme include:
 1. **Profiling of SSWs** in ULBs through digital tools (~ 1 lakh SSW to be identified).
 2. **Health Insurance** of SSW under PM-JAY.
 3. **Occupational safety training** of SSWs and Sanitation Response Units for NAMASTE.
 4. **Capital Subsidy** up to Rs. 5.00 lakh for procurement of Sanitation Related Vehicles/ Equipment.
 5. **Distribution of PPE** to SSWs.
 6. **Distribution of safety devices to Emergency Response Sanitation Unit (ERSU).**
 7. **IEC Campaign** for awareness on SSW safety and dignity.

114. Answer: (c)

Explanation:

What is the National Crime Records Bureau (NCRB)?

- About:
 - NCRB, headquartered in New Delhi, was set-up in 1986 under the Ministry of Home Affairs to function as a repository of information on crime and criminals so as to assist the investigators in linking crime to the perpetrators.
 - It was set up based on the recommendations of the National Police Commission (1977-1981) and the MHA's Task Force (1985).
 - Hence, all the statements are correct.
- Functions:
 - The Bureau has been entrusted to maintain National Database of Sexual Offenders (NDSO) and share it with the States/UTs on regular basis.
 - NCRB has also been designated as the Central Nodal Agency to manage technical and operational functions of the 'Online Cyber-Crime Reporting Portal' through which any citizen can lodge a complaint or upload a video clip as an evidence of crime related to child pornography, rape/gang rape.
 - The responsibility of implementation of the Inter-operable Criminal Justice System (ICJS) has also been given to the NCRB.
 - ICJS is a national platform for enabling integration of the main IT system used for delivery of Criminal Justice in the country.
 - It seeks to integrate the five pillars of the system viz Police (through Crime and Criminal Tracking and Network Systems), e-Forensics for Forensic Labs, e-Courts for Courts, e-Prosecution for Public Prosecutors and e-Prisons for Prisons.
 - The Government of India has set a target of the second phase of ICJS (Inter-operable Criminal Justice System) by 2026 with an expenditure of about Rs. 3,500 crore.

115. Answer: (d)

Explanation:

Hindu Succession Act, 1956:

- About:
 - The Mitakshara school of Hindu law codified as the Hindu Succession Act, 1956 governed succession and inheritance of property but only recognised males as legal heirs.
 - It applied to everyone who is not a Muslim, Christian, Parsi or Jew by religion. Buddhists, Sikhs, Jains and followers of Arya Samaj, Brahma Samaj, are also considered Hindus for this law.
 - In a Hindu Undivided Family, several legal heirs through generations can exist jointly.
 - Traditionally, only male descendants of a common ancestor along with their mothers, wives and unmarried daughters are considered a joint Hindu family. The legal heirs hold the family property jointly.
- Hindu Succession (Amendment) Act, 2005:
 - The 1956 Act was amended in September 2005 and women were recognised as coparceners for property partitions arising from 2005.
 - Section 6 of the Act was amended to make a daughter of a coparcener also a coparcener by birth “in her own right in the same manner as the son”.
 - It also gave the daughter the same rights and liabilities “in the coparcenary property as she would have had if she had been a son”.
 - The law applies to ancestral property and to intestate succession in personal property, where succession happens as per law and not through a will.
 - Hence, all the statements are correct.

116. Answer: (a)

Explanation:

What is the Midday Meal Scheme?

- About:
 - The Midday meal scheme (under the Ministry of Education) is a centrally sponsored scheme launched in 1995. Hence, Statement 1 is correct.
 - It is the world's largest school meal programme aimed to attain the goal of universalization of primary education. Hence, Statement 2 is correct.
 - Provides cooked meals to every child within the age group of six to fourteen years studying in classes I to VIII who enrolls and attends the school. Hence, Statement 3 is incorrect.
 - In 2021, it was renamed as 'Pradhan Mantri Poshan Shakti Nirman' scheme (PM Poshan Scheme) and it also covers students of balvatikas (children in the 3–5-year age group) from pre-primary classes.
- Objective:
 - Address hunger and malnutrition, increase enrolment and attendance in school, improve socialisation among castes, provide employment at grassroot level especially to women.
- Quality Check:
 - AGMARK quality items are procured, tasting of meals by two or three adult members of the school management committee.
- Food Security:
 - If the Mid-Day Meal is not provided in school on any school day due to non-availability of food grains or any other reason, the State Government shall pay food security allowance by 15th of the succeeding month.
- Regulation:

- The State Steering-cum Monitoring Committee (SSMC) oversees the implementation of the scheme including establishment of a mechanism for maintenance of nutritional standards and quality of meals.
- Nutritional Standards:
 - Cooked meals having nutritional standards of 450 calories and 12 gm of protein for primary (I-V class) and 700 calories and 20 gm protein for upper primary (VI-VIII class)
- Coverage:
 - All government and government aided schools, Madarsa and Maqtabas supported under the Sarva Shiksha Abhiyan (SSA).
 - The scheme covers 11.80 crore children across Classes 1 to 8 (age group 6 to 14) in 11.20 lakh government and government-aided schools and those run by local bodies such as the municipal corporations in Delhi under the provisions of the National Food Security Act, 2013 (NFSA).
 - In the Budget for 2022-23, the Centre has earmarked Rs 10,233 crore for the scheme, while the states are expected to spend Rs 6,277 crore.

117. Answer: (a)

Explanation:

TRIFED

- The Tribal Co-operative Marketing Development Federation of India Limited (TRIFED) was founded in 1987. It is a national-level apex organization functioning under the administrative control of Ministry of Tribal Affairs.
- Other initiatives of TRIFED:
 - Aadi Mahotsavas- Organised in Delhi, Jaipur, Bhopal, Ranchi, Chandigarh and Guwahati to facilitate tribal artisans to directly link up with big markets.
 - Aadi Vyapar- A handbook for TRIFED's retail trade to institutionalize the sale and procurement operations
 - For Minor Forest Produce-
 - Pricing of Minor Forest Produces need to be carefully done so that tribals can get best price for their products.
 - Minimum Support Price and Value Addition Scheme for Minor Forest Produces has now been extended to 19 States and that Value Addition has been given high priority.
 - A target has been set for 30,000 Value Addition Centres in rural areas.
 - Tribes Haat- A news magazine to provide information to all stakeholders and customers about its activities and to attract them to be partners in the tribal development strategy.

118. Answer (c)

Explanation:

Agmark Online

- Minister of Agriculture and Farmers' Welfare launched an online software for Agmark – AGMARK Online, also known as the Agmark Quality Control Management System (AQCMS). Hence, Statement 1 is correct.
- Through the Agmark online, the application processes related to Agmark certification will be done online by the Directorate of Marketing & Inspection (DMI).

- The Agricultural Produce (Grading and Marketing) Act, 1937, popularly known as AGMARK Act, prescribes certain standards of quality for agricultural produce and verifies whether certain products get marked safe as per the AGMARK regulations. Hence, Statement 2 is correct.
- The use of modern technologies by the National Informatics Center has made these processes easy, reliable and cost-effective by providing online electronic mode.

119. Answer: (b)

Explanation:

Mahatma Gandhi National Rural Employment Guarantee Act, 2005

- The Act aims at enhancing the livelihood security of people in rural areas by guaranteeing hundred days of wage employment in a financial year to a rural household whose adult members (at least 18 years of age) volunteer to do unskilled work.
- The central government bears the full cost of unskilled labour, and 75% of the cost of material (the rest is borne by the states). Hence, Statement 2 is incorrect.
- It is a demand-driven, social security and labour law to enforce the 'right to work'.
- The Ministry of Rural Development (MRD), in association with state governments, monitors the implementation of the scheme. Hence, Statement 1 is correct.
- Agriculture and allied activities constitute more than 65% of the works taken up under the programme.

120. Answer: d

Explanation:

Susan Wojcicki is the current CEO of YouTube since February 2023. Steve Chen, Chad Hurley and Jawed Karim founded YouTube and launched it on Feb 14, 2005.

