⊙ **Consider the following statements regarding Type 1 diabetes:**

1. Type1 diabetes is an auto immune disease
2. Type 1 diabetes is also known insulin-dependent diabetes.
3. Type 1 diabetes can be treated with stem cell therapy
4. The embryonic stem cells alone is used in providing treatment for type 1 diabetes

How many of the following statements is/are correct

a) 1
b) 2
c) 3
d) 4

Ans: C

Source : The Indian express

Topic: applied biology

Explanation:

Source: The Hindu topic: biotechnology

Recently, their was a new,The most exciting news in the world of diabetes this year has been the successful use of stem cells to "cure" diabetes

a patient with Type 1 diabetes was reported to be insulin-free a year after stem cell transplant.

- Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves.
- The most common is type 2 diabetes, usually in adults, which occurs when the body becomes resistant to insulin or doesn't make enough insulin.
- Autoimmune diabetes mellitus or T1DM is an organ-specific autoimmune disease that affects the insulin-producing pancreatic beta cells, after an inflammatory process leads to a chronic deficiency of insulin in genetically susceptible individuals. **Hence first statement is correct.**
- Type 1 diabetes, once known as juvenile diabetes or insulin-dependent diabetes, is a chronic condition in which the pancreas produces little or no insulin by itself. **Hence 2nd statement is correct**
- For people living with diabetes, access to affordable treatment, including insulin, is critical to their survival. There is a globally agreed target to halt the rise in diabetes and obesity by 2025.
- Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decades.
- **Pluripotent stem cells that have the ability to transform into any cell type are pre-programmed into insulin-producing cells and transplanted into the human body: this is a potential game-changer in the treatment of Type 1 diabetes**
- **Hence statement 3 is correct**
- **Stem cell therapy is presently uses adult stem cells and not embryonic stem cells. Hence 4th statement is incorrect.**

⊙ **Which among the following is/are application of recombinant DNA technology?**

1. Development of synthetic insulin
2. For developing human growth hormone
3. To prevent heart attacks
4. Development of vaccine for hepatitis B
5. Disease diagnosis

Select the correct answer using the codes given below:

a) 1,2 and 3 only
b) 1,4 and 5 only
c) 1,2,4 and 5 only
d) 1,2,3,4 and 5

Ans: D

Explanation:

Source: NCERT
TOPIC: basic applied science
Development of synthetic insulin:

- **Recombinant DNA technology** has been extensively used to produce **synthetic (or recombinant) insulin**. In this process, the gene for human insulin is inserted into bacterial or yeast cells, which then produce the insulin in large quantities. This insulin is used for the treatment of **diabetes**. It is one of the most well-known applications of genetic engineering.

For developing human growth hormone:

- Recombinant DNA technology is also used to produce**human growth hormone (hGH)**, which is used to treat growth disorders in children and adults. By inserting the gene for hGH into bacteria, the bacteria can be induced to produce the hormone in large quantities for medical use.

To prevent heart attacks:

- While recombinant DNA technology is not directly used to "prevent" heart attacks in the traditional sense, it plays a role in **genetic therapy**, **gene editing**, and the development of drugs that could manage risk factors for heart disease (like high cholesterol). For example, the production of **statins** (cholesterol-lowering drugs) involves recombinant DNA technology. **Genetic engineering** has the potential to create therapies that reduce the risk of heart disease or repair heart tissue, although direct prevention of heart attacks through gene therapy is still under research.

Development of vaccine for hepatitis B:

- Recombinant DNA technology has been used to develop the **hepatitis B vaccine**. In this process, the gene for the **hepatitis B surface antigen** (HBsAg) is inserted into yeast cells, which then produce the antigen. The antigen is purified and used in the vaccine to stimulate the immune system to recognize and fight the hepatitis B virus.

