SCIENCE & TECHNOLOGY

❖ **Understanding the Kavach system**

➢ **Context:** The death of over 288 passengers in the ghastly train accident on June 2 at Bahanaga Bazaar railway station in the Balasore district of Odisha has brought into sharp focus the safety mechanisms needed to prevent such tragedies.

➢ **What is Kavach?**

- The KAVACH is an indigenously developed **Automatic Train Protection (ATP) system** by the **Research Design and Standards Organisation (RDSO)** in collaboration with the Indian industry. The trials were facilitated by the South Central Railway to achieve safety in train operations across Indian Railways. It is a state-of-the-art electronic system with Safety Integrity Level-4 (SIL-4) standards.
- It is meant to provide protection by preventing trains to pass the signal at Red (which marks danger) and avoid collision. It activates the train's braking system automatically if the driver fails to control the train as per speed restrictions.
- In addition, it prevents the collision between two locomotives equipped with functional Kavach systems. The system also relays SoS messages during emergency situations. An added feature is the centralised live monitoring of train movements through the Network Monitor System. 'Kavach' is one of the cheapest, SIL-4 certified technologies where the probability of error is 1 in 10,000 years.

➢ **How does Kavach work on Railway Systems?**

- The Traffic collision avoidance system (TCAS), with the help of equipment on board the locomotive and transmission towers at stations connected with Radio Frequency Identification (RFID) tags, helps in two-way communication between the station master and loco-pilot to convey any emergency message. The instrument panel inside the cabin helps the loco-pilot know about the signal in advance without visual sighting and the permissible speeds to be maintained.
- If a red signal is jumped and two trains come face to face on the same line, the technology automatically takes over and applies sudden brakes. Additionally, the hooter activates by itself when approaching a level crossing which serves as a big boon to loco-pilots during fog conditions when visibility is low.
- Both the Shalimar-Chennai Coromandel Express and the Yeshwanthpur-Howrah Express were not fitted with KAVACH-TACS. The Kavach system project is yet to be implemented on the Howrah-Kharagpur-Chennai line.

➢ **Where has Kavach been implemented?**

- The Union Railway Minister Ashwini Vaishnaw inspected the trial of the Kavach working system between Gullaguda-Chitgidda Railway stations on Lingampalli-Vikarabad section in the Secunderabad Division of South Central Railway last March.
- The South Central Railway (SCR) Zone is a pioneer in the implementation of the KAVACH – (TACS). The Kavach system has been deployed over 1,465 kms in the SCR limits in 77 locomotives and 135 stations till March this year.
- Additionally, the Secunderabad-based Indian Railways Institute of Signal Engineering & Telecommunications (IRISET) hosts the 'Centre of Excellence' for Kavach. IRISET has been mandated by the Railway Board to train the in service railway staff on Kavach. The Institute's Kavach lab carries out round the year training programmes.

➢ **What is the Kavach deployment strategy?**

- Kavach implementation is being taken up in a focused manner by the Railway Board. The first priority are the High Density Routes and the New Delhi-Mumbai and New Delhi-Howrah Sections, as they have higher chances of accidents because the trains run closer to each other. The second priority lines are the Highly Used Networks, the third ones are other Passenger High Density Routes and the final priority is of course to cover all other routes.
- The RDSO has approved three firms — Medha Servo Drives, HBL and Kernex — for providing Kavach equipment with two more being in the pipeline. Glitches about vulnerability of a vehicle crossing a closed level crossing, stray cattle or boulders on track, radio communication issues in tunnels, ghat sections, have been tackled.

SECURITY

❖ **What are the friction points on the LAC?**

➢ **Context:** As the 2020 standoff in Eastern Ladakh marks three years, India and China are far from achieving the objective of disengagement and de-escalation and restoration of status quo ante to resolve the situation along the Line of Actual Control (LAC).

➢ As part of the disengagement process from the friction points in Eastern Ladakh, India and China have been engaged in talks at the diplomatic, military and political level, with the senior military commander-level

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talks being the major avenue to undertake disengagement and de-escalation and resolve the standoff that began in May 2020.