121. Answer: C

122. Answer: A

Explanation: DNA is a linear chain of nucleotides, portions of which are faithfully transcribed into linear messenger RNA. The message in this RNA is translated into strings of amino acids - proteins. Proteins need to take a precise three-dimensional shape to become functional entities. This protein folding does not happen all by itself, at least most of the time. A special bunch of proteins called molecular chaperones assist in correctly folding the protein. Misfolding of proteins can cause a number of diseases including Parkinson's disease, cataract, etc.

123. Answer: C

124. Answer: D

Explanation:

India is a party to all the major international treaties/regulations related to outer space:

1. Outer Space Treaty, 1967 (formally, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies)

2. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 1968
3. Convention on International Liability for Damage Caused by Space Objects, 1972
4. Convention on Registration of Objects Launched into Outer Space, 1974
5. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 1979

India also actively participate in various meetings and Working Groups of the **UN Committee on the Peaceful Uses of Outer Space (COPUOS)**.

125. Answer: C

Explanation: The term 'metaverse' refers to a computer-simulated, interactive digital environment in which people interact as if they are in the real or physical world. It is enabled by Augmented Reality (AR), Virtual Reality (VR) and blockchain technologies, artificial intelligence (AI), 3D reconstruction and Internet of Things, etc. It has potential applications in social media, architectural industry, entertainment, medical and military training, etc.

126. Answer: d

127. Answer: a

128. Answer: a

Explanation: Among the CCS technologies, chemical absorption is the most mature one with the advantages of high stability, capacity, and Technology readiness level, and specifically, monoethanolamine (MEA) is the most used solvent in numerous processes because of its excellent capture performance.

MEA is widely used in gas treatment processes, specifically in the removal of carbon dioxide (CO₂) and hydrogen sulfide (H₂S) from natural gas, refinery gases, and other gaseous streams. In this application, MEA serves as a gas sweetening agent.

Monoethanolamine is used in the manufacture of liquid laundry and dishwashing detergents due to its ability to provide superior cleaning with minimal impact on the environment.

129. Answer: (d)

Explanation: the PM recently inaugurated the world's largest meditation centre, Swarved Mahamandir, in Varanasi. About **20,000 people can sit together and meditate here.**

130. Answer: A

Explanation:

PM Narendra Modi used a real-time Artificial Intelligence-based translation tool while delivering his speech during the inauguration ceremony of Kashi Tamil Sangamam 2.0 at Namoh Ghat in Varanasi.

- 'Bhashini' is an AI-led language translation system that enables people to speak in their own language while talking to speakers of other Indian languages.
- Kashi Tamil Sangamam 2023 was an initiative by the Government of India as part of Azadi Ka Amrit Mahotsav to uphold the Spirit of Ek Bharat Shreshtha Bharat. The second edition of the KTS was held from December 17-30, 2023.

131. B

Nirmal Arts:

It is said that this art form originated somewhere around 14th century. The big community of craftsmen in Nirmal are referred to as 'Nakkash' perform the art work. And also, these paintings were greatly admired and patronised by the Mughal rulers in the medieval period and it is said that Lady Hydri later

on brought the craftsmen to Hyderabad to promote their growth and development. In this, traditional art scenes are painted from the Hindu epics Ramayana and Mahabharata. The paintings have been influenced by the Indian Schools of Art like Ajanta, Kangra and from Mughal miniatures.

132. C

Bidri Craft:

This craft form is said to have originated in Iran centuries ago and brought down by migrants. It is the unique art of silver engraved on metal. It involves four stages of manufacturing namely casting, engraving, inlaying and oxidising. Black colors for surface ornamentation are used for Bidri art which does not fade easily and is accompanied by silver and gold coatings. An alloy of zinc and copper called gunmetal is used for this art.

133. D

Alampur Temples:

There are a total of nine temples in Alampur. All of them are dedicated to Shiva. These temples date back to the 7th century A.D and were built by the Badami Chalukyas rulers who were great patrons of art and architecture. The temples are emblematic of the Northern and Western Indian styles of architecture. They do not reflect the Dravidian style of architecture as is generally common with the temples in this region. The shikharas of all these temples have a curvilinear form and are adorned with the miniature architectural devices.