Disease diagnosis:

- Recombinant DNA technology plays an important role in **disease diagnosis**, particularly through techniques like **PCR (Polymerase Chain Reaction)** and **genetic testing**. These technologies use recombinant DNA tools to detect the presence of specific genes or pathogens in a patient's sample. For example, recombinant DNA technology is used to identify genetic disorders, detect infections like HIV or COVID-19, and conduct forensic analysis.
- **Thus Option D is the correct answer.**

⊙ **Consider the following statements:**

1. The DNA fingerprinting uses satellite DNA to differentiate persons
2. Identical twins have same DNA pattern
3. DNA fingerprinting can be used in studying genetic diversity among population
4. DNA fingerprinting provides very accurate reports in forensic applications

How many of the following statements is/are correct?

a) 1
b) 2
c) 3
d) 4

Ans: C
Source: NCERT
Topic: basic science, applied biology
Explanation:

- The human genome has 3 billion base pairs. Did you know that the DNA pattern of two individuals cannot be same except for identical twins. Each person's DNA sequence is unique due to the small difference in the base pairs. Therefore, if we want to compare the genetic difference among the two individuals, DNA fingerprinting is the easier and quicker method.
- The technique analyses each individual's unique DNA sequences and provides distinctive characteristics of individual which helps in identification. Variable number of tandem repeat sequences (VNTRs) serve as molecular markers for identification. Hence 1st statement is correct

- In human beings, 99 % of the DNA base sequences are the same and this is called as bulk genomic DNA. The remaining 1 % DNA sequence differs from one individual to another. This 1 % DNA sequence is present as small stretch of repeated sequences which is known as satellite DNA.
- The number of copies of the repeat sequence also called as VNTRs differs from one individual to another, and results in variation in the size of the DNA segment.
- In case of identical twins, the whole set of DNA will be same including tandem repeats because they originate from same fertilized egg
- Applications of DNA Fingerprinting
- i. DNA fingerprinting technique is widely used in forensic applications like crime investigation such as identifying the culprit. It is also used for paternity testing in case of disputes.
- ii. It also helps in the study of genetic diversity of population, evolution and speciation
- **Thus Option C is the correct answer.**

⊙ **Consider the following statements:**

1. Phage therapy is best solution for reducing the risk of antibiotic resistance
2. In phage therapy viruses are used which are highly specific in targeting only the bacterial cells.

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

Ans: C

Explanation

Why was in news?

- A study conducted by the University of Exeter shows that the public is aware of and accepts the use of bacteria-killing viruses, known as phage therapy, as an alternative to antibiotics.
- Phage therapy is a treatment approach that uses **bacteriophages,** which are viruses that infect and kill specific bacteria. It involves using these viruses to **target and destroy bacterial infections**, serving as an alternative to antibiotics.
- Phages are highly **specific in their action**, targeting only the specific bacteria they are programmed to attack, which can **potentially reduce the risk of antibiotic resistance**. Phage therapy has gained attention as a potential solution for **antibiotic-resistant infections** and is being explored as a promising avenue in medical research.
- Bacteriophages are viruses that infect bacteria and use them as hosts for their replication. They are highly diverse and can target different types of bacteria.
- **Hence both the statements are correct.**

⊙ **Consider the following statements regarding Epigenetics:**

1. Epigenetic changes are similar to genetic changes which are irreversible
2. Epigenetic changes are outcome of environmental and behavioural factor
3. Epigenetics of an organism changes throughout its life.

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

Ans: B

Explanation:

Why was in news?

- CSIR-Centre for Cellular and Molecular Biology (CCMB) is collaborating with research groups across the world on the Diverse Epigenetic Epidemiology Partnership (DEEP) project.
- Epigenetics is the study of how your behaviours and environment can cause changes that affect the way your genes work. Unlike genetic changes, epigenetic changes are reversible and do not change your DNA sequence, but they can change how your body reads a DNA sequence.

- **Hence 1 statement is incorrect and 2nd statement is correct**
- Gene expression refers to how often or when proteins are created from the instructions within your genes. While genetic changes can alter which protein is made, epigenetic changes affect gene expression to turn genes "on" and "off."

⊙ **Consider the following statements regarding Green Voyage 2050 project:**

1. It is supporting developing countries in meeting their commitment towards relevant climate change and energy efficiency goals, for international shipping.
2. Denmark has been selected as the first country under IMO Green Voyage 2050 project for conduct of a pilot project related to Green Shipping

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

Ans: A

Why in news?