- **Where is the disengagement process?**
  - Since the Corps commander level talks in 2020, the two sides have so far undertaken disengagement from five friction points - at **Galwan** after the violent clash in June 2020, **the north and south banks of Pangong Tso** in February 2021, at **Patrolling Point (PP) 17 in the Gogra-Hot Springs** area in August 2021, and **PP15** in September 2022.
  - On the **Depsang Plains and Demchok**, there are fundamental disagreements, as India maintains that they are the two additional friction points that still remain while China has refused to accept it, terming them as legacy issues predating the 2020 standoff.
  - On several occasions, Army Chief Gen Manoj Pande has termed the situation along the LAC as "stable but unpredictable" while stating that five out of the seven friction points in Eastern Ladakh have been resolved and the focus is now on the remaining two points.
  - The 18th round of Corps Commander talks was held at the Chushul Moldo meeting point on the Chinese side on April 23, 2023. The Indian stance on the same was consistent, i.e. restoration of status quo ante as on April 2020. The above entails restoration of patrolling rights till the traditional patrolling points.
  - On May 31, 2023, India and China held the 27th Meeting of the Working Mechanism for Consultation and Coordination on India-China Border affairs (WMCC) in New Delhi which made no headway and the two sides agreed to hold the **19th round of Corps Commanders** talks very soon.
  - In the past, Beijing has said that it would not accept India's demand for restoration of status quo ante prior to the standoff saying that "the status quo of April 2020… was created by India's illegal crossing of the LAC."
  - Meanwhile, China has been undertaking massive build-up of infrastructure, habitat and induction of new weapons and equipment along the **3,488 km-long LAC**, fundamentally altering the status quo on the ground. India too has been building infrastructure and undertaking capability enhancement to match the Chinese. This is in addition to the over 50,000 troops and heavy equipment, on each side, that continue to be deployed close to the LAC in Eastern Ladakh. In this backdrop, any de-escalation to restore the status quo predating the standoff looks remote.
- **What are buffer zones? What is their status?**
  - During the disengagement process, buffer zones were created at the friction points as per the understanding reached at the Corps Commanders-level talks. It was decided that both sides would pull back at an equal distance from the friction points to prevent any fresh flare-ups; also, no patrolling would be undertaken by both sides till the overall disengagement and de-escalation is achieved after which the two sides have to work out new patrolling norms to maintain peace and tranquillity. All disengagements carried out earlier have been done on the basis of mutual and equal security with no prejudice to LAC claims by either side.
  - Since the beginning of the standoff, China had moved large number of troops and equipment close to the LAC in addition to the ingress by Chinese troops inside Indian territory at friction points.
  - On the North Bank of Pangong Tso, Chinese troops made ingress from Finger 8 up to Finger 4 blocking Indian patrols. India holds its place till Finger 4 but claims territory till Finger 8 as per alignment of the LAC. Disengagement has been undertaken there since and buffer zones at all the five points continue to be in place.
  - To ensure that the Chinese are fully honouring the understanding reached, verification by aerial monitoring using Unmanned Aerial Vehicles (UAV) as well as satellites is undertaken regularly.
  - In fact, during the first phase of disengagement both sides had pulled back troops by equal distance from Patrolling Points (PP) 14 in Galwan valley and PP15 in Gogra-Hot Springs during which violent clashes had occurred resulting in the deaths of 20 Indian personnel and at least five deaths on the Chinese side(disputed no. as China is hiding real no. of causalities).
- **What is the strategic significance of Depsang?**
  - **Demchok** is one of the two mutually agreed disputed areas in Eastern Ladakh, while **Depsang is another friction point**. In Demchok while there are varying claims in the Charding La area, China has set up tents on this side of Charding nala. The crucial Sub-Sector North (SSN) consists of the Depsang plains and **Daulat Beg Oldie (DBO)**. Currently, the airfield at DBO is accessible by the 255 km-long Darbuk-Shyok-DBO (DSDBO) road. A plan for an alternate axis across Saser La which has an ancient trade route, is in the works.
  - In Depsang Plains, Chinese troops have been blocking Indian Army patrols from going up to the PPs 10, 11, 11A, 12 and 13, beyond the Y junction. Chinese build-up in this area threatens Indian positions

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at DBO and also brings Chinese troops closer to the DSDBO road. Depsang is also close to the Karakoram pass overlooking the strategic Saltoro ridge and Siachen glacier, the world's highest battlefield.