134. B

Dandaria dance is generally performed by the Gonds of the hilly region of Northern Hyderabad with Dandas or sticks. The male dancers wear colorful costumes and strike their sticks dancing to the accompaniment of trumpets and drums with musicians leading the procession. They go from village to village and even the hosts sometimes accompany them in their dance.

135. C

Vattikota Alwarswamy, known as the Father of Telangana Grandhalaya Udyamam, single-handedly championed the cause of people's library and literary movement. As an active participant in the people's movement, Alwarswamy also produced popular literature depicting the socio-economic conditions of peasantry in Telangana as well as the social evils like Vetticahkiri, Jogini, Adapapa. He wrote the famous novel, Prajalamanishi, in which he portrayed the socio-economic conditions in Telangana villages, feudal exploitation, etc. Alwarswamy was considered the first Novelist of Telangana.

136. C

Medak Fort is a huge structure located on the top of a hill, which was built about 800 years back in Medak. This fort has many special architectural features in it. One being; on the top of the third gate, at both left and right sides the 'Ganda Bherunda,' emblem of Vijayanagara Empire built by Srikrishna Devaraya, stands out. It was believed that the fort built by Kakatiya's was renovated by Qutub Shahis's around 400 years ago.

137. A

Mallinatha Suri was an eminent critic, known for his commentaries on five mahakavyas (great compositions) of Sanskrit. During his times, he is said to have received the titles of Mahamahopadyaya and Vyakhyana Chakravarti.

- Sanjivani - Commentary on Kalidasa's Raghuvamsa, Kumarasambhava and Meghaduta
- Ghantapatha - Commentary on Bharavi's Kiratarjuniya
- Sarvankasa - Commentary on Magha's Sisupalavadha
- Jivatu - Commentary on Sriharsa's Naisadhiyacarita

138. C

Chenchus:

In Telangana, Chenchus are the 1st recognised Primitive tribal group. Chenchus are mainly living in the Amrabad forest of Nagarkurnool district, Nalgonda district and in Nallamala forests. Initially Chenchus led Nomadic life in course of time due to changes in economic situations they abandoned nomadic life and some period of time they led settled life in temporarily constructed Huts. In Chenchus, husband and wife have equal responsibilities. When there is a conflict between husband and wife, they separate easily.

139. C

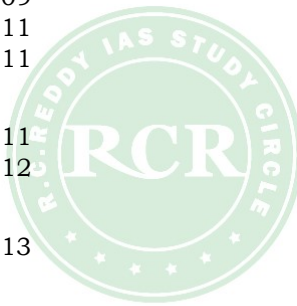
Scheduled Castes:

- o The castes in this category were treated as untouchables.
- o Every caste in this category have special occupation.
- o Dakkali - They tell the story of genealogy of Madigas
- o Arundatiya - Leather work
- o Bhyagari - Kati kapari
- o Chakiri - Grama Kapari, Boya
- o Matangi - Begging by singing songs
- o Mang - Catching snakes
- o Sindolu - Dramas, dancing
- o Bhavuri - Manufacturing clothes

140. B

GI tagged Products in Telangana:

- Pochampally Ikat 2004-05
- Silver Filigree 2007-08
- Nirmal furniture 2008-09
- Cherial Paintings 2010-11
- Pambarthi Metal Crafts 2010-11
- Hyderabad Haleem 2010-11
- Siddipet Gollabhama Sarees 2011-12
- Narayanpet Handloom Sarees 2012-13
- Adilabad Dhokra 2017-18



On March 2, 2024, the lac bangles of Hyderabad received a Geographical Indication (GI) tag from the Registrar of Geographical Indications. Ranjan pots of Adilabad district, Pearls of Chandampet did not receive GI Tag.

141. C

Jogini System:

Jogini system is related to Veera Shaiva tradition. This is Dravida tradition and the culture of lower castes.

Devadasi System:

Devadasi system is related to Vaishnava tradition. This is the culture of Aryans and Upper Caste. The Devadasis were experts in literature and fine arts. They used to sing and dance before the gods in temples. In Devadasi, Matriarchal system is followed.