India is making significant strides in the green shipping sector, aims to be among the top ten shipbuilding nations by 2030 and the top five by 2047: Union Minister Joshi

Explanation:

- The GreenVoyage2050 Project is a partnership project between the Government of Norway and IMO launched in May 2019 aiming to transform the shipping industry towards a lower carbon future.
- The global partnership is supporting developing countries, including Small Islands Developing States (SIDS) and Least Developed Countries (LDCs), in meeting their commitment towards relevant climate change and energy efficiency goals, for international shipping, through supporting the Initial IMO GHG Strategy.
- It is supporting developing countries in meeting their commitment towards relevant climate change and energy efficiency goals, for international shipping. **Hence statement 1 is correct.**
- India has been selected as the first country under this project for conduct of a pilot project related to Green Shipping. **Hence statement 2 is incorrect**.
- India intends to increase share of renewable energy to 60% of total power demand of each of its major port from present share of less than 10%. This will be through solar and wind generated power.
- The 50% of port equipment will be electrified by 2030, and all ports shall supply shore power to all visiting ships in a three-phased manner by that time. The ports have also aimed to reduce Carbon emissions per ton of cargo handled by 30% by 2030.
- https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2062925

⊙ **The Finance Minister of India, in her Budget speech for the financial year 2024-25had announced that the Union government will partner with the private sector to establish Bharat Small Reactors and advance research and development of small modular reactors in the country.In this context, Consider the following:**

1. Energy Accessibility in Remote Areas
2. Helping countries to achieve SDG 6
3. Better Flexibility
4. Higher Scalability
5. lower economies of scale
6. Lower per unit Operational Costs

How many of the above are advantages of Bharat Small Modular Reactors (SMRs)?

a) Only Three
b) Only Four
c) Only Five

d) All Six

Ans: A

Why in news:What are Bharat Small Reactors and why India needs it

Explanation:

- In her Budget 2024 speech, Finance Minister Nirmala Sitharaman announced plans to develop Bharat Small Reactors (BSRs) as part of India's push to expand its nuclear energy capabilities.
- The government plans to partner with the private sector to set up Bharat Small Reactors and conduct research and development on small modular reactors and newer nuclear technologies.
- These reactors represent a significant shift in India's nuclear energy strategy, aiming to make nuclear power more accessible and versatile.
- Bharat Small Reactors are essentially compact nuclear reactors designed to generate electricity on a smaller scale compared to traditional large nuclear power plants.
- The BSRs will be based on India's tried and tested 220-megawatt pressurised Heavy Water Reactor (PHWR) technology, of which 16 units are already operational in the country.
- The key innovation with BSRs is the government's decision to partner with the private sector for their development and deployment.
- It will help countries achieve SDG 7 (universal access to energy).**Hence statement 2 is incorrect**

Advantages:

- Bharat SMRs can provide clean and reliable energy to remote and geographically isolated regions where large power plants are not feasible.**Hence statement 1 is correct.**
- SMRs offer modularity, allowing better flexibility and scalability, which aligns with India's growing but varied energy demand across states and regions.**Hence statement 3 and 4 are correct.**

Disadvantages:

- While SMRs require lower capital for individual units, the initial R&D, licensing, and regulatory compliance costs for new reactor designs can be prohibitively high.
- Generating the same total capacity using SMRs could lead to higher cumulative costs compared to large reactors, thus reducing economies of scale. **Hence statement 5 is incorrect.**
- Smaller reactors may incur higher per-unit maintenance and operational costs compared to large nuclear reactors.**Hence statement 6 is incorrect.**
- Source: https://www.indiatoday.in/science/story/explained-what-are-bharat-small-reactors-and-why-india-needs-it-2571111-2024-07-24

⊙ **Consider the following:**

1. Carbon sequestration
2. Road construction
3. Fertilizer Additive
4. Wastewater treatment
5. Energy Storage

Which of the above are potential applications of steel slag?

a) 1, 2, 3 and 4 only
b) 2, 3, 4 and 5 only
c) 1,2, 3 and 5 only
d) 1, 2, 3, 4 and 5

Ans: D

Why in news: India to implement steel slag in roads, aiming for sustainable infrastructure

Explanation:

- Steel slag is a solid waste byproduct of steel production that's created when molten steel is separated from impurities in furnaces.
- India Being recognised as the world's second-largest steel producer, India currently produces around 19 million tons of steel slag annually, and this is expected to increase to 60 million tons by 2030.
- With approximately 200 kg of slag generated for every tonne of steel production.
- The technology to use steel slag for road construction was created by the Council of Scientific and Industrial Research (CSIR)-Central Road Research Institute (CRRI)

- The technology has been developed by the CSRI under a research project in collaboration with the Ministry of Steel, Government of India.
- It is widely used in road construction, waste management and waste water treatment.
- It is used as additive in fertilizers and also in thermochemical energy storage application. **Hence statement 2,3,4 and 5 are correct.**
- The direct carbonation of steel slag has emerged as a promising approach for carbon dioxide (CO_2) utilization and sequestration, holding potential for advancing sustainable steel production. **Hence statement 1 is correct.**
- Source: https://energy.economictimes.indiatimes.com/news/renewable/india-to-implement-steel-slag-in-roads-aiming-for-sustainable-infrastructure/111418377

⊙ **Consider the following:**

1. Incandescent Bulbs
2. Sodium Vapor Lamps
3. Flame-Based Sources
4. Neon Lights

Which of the above cannot be used as light source in Li-Fi technology?

a) 1, 2 and 3 only
b) 2 and 3 only
c) 3 only
d) 1, 2, 3 and 4

Ans: D

Why in news: Telecom startup Velmenni has received a grant from the ministry of defence (MoD) under the Innovations for Defence Excellence (iDEX) initiative for its innovative Li-Fi (Light Fidelity) technology

Explanation:

- Li-Fi stands for Light Fidelity. Li-Fi uses special LED (light-emitting diodes) bulbs as routers and works on optical wireless communications (OWC) technology.
- Li-Fi devices deliver data through visible, infra-red, or ultraviolet light.
- Meanwhile, Wi-Fi routers use radio frequencies to transmit data. Li-Fi also boasts of delivering speeds of up to 224GB per second.
- Li-Fi's speed is said to be 100 times faster than WiGig, the fastest Wi-Fi in the 60GHz frequency band, which can achieve a maximum speed of 7GB per second.
- It operates using visible light, allowing data to be transmitted through LEDs.
- This means that even in highly secure areas, such as underground facilities or shielded rooms, where RF signals cannot penetrate, LiFi can ensure uninterrupted connectivity, enabling seamless communication and coordination during mission-critical operations.
- It provides high-speed, bidirectional, networked mobile communication in a similar manner as WiFi but with higher speeds, lower latency, and a larger bandwidth.
- LEDs, laser diodes, and micro-LEDs are suitable for Li-Fi due to their fast modulation capability and energy efficiency.
- Incandescent bulbs, sodium vapor lamps, Flame based light sources, Neon bulbs and fluorescent lights are unsuitable because they lack the ability to modulate light rapidly for data transmission.**Hence all statements are correct**
- Source:https://www.moneycontrol.com/news/india/how-velmennis-li-fi-technology-can-help-indian-navy-12760494.html

⊙ **Consider the following statements:**

1. National Chartered Accountants Day and National Doctor's Day fall on the same date every year in India.
2. National Doctor's day is observed as a tribute to Dr.Bidhan Chandra Roy on his birth anniversary.
3. India's National Flag Day is observed to commemorate the day whenPingali Venkayya showed his design to Mahatma Gandhi.

Which of the statements given above is/are *not* correct?

a) 1 only
b) 2 only
c) 3 only
d) None of the above

Ans: C

Why in news: The Prime Minister greets Doctors on Doctor's Day.