- Also, the distance from the Limit of Patrol (LoP), on which the PPs are marked, to the LAC is the maximum in the Depsang area. Depsang has seen several face-offs in the past and as reported earlier, officials pointed out that as India's capacity in the area increased, especially since 2013, the number of troops and frequency of patrols had gone up and with it the number of face-offs.

➢ As the 2020 standoff in Eastern Ladakh marks three years, India and China are far from achieving the objectives of disengagement and de-escalation and restoration of status quo ante to resolve the situation along the Line of Actual Control (LAC).

➢ During the disengagement process, buffer zones were created at the friction points as per the understanding reached at the Corps Commanders-level talks. All disengagements carried out earlier have been done on the basis of mutual and equal security with no prejudice to LAC claims by either side, sources said.

➢ To ensure that the Chinese are fully honouring the understanding reached, verification by aerial monitoring using Unmanned Aerial Vehicles (UAV) as well as satellites is undertaken regularly.

HEALTH

❖ **How researchers used AI to find an antibiotic against a superbug**

➢ **Context:** In a major breakthrough for the use of Artificial Intelligence (AI) in the field of medicine, scientists from the United States and Canada have found a new antibiotic – powerful enough to kill a superbug – using AI.

➢ Superbugs are bacteria that are resistant to several types of antibiotics. Each year these drug-resistant bacteria infect more than 2 million people in the US and kill at least 23,000, according to the US Centers for Disease Control and Prevention (CDC).

➢ **What is Acinetobacter baumannii?**

- In 2017, the bacterium was identified by the World Health Organization (WHO) as one of the **world's most dangerous antibiotic-resistant bacteria**. Notoriously difficult to eradicate, A. baumannii can cause pneumonia, meningitis and infect wounds, all of which can lead to death. A. baumanni is usually found in hospital settings, where it can survive on surfaces for long periods.
- The WHO's list of superbugs highlighted bacteria that are having built-in abilities to find new ways to resist treatment and can pass along genetic material that allows other bacteria to become drug-resistant as well.

➢ **How do bacteria become resistant to drugs?**

- Antibiotics are medicines used to prevent and treat bacterial infections. Antibiotic resistance occurs when bacteria change in response to the use of these medicines. This ultimately threatens the ability of medicines to treat common infectious diseases.
- "Where antibiotics can be bought for human or animal use without a prescription, the emergence and spread of resistance is made worse," WHO says, cautioning against overconsumption of medicines without medical professionals' recommendation for treating common illnesses.
- The WHO lists infections such as pneumonia, tuberculosis, and foodborne diseases as becoming harder to treat with existing medication due to increasing anti-bacterial resistance.

➢ **How did researchers use AI in this case?**

- Narrowing down the right antibacterial chemicals against bacteria can be a long, difficult process. This is where algorithms come in because the concept of AI is based on the process of machines being given large amounts of data and training themselves on identifying patterns and solutions based on them.
- According to MIT, the researchers first exposed A. baumannii grown in a lab dish to about 7,500 different chemical compounds, to see which ones could help pause the growth of the bacterium.
- Then they fed the structure of each molecule into the machine-learning model. They also told the model whether each structure could prevent bacterial growth or not. This allowed the algorithm to learn chemical features associated with growth inhibition.
- Once the model was trained, the researchers used it to analyse a set of 6,680 compounds. This analysis took less than two hours and yielded a few hundred results. Of these, the researchers chose 240 to test experimentally in the lab, focusing on compounds with structures that were different from those of existing antibiotics.
- Those tests yielded nine antibiotics, including one that was very potent and effective at killing A. baumannii. This has been named **abaucin**.
- Using AI, we can rapidly explore vast regions of chemical space, significantly increasing the chances of discovering fundamentally new antibacterial molecules.