142. B

Jain Centres in Telangana

- Kolanupaka in Yadadri - Bhuvanagiri
- Bodhan in Nizamabad
- Potla Cheruvu in Sanga reddy
- Munulagutta in Karimnagar
- Kulcharam in Medak
- Jogipet in Medak
- Kurikyala in Karimnagar

Buddhist Centres in Telangana

- Dhulikatta in Peddapalli

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- Mirjam pet in Peddapalli
- Kotilingala in Jagityal
- Pashigam in Jagityal
- Tambalapalli in Jagityal
- Phanigiri in Suryapet
- Tirumalagiri in Suryapet

143. D

- First Novel written in Telangana dialect - Chillara Devullu
- First Novel in Telangana - Kambukandara Charitra, authored by Tadakamalla Krishna Rao
- First Telugu Encyclopaedia - Panditaradhya Charitra
- First Verse Text - Prataparudra Charitra, Author: Ekamranadhudu
- First grammar book in Telugu (Vyakaranam) - Andhra Basha Bhushanam, Author: Ketana
- First Telugu Ghazals - Ghalib Geethalu, Author: Dasarathi Krishnama Charyulu

144. B

Jnanpith Award:

- It is the highest award in the field of literature in the country.
- C. Narayana Reddy - 1988, Book - Visvambhara.
- Padma Vibhushan:
- Kaloji Narayana Rao (1992)
- C. Narayana Reddy (2000)
- Ravi Narayana Reddy (1972) etc.
- Dadasaheb Phalke Award:
- It is the highest award in the film industry.
- Paidi Jairaj - 1980

145. A

Nizam-Ul-Mulk was a wise administrator and also he was known for his remarkable poetry. He fulfilled his creative calling by penning countless poems in Persian and Turkish, under the names 'Shakir' and 'Asif'.

Other Poets and their Pen Names

Maanill - Mohammad Quli Qutub Shah

Shad - Kishen Pershad

Taqqalus- Mahlaqa Chanda Bai

Chera - Chekuri Rama Rao

146. A

- Father of Telangana Nation (Jathipitha) - Prof. Jaya Shankar
- Father of Telangana (Pithamaha) - Konda Venkata Ranga Reddy
- Father of Telangana armed Struggle - Ravi Narayana Reddy
- Telangana Avadhana Yuva Kesari - Ande Venkatarajam
- Telangana Adikavi - Palkuriki Somanatha
- Abhinava Potana - Vanamalai Varadacharya
- Kalaprapurna - Dasarathi Krishnamacharya
- Telangana Dialect Poet - Kaloji

147. C

Sarojini Naidu was the Empress of Indian English Literature. The Bird of Time is the most famous writing of Sarojini Naidu. The collection of poems written by her in 1905 was known as The Golden Threshold. The residence of Sarojini Naidu at Hyderabad is famous by the name 'The Golden Threshold'. Her residence stands as a symbol of Hindu-Muslim unity.

148. C

Cellular Jail (1858):

- o Cellular Jail was constructed in Gothic style at Tirumalgiri crossroads, Secunderabad.
- o The Jail is constructed in the "Shape of the Cross".
- o In 1997, INTACH (Indian national trust of art & culture) Heritage award was presented to it.

" Based on this construction, after 50 years Kalpani Jail was constructed at Andaman & Nicobar.

149. B

Golconda fort:

- o Initially it was known as Mankal.
- o The construction of fort was started in the 12th century during Kakatiya's period.
- o During Kakatiya's period, a mud fort was constructed on a hill known as "Golla Konda" (Round shaped hill). Later, Qutub Shahi's constructed the present day fort with Granite.
- o The main entrance is known as "Fateh Darwaja (Victory gate)". The Cameo (design) on the main entrance of the fort is "Svatankriti".

150. B

The Qutub shahis practiced religious tolerance patronized painting. The painting of Qutub shahis was a blend of Persian and Hindu styles along with the influence of Western style. It is known as Deccani style of painting.

Mir Hashim is considered as the father of Deccani style of Painting. The style of decorating books with miniature painting was also started during this period in South India.



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