Explanation:

- Doctor's Day pays tribute to the selfless service and invaluable contributions of doctors,
- It is celebrated annually on July 1st from 1991, to honour the birth and death anniversary of Dr Bidhan Chandra Roy.**Hence statement-2 is correct.**
- The Theme for the National Doctor's Day in 2024 is"Healing Hands, Caring Hearts".
- The National Chartered Accountants (CA) Day is observed annually on July 1. CA Day celebrates the foundation of the Institute of Chartered Accountants of India (ICAI).**Hence statement-1 is correct.**
- This year's celebrations mark the 76th anniversary of the ICAI's foundation.
- India's National Flag Day commemorates the adoption of the Indian national flag on July 22, 1947, by the Constituent Assembly, a few days before the country attained Independence from the British on August 15, 1947.**Hence statement-3 is incorrect.**
- Source:https://indianexpress.com/article/when-is/national-doctors-day-2024-date-history-significance-and-more-9424283/

⊙ **Consider the following statements**

Statement-I:

Fiscal stimulus is a type of long-term economic stimulus that tries to increase economic activity by promoting consumption and investment.

Statement-II:

Monetary stimulus is intended to expand the money supply, enhances consumer spending and investment, which will aid in accelerating economic growth.

Which one of the following is correct in respect of the above statements?

a) Both Statement-I and Statement-II are correct and Statement-II explains Statement-I
b) Both Statement-I and Statement-II are correct, but Statement-II does not explain Statement-I
c) Statement-I is correct, but Statement-II is incorrect
d) Statement-I is incorrect, but Statement-II is correct

Ans: D

Explanation:

- Monetary and Fiscal Stimulus are two of the main tools the Government has to stabilize the economy during financial crises. Two of the key tools the government has to stabilize the economy amid financial crises are fiscal and monetary stimulus.
- A collection of government policies known as "Fiscal Stimulus" are intended to kick-start a lethargic economy. Government spending growth stimulates the economy by injecting additional funds. As a result, the demand for products and services may rise, which may support economic growth.
- **Statement 1 is incorrect:** Fiscal stimulus is **one type of short-term** economic stimulus that tries to increase current economic activity by promoting consumption and investment.
- Economic stimulation may persuade enterprises to invest more money in their operations or in initiatives that will generate income in the future.
- **Statement 2 is correct:** Monetary stimulus is how central banks control the amount of money available to the economy of a country. This means that in order to control the amount of money in circulation, the government raises the amount of money in the economy and lowers the access fees.

⊙ **The Producer Price Index (PPI) differs from the Consumer Price Index (CPI) in which of the following ways?**

1. PPI measures the average change in prices received by producers, whereas CPI measures changes in the prices paid by consumers.
2. PPI excludes indirect taxes, whereas CPI includes them.
3. PPI tracks only goods, whereas CPI tracks goods and services.

Select the correct answer using the codes given below:

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

Answer: B

Explanation:

- **Statement 1 is correct:** PPI reflects average change in selling prices received by domestic producers for their output over a period of timewhile CPI represents price changes from the consumer's perspective.
- **Statement 2 is correct:** PPI excludes indirect taxes like GST, as they are not part of producers' earnings, but CPI includes them since consumers bear these costs.
- **Statement 3 isincorrect:** PPI and CPI includes both goods and services.

⊙ **In the context of Indian taxation, an Inverted Duty Structure arises when:**

a) Import duties on raw materials are higher than those on finished goods.
b) Export duties on finished goods are higher than those on raw materials.
c) Corporate tax rates are higher for small enterprises than for large corporations.
d) GST rates on services are higher than on goods.

Ans: A

Explanation:

- Inverted duty structure refers to taxation of inputs at higher rates than finished products that result in the build-up of credits and cascading costs. Inverted duty structure impacts the domestic industry as manufacturers have to pay a higher price for raw materials in terms of duty, while the finished products land at lower duty and cost. Inverted duty structure goes against the government's emphasis on 'Make in India' as it encourages the import of finished products rather than raw materials by imposing a higher import duty on the latter. **Hence, option A is correct.**

⊙ **Which of the following conditions must be met to claim GST Input Tax Credit (ITC)?**

1. The recipient must possess a valid tax invoice.
2. The tax on the invoice must have been paid to the government by the supplier.
3. The goods must be used for personal purposes.

Select the correct answer using the codes given below:

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

Ans: A

Explanation:

- Input Tax Credit or ITC is the tax that a business pays on a purchase and that it can use to reduce its tax liability when it makes a sale. In other words, businesses can reduce their tax liability by claiming credit to the extent of GST paid on purchases. Goods and Services Tax (GST) is an integrated tax system where every purchase by a business should be matched with a sale by another business. This makes flow of credit across an entire supply chain a seamless process.