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PRELIMS

1. Shanan Power Project

➢ **In News:** Punjab and Himachal Pradesh are set for a face-off as the 99-year lease on the British-era 110 MW Shanan hydropower project situated at Jogindernagar in Mandi district of Himachal Pradesh, presently under the control of the Punjab Government, will expire in March 2024.
The issue may snowball into a major controversy between the two neighbouring States as the Himachal Pradesh Government has made it clear that it will not to renew or extend the lease. Himachal Pradesh wants the project handed over to the State expiry of the lease period. The Punjab Government, on the other hand, is no mood to part with its prized project, and is prepared to take legal recourse to retain it.

➢ **About Shanan Powerhouse:**

- Location: It is located in Joginder Nagar in the Mandi district of Himachal Pradesh.
- Commissioned in 1932, the powerhouse was constructed as per a 99-year lease executed between Raja Jogendra Sen, the then king of Mandi, and Col BC Batty, Chief Engineer of the Punjab Government, in 1925.
- This powerhouse was constructed against the backdrop of dense deodar forests.
- It is one of the oldest powerhouses of the country, which used to feed the entire undivided Punjab, Lahore and Delhi before Independence.
- The Shanan project was allocated to the State of Punjab in accordance with the provisions of the Punjab Reorganisation Act, 1966. Under the Act, the Shanan project was allocated to Punjab State by the Ministry of Irrigation and Power, Government of India. In 1972, the Centre responded with a clarification to an objection raised by Himachal Pradesh, reaffirming the allotment of the project in favour of Punjab State.
- The project originally was of 48 MW capacity, but the Punjab government enhanced its capacity to 60 MW in 1982. Later, 50 MW more was added to make its capacity 110 MW.
- The main attraction of the hydro project is the four-stage haulage trolley service. It was basically constructed for carrying construction material of Shanan powerhouse from Jogindernagar to Barot. It is a unique type of trolley based on pulley system with no engine, steering wheel or no gears or brakes.

2. Fixed-Dose Combination (FDC) Drugs

➢ In News: Fourteen fixed-dose combination (FDC) medicines found to lack therapeutic relevance have been banned by the Central Government through a gazette notification issued recently.

➢ **About Fixed-Dose Combination (FDC) Drugs:**

- A FDC drug includes two or more active pharmaceutical ingredients (APIs) combined in a single dosage form, which is manufactured and distributed in fixed doses.
- They have been shown to appreciably reduce the risk of medication non-adherence, which is particularly important in patients with chronic diseases.
- However, their rationality for use should be based on sound medical principles as there have been concerns with their irrationality and utility in several countries.
- Common examples: Cough syrups Phensedyl and Corex, Vicks Action 500.

➢ Advantages of FDCs:

✓ Burden of keeping track of several medications, understanding their various instructions, etc. is reduced which improves patient compliance and therefore improves treatment outcomes.
✓ The FDCs are more economic than single ingredient drugs.
✓ The manufacturing cost is quite low as compared to the cost of producing separate products
✓ Then there is Simpler logistics of distribution.

➢ Disadvantages of FDCs:

✓ If an adverse drug reaction occurs from using an FDC, it may be difficult to identify the active ingredient responsible for causing the reaction.
✓ If the drugs combination is not appropriate, then it can lead to some patients getting too much of an ingredient and others getting too little. FDCs "limit clinicians' ability to customize dosing regimens."

3. The Draft Aircraft Bill, 2023

➢ **In News:** The Civil Aviation Ministry has issued the Draft Aircraft Bill, 2023 to replace the existing Aircraft Act, 1934.

➢ The draft bill aims to provide a simplified approach to regulations (including design, manufacture, possession, use, operation, sale, import, and export) in order to meet the current needs of the civil aviation sector and remove redundancies present in the 1934 law. It also seeks to bring India in line with the Chicago Convention.

➢ Major provisions:

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- Creation of two statutory bodies, namely the **Bureau of Civil Aviation Security and the Aircraft Accident Investigation Bureau.** These bodies would be responsible for implementing the Standards and Recommended Practices (SARPs) prescribed under the Chicago Convention and would discharge regulatory and oversight functions.
- Sufficient powers for the statutory regulatory bodies, such as the Directorate General of Civil Aviation (DGCA).