Conditions to claim ITC:

- **Statement 1 is correct:**A valid tax invoice is necessary to claim ITC.
- **Statement 2 is correct:** The supplier must have deposited the tax with the government for the recipient to claim ITC.
- **Statement 3 is Incorrect:** ITC can only be claimed if the goods or services are used for business purposes, not for personal use.

⊙ **The Cost Inflation Index (CII) in India is primarily used for which of the following purposes?**

a) To adjust the tax rates in response to inflation.
b) To index the cost of capital goods for depreciation claims.
c) To calculate the inflation-adjusted cost of assets for capital gains taxation.
d) To determine the inflation rate for monetary policy decisions.

Ans: C

Explanation:

- The cost inflation index (CII) is used by a taxpayer to compute gains arising out of the sale of capital assets after adjusting for inflation.
- CII or Cost Inflation Index is notified under the Income-tax Act, 1961, every year.
- It is popularly used to calculate the "indexed cost of acquisition" while calculating capital gains at the time of sale of any capital asset.
- CII is a measure used by the Income Tax Department of India to account for inflation when calculating the capital gains on the sale of long-term capital assets.
- The index is revised annually to keep up with inflation, with the base year being periodically reset (currently the base year is 2001-02 in India).
- Normally, an asset is required to be retained for more than 36 months (24 months for immovable property and unlisted shares, 12 months for listed securities) to qualify as long-term capital gains.
- Since the prices of goods increase over time resulting in a fall in the purchasing power, the CII is used to arrive at the inflation-adjusted purchasing price of assets to compute taxable long-term capital gains (LTCG).
- **Hence, option C is correct.**

⊙ **Consider the following statements regarding Immune imprinting was recently news:**

1. Immune imprinting is a tendency of the body to repeat its immune response based on the first variant it encountered.
2. The immune imprinting was first observed recently during covid pandemic.

Which of the statements given above is/are *not* correct?

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

Ans: B

Explanation:

- Immune imprinting is a tendency of the body to repeat its immune response based on the first variant it encountered — through infection or vaccination — when it comes across a newer or slightly different variant of the same pathogen.

The phenomenon was first observed in 1947

- Scientists have realized that imprinting acts as a database for the immune system, helping it putup a better response to repeat infections. After our body is exposed to a virus for the first time, it produces memory B cells that circulate in the bloodstream and quickly produce antibodies whenever the same strain of the virus infects again.
- **Hence statement 1 is correct and statement 2 is incorrect**

⊙ **Consider the following statements:**

1. A single cell can have more than one nucleus.
2. Cancerous cells and those infected with viruses can also have multiple nuclei at times
3. Ribosomal RNA are synthesized in nucleolus of cells.

Which of the statements given above is/are *not*correct?

a) 1 only
b) 1 and 2 only
c) 2 and 3 only
d) None of the above

Ans: D

Explanation:

- Normally, there is only one nucleus per cell, variations in the number of nuclei are also frequently observed. While a majority of cells in the human body only possess a single nucleus, there are some cells which are multinucleated, possessing two or more nuclei. Some of these cell types include hepatocytes (the main functional cells in the liver), osteoclasts (cells that break down bone tissue), and skeletal muscle fibers.
- Sometimes Cancerous cells and those infected with viruses can also have multiple nuclei.
- The nuclear matrix or the nucleoplasm contains nucleolus and chromatin. The nucleoli are spherical structures present in the nucleoplasm. The content of nucleolus is continuous with the rest of the nucleoplasm as it is not a membrane bound structure. It is a site for active ribosomal RNA synthesis.
- **Thus Option D is the correct answer.**

⊙ **Which of the following diseases can be treated using stem cell therapy?**

1. Leukemia
2. Parkinson's Disease
3. Diabetes
4. Alzheimer's Disease
5. Sickle Cell Disease

Select the correct answer using the codes given below:

a) 1,2 and 3 only
b) 1,3 and 5 only
c) 1,3 and 4 only
d) 1,2,3,4 and 5

Ans: D

Explanation:

Source :The Hindu

Topic: applied biology

- All the above given diseases can be treated by stem cell therapy
- **Hematopoietic stem cell transplants (HSCT)** are a well-established treatment for leukemia. Leukemia is a type of cancer that affects the blood and bone marrow, causing abnormal white blood cell production. **Stem cell therapy** involves replacing the diseased bone marrow with healthy stem cells, often from a donor (bone marrow or umbilical cord blood). These stem cells regenerate healthy blood cells, thus treating the leukemia and enabling the patient to recover.
- **Parkinson's disease** is a neurodegenerative condition where the **dopamine-producing neurons** in the brain are damaged or destroyed. Stem cell therapy is being researched for Parkinson's disease because stem cells can potentially replace the lost neurons. Stem cells are being used experimentally to generate dopaminergic neurons, which could help restore brain function and alleviate symptoms like tremors and muscle rigidity.
- In **Type 1 diabetes**, the immune system destroys the insulin-producing cells (beta cells) of the **pancreas**. Stem cells, particularly **pluripotent stem cells (iPSCs)**, are being studied for their ability to differentiate into insulin-producing beta cells. It was recently successfully tested in few patients
- **Alzheimer's disease** is characterized by the loss of neurons in the brain, leading to memory loss and cognitive decline. Research into stem cell therapy for Alzheimer's involves using stem cells to **replace damaged neurons** or stimulate regeneration in the brain. While there is no established clinical application yet, experimental studies and clinical trials are underway, and the idea is that stem cells could help restore brain function or slow disease progression.
- **Sickle cell disease** is a genetic disorder where red blood cells become sickle-shaped, causing blockages in blood flow and leading to pain and organ damage. **Stem cell therapy**, specifically **bone marrow transplants**, is a curative treatment for sickle cell disease. By replacing the patient's defective stem cells with healthy ones from a donor, the therapy can restore normal red blood cell production, alleviating symptoms and improving the patient's quality of life.

- **Thus Option D is the correct answer.**

⊙ **With reference to the Wolbachia technique used in the control of vector-borne diseases, consider the following statements:**

1. The first beneficial use of Wolbachia technique was in controlling malaria in tropical regions.
2. The Wolbachia technique involves releasing mosquitoes infected with Wolbachia into the wild population.
3. Wolbachia-based strategies was very successful in controlling malaria.

Which of the statements given above is/are correct?

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

Ans: B

Explanation:

- The Wolbachia method is simple. When Aedesaegypti mosquitoes carry Wolbachia, the bacteria compete with viruses like dengue, Zika, chikungunya and yellow fever.
- This makes it harder for viruses to reproduce inside the mosquitoes. And the mosquitoes are much less likely to spread viruses from person to person. This means that when Aedesaegypti mosquitoes carry natural Wolbachia bacteria, the transmission of viruses like dengue, Zika, chikungunya and yellow fever is reduced.
- The **Wolbachia technique** involves releasing **mosquitoes infected with the Wolbachia bacterium** into the wild mosquito population. The bacteria affect the reproductive behavior of mosquitoes, leading to a **reduction in the population** or preventing the mosquitoes from transmitting certain diseases like **dengue** and **Zika**. By releasing infected mosquitoes, scientists aim to establish a population where **Wolbachia-infected mosquitoes** outnumber the wild mosquitoes, thereby reducing the spread of the virus.
- Wolbachia-based strategies have **not been used successfully to control malaria**. While Wolbachia has shown success in controlling **Aedes mosquitoes** (which spread diseases like dengue, Zika, and Chikungunya), it has **not** been shown to be successful in controlling **malaria**, which is caused by the **Plasmodium parasite** and transmitted by **Anopheles mosquitoes**.
- **Thus Option B is the correct answer.**

⊙ **Consider the following statementsregarding AI agent:**

1. An AI agent is a system that perceives its environment through sensors and takes actions through actuators to achieve specific goals.
2. AI agent can use multimodal inputs to produce desired outputs
3. AI agent can be used decision-making, problem-solving, interacting with external environments and executing actions.
4. AI agent can make Personalized recommendations on e-commerce sites.

How many of the following statements is/are correct?

a) 1
b) 2
c) 3
d) 4

Ans: D

Explanation:

- "An AI agent is a system that perceives its environment through sensors and takes actions through actuators to achieve specific goals."the statement is an explanation for AI agent.
- An AI agent typically perceives its environment via **sensors** (e.g., cameras, microphones) and performs actions through **actuators** (e.g., motors, displays) in order to achieve its goals. For example, an autonomous car perceives the environment using sensors like cameras, LIDAR, and radar, and takes actions such as steering, accelerating, or braking to drive safely.

- AI agents can indeed use **multimodal inputs**, meaning they can process and combine multiple types of data (e.g., images, text, voice) to make decisions or produce outputs. For example, a virtual assistant might use both **voice input** and **text input** to understand and respond to user queries, or a self-driving car might use both **visual** and **sonar data** to navigate.
- AI agents are designed to **make decisions**, **solve problems**, **interact with environments**, and **execute actions** based on their programming and the data they receive. This is true for a wide range of AI systems, from game-playing agents (e.g., AlphaGo) to personal assistants (e.g., Siri, Alexa) and autonomous robots or vehicles.
- AI agents, particularly recommendation systems, are widely used in **e-commerce** platforms (like Amazon or Netflix) to **personalize product or content recommendations** for users based on their past behavior, preferences, and interactions. This is a common and powerful application of machine learning algorithms in real-world AI systems.
- **Hence all the statements are correct.**

⊙ **With reference to hydrogen line, consider the following statements:**

1. The Hydrogen line is critical for mapping the structure of our galaxy
2. The specific radio frequency of the hydrogen line can penetrate the Earth's atmosphere

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

Answer: C

Why in news:'Wow': Scientists may have received an alien message from space, but what does it mean?

Explanation:

- The hydrogen line, 21 centimeter line, or H I line is a spectral line that is created by a change in the energy state of solitary, electrically neutral hydrogen atoms.
- This jump releases energy in the form of light, specifically with a wavelength of about 21 centimetres. This wavelength is what scientists call the hydrogen line.
- The hydrogen line is observed at a wavelength of 21 centimetres (or 1420.4 MHz frequency) in the radio spectrum.
- The Hydrogen line is critical for mapping the structure of our galaxy.Hence statement 1 is correct.
- Neutral hydrogen emits this radiation, allowing astronomers to study the distribution and motion of clouds of cold, neutral hydrogen atomic gas in interstellar space.
- The hydrogen line lies in the radio spectrum, which can penetrate the Earth's atmosphere, making it observable by Earth-based radio telescopes.**Hence statement 2 is correct.**
- Source: https://www.businesstoday.in/visualstories/news/wow-scientists-may-have-received-an-alien-message-from-space-but-what-does-it-mean-149335-05-07-2024

⊙ **With reference to Quantum Navigation, consider the following statements:**

1. Quantum signal doesn't drift which makes interception much harder to achieve compared to GPS.
2. Quantum navigations are more susceptible to accidental and deliberate outages than GPS.
3. Quantum navigation requires ultracold atoms thus replacing GPS at present is difficult.

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

Ans: C

Why in news: A UK aircraft has tested ground-breaking quantum technology that could pave the way for an unjammable back-up for GPS navigation systems.

Explanation:

- A UK aircraft has tested ground-breaking quantum technology that could pave the way for an unjammable back-up for GPS navigation systems.
- The government, which helped fund the research, said it was the first test of its kind to be publicly acknowledged.
- While GPS is satellite-based, the new system is quantum-based - a term used to describe tech that is reliant on the properties of matter at very small scales.
- GPS is a critically important system, used on planes ships and road vehicles and by the militarily, as well as helping your smartphone determine your location.
- But signals from GPS satellites can be jammed, or "spoofed" to give misleading location data.
- Where satellite navigation relies on the signal bouncing back from space,quantum navigation focuses on the movement of a single atom tracked under cryogenic conditions, explains science publication New Atlas.
- Instead of a satellite floating in space, a quantum navigation system is within each individual vehicle, with measurements being made "at point of use". This means the signal "doesn't drift", making interception much harder to achieve. **Hence statement 1 is correct.**
- Global navigation satellite systems (GNSS) like GPS are susceptible to accidental