➢ **About Chicago Convention;**

- The Chicago Convention, officially known as the Convention on International Civil Aviation, is an international treaty that was signed in Chicago, Illinois, in 1944. The convention established the International Civil Aviation Organization (ICAO), a specialized agency of the United Nations responsible for coordinating and regulating international air travel.
- The primary goal of the Chicago Convention is to promote the safe, efficient, and orderly development of civil aviation on a global scale. It sets out a framework of principles and standards for the international aviation community, covering various aspects of civil aviation, including aircraft registration and airworthiness, aviation safety and security, air navigation services, and environmental protection.
- Some key provisions of the Chicago Convention include:
  - ✓ Sovereignty: Each state has complete and exclusive sovereignty over the airspace above its territory.
  - ✓ Non-discrimination: All contracting states have the right to operate international air services without any unjustifiable discrimination.
  - ✓ Safety: States are responsible for ensuring the safety of civil aviation within their territories and for establishing safety regulations and oversight.
  - ✓ Navigation and Communications: The convention establishes standards and procedures for air navigation and communication systems, including the use of international airspace.
  - ✓ Environmental Protection: The convention encourages the development and promotion of measures to minimize the environmental impact of aviation, including noise and emissions.
- The Chicago Convention has been ratified by a large number of countries, making it a widely recognized framework for international civil aviation. It serves as the basis for the development of international air transport regulations and the harmonization of aviation practices among member states. The ICAO, as the governing body, works to ensure the consistent implementation of the convention's provisions and promotes cooperation among its member states to achieve safe and efficient global air travel.

4. Li-ion battery recycling technology

➢ **In News:** The Ministry of Electronics and Information Technology (MeitY) in India has transferred cost-effective lithium-ion battery recycling technology to nine recycling industries and start-ups as part of the **Mission LiFE under the "Promote circularity campaign."**

➢ This indigenous technology can process various types of discarded lithium-ion batteries, recovering over 95% of lithium, cobalt, manganese, and nickel contents in the form of corresponding oxides/carbonates with a purity of about 98%.

➢ The technology was developed at the Centre of Excellence on E-waste Management, in collaboration with the Government of Telangana and industry partner.

➢ Aim of recycling is to recover valuable materials from lithium-ion batteries, reducing the need for mining and minimizing environmental impact. It helps conserve resources and promotes sustainable practices in battery manufacturing.

➢ **What is the recycling process?**

- The recycling process of lithium-ion batteries involves several steps.
- First, the batteries are collected, sorted and disassembled
- Next, the electrodes, which contain valuable metals like lithium, cobalt, manganese, and nickel, are extracted, through a process called leaching, where the electrodes are submerged in a liquid that dissolves these metals.
- After that, the metals are purified to remove impurities, resulting in high-purity lithium, cobalt, manganese, and nickel compounds.

➢ India generates more than 50,000 tons of lithium-ion battery waste annually, growing in the range of 40-80%. India currently imports all of its Li from Australia and Argentina and 70% of its Li-ion cell requirement from China and Hong Kong.

➢ **Key facts about Lithium**

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- It is a soft, silvery-white metal that heads group 1, the alkali metals group, of the periodic table of the elements.
- It has the lowest density of all metals and the lightest of the solid elements.
- It reacts vigorously with water.
- It does not occur as a metal in nature but is found combined in small amounts in igneous rocks.
- Major Reserves: Lithium reserves are concentrated in the lithium triangle in South America – Argentina, Bolivia & Chile, with 50% of the deposits concentrated in these regions.

5. Environmental Information, Awareness, Capacity Building and Livelihood Programme (EIACP)

In News: The Ministry of Environment, Forest and Climate Change (MoEF & CC), Government of India envisages celebrating World Environment Day 2023 with a thrust on the Mission LiFE. EIACP Programme Centre at Raipur, Chhattisgarh creates a world record by taking LiFE pledge of over 12.38 lakh people to conserve environment

➢ **About EIACP Programme:**

- It is one of the Central Sector sub-scheme being implemented in alignment with Mission LiFE.
- The Environmental Information System (ENVIS) is renamed EIACP (Environmental Information, Awareness, Capacity Building and Livelihood Programme).
- ENVIS came into existence as a planned programme in 1983.
- It has been subsumed within the revamped scheme of Environment Education, Awareness, Research and Skill Development.
- ENVIS EIACP serves as a one-stop platform for the dissemination of environmental information, informed policy formulation on various facets of the environment and facilitation of alternate livelihoods through green skilling.

➢ **Key facts about Mission LiFE (Lifestyle for Environment)**

- It was first proposed by the Prime Minister of India at COP 26.
- It is envisioned as an India-led global mass movement that will nudge individual and collective action to protect and preserve the environment.
- The global movement will showcase sustainable goals and climate actions taken by countries and individuals around the world.
- It makes the fight against climate change democratic, in which everyone can contribute with their respective capacities.
- It emboldens the spirit of the P3 model, i.e. Pro Planet People.
- It functions on the basic principles of 'Lifestyle of the planet, for the planet and by the planet'.

ANSWER WRITTING

Que. Throw light on the various types of Art forms found in excavations from the Indus Valley Civilisation and their significance in understanding the socio-religious practices of the period.

The Indus Valley Civilisation (IVC) was a bronze age civilisation which existed in the north-western part of the Indian subcontinent. The art forms of the Indus Valley Civilisation emerged during the second half of the third millennium BCE. The forms of art found from various sites of the civilisation include sculptures, seals, pottery, jewellery, terracotta figures, etc. These findings are important because they provide insights into the minds, lives, and religious beliefs of their creators.

Various types of art forms found in excavations:

- Stone Statues: Statues whether in stone, bronze or terracotta found in Harappan sites are not abundant, but refined. In stone are two male figures, one is a torso in red sandstone and the other is a bust of a bearded man in soapstone.
- Bronze figures: Bronze casting was popular at all the major centres of the Indus Valley Civilisation. In bronze, figures of both animals and humans are found. The most important example is the statue of a girl popularly titled 'Dancing Girl'.
- Terracotta figures: The Indus Valley people also made terracotta images. The most important among the terracotta figures are those representing the mother goddess. Toy carts with wheels, whistles, rattles, birds and animals, etc were also rendered in terracotta.
- Seals: Archaeologists have discovered thousands of seals, mostly made of steatite, and occasionally of agate, copper, faience and terracotta. Seals bear a great variety of motifs and especially beautiful figures of animals, such as unicorn bull, rhinoceros, tiger, elephant, bison, buffalo, etc.
- Pottery: The Indus Valley pottery consists chiefly of very fine wheel-made wares. Plain pottery is more common than painted ware.

Significance of art forms in understanding socio-religious practices of the period:

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- Nature and animal worship: Seals found in the excavation throw light on the worship of pipal trees and various other animals. For e.g.: As per coins of the Indus region, it is assumed that both humped and normal bulls were worshipped. Thus, in this period, worship of power in the form of nature was prevalent.
- Idol worship: In the Indus Valley civilisation, evidence of idol worship is also found. For e.g. terracotta figures of mother goddesses are found at various sites. Pashupati a form of male god was also worshipped. Further, some historians also refer to the statue of the dancing girl as a form of a Hindu goddess.
- Seals as amulets: A considerable number of the seals contain scenes of mythological or religious significance. Many seals of rectangular shapes have been found in the excavation which has deities and goddess's picture and some mantra on it. Indus people used to wear such amulets as protection against evil forces.
- Family life in Indus Valley society: Traditional family was a unit of society in the Indus Valley civilization. On the basis of evidence found it can be said that IVC society was predominantly matriarchal. This is also evident from the Indus people's reverence for the Mother Goddess.
- Conscious of Fashion: From archaeological finds, it appears that the people of the Indus Valley were conscious of fashion. Different hairstyles were in vogue and wearing a beard was popular. Women wore different types of ornaments and cinnabar was used as a cosmetic and face paint and lipstick were also known to them. For e.g: Some sculptures are of standing women wearing ornaments. Some of such images are of standing men, who are shown in beards.
- Agriculture and food patterns: Excavation also throws some light on agricultural practices and their food pattern. Mohenjo-Daro's excavation tells that people there used wheat and barley. They were aware of the fact that animal milk gives good health. There were huge godowns where rich people used to keep their grains.

Therefore, excavations from Indus Valley sites have produced much evidence of artistic activity and provide significant insights into the society, religious practices and economy of the period. The artists of that time surely had fine artistic sensibilities and a vivid imagination. Various living styles adopted by them are still influencing us in different forms.

MCQs

1. Recently, the Central Board of Direct Taxes (CBDT) has exempted buyers from gift tax when they acquire equity shares in public-sector units (PSUs) through strategic disinvestment. With reference to the Gift Tax, consider the following statements:
   1. Under the Income Tax Act gifts whose value exceeds Rs.50, 000 are subject to gift tax.
   2. Cash or rewards received by local authorities or educational institutions based on merit is exempted from tax.

   Which of the statements given above is/are correct?
   a) 1 Only
   b) 2 Only
   c) Both 1 and 2
   d) Neither 1 nor 2
2. Recently, the Prime Minister of India lauded Asia's first demonstration of Performance-Based Navigation for helicopters for a flight from Juhu to Pune using GAGAN satellite technology. With reference to the GAGAN satellite technology, consider the following statements:
   1. It is jointly developed by the Indian Space Research Organisation and the Airports Authority of India (AAI).
   2. There are only four Space-Based augmentation systems available in the world namely India (GAGAN), US (WAAS,) Europe(EGNOS) and Japan (MSAS).

   Which of the statements given above is/are correct?
   a) 1 Only
   b) 2 Only
   c) Both 1 and 2
   d) Neither 1 nor 2
3. Abaucin, which was recently seen in the news related to which of the following?
   a) Newly developed digital currency
   b) Invasive species
   c) Antibiotic
   d) Viral Fever
4. Recently, the government-owned Tribal Development Co-operative Corporation of Odisha Ltd (TDCCOL) decided to procure Sal seeds (Shorea robusta) from nine Odisha districts. With reference to the Sal tree, consider the following statements:
   1. It requires well-drained, moist and sandy loam soil for its growth.

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2. It is indigenous to India and occurs in two main regions separated by Gangetic plain namely the northern and central Indian regions.
3. It survives upto a maximum temperature of 36°C to 44°C and minimum temperature of 11°C to 17°C and it needs an average rainfall of 1000 mm to 3500 mm per annum.

Which of the statements given above is/are correct?

a) 1 and 2 Only
b) 2 and 3 Only
c) 1 and 3 only
d) 1, 2 and 3

5. Consider the following statements regarding Da Vinci Robotic System:
1. It is a tool that helps surgeons perform a variety of surgeries.
2. It only uses small cuts resulting in less pain, fewer complications and a shorter recovery time.

Which of the statements given above is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

6. Udanti Sitanadi Tiger Reserve recently was in news, it is located in which of the following state?
a) Madhya Pradesh
b) Karnataka
c) Bihar
d) Chhattisgarh

7. Consider the following statements regarding Kavach System, recently seen in the news:
1. It is an indigenously developed Automatic Train Protection (ATP) system.
2. It was developed by the Defence Research and Development Organisation (DRDO).

Which of the statements given above is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

8. Consider the following statements regarding Fixed-Dose Combination (FDC) Drugs:
1. A FDC drug includes two or more active pharmaceutical ingredients (APIs) combined in a single dosage form.
2. The FDCs are more economic than single ingredient drugs.

Which of the statements given above is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

9. With reference to Lithium, consider the following statements:
1. It is an alkali metal which reacts vigorously with water.
2. Africa has the highest reserves of Lithium in the world.

Which of the statements given above is/are correct?

a) 1 Only
b) 2 Only
c) Both 1 and 2
d) Neither 1 nor 2

10. With reference to the Environmental Information, Awareness, Capacity Building and Livelihood Programme, consider the following statements:
1. It is one of the Central Sector sub-scheme being implemented in alignment with Mission LiFE.
2. This programme consists of the dissemination of environmental information, informed policy formulation and green skilling.

Which of the statements given above is/are correct?

a) 1 Only
b) 2 Only
c) Both 1 and 2
d) Neither 1 nor 2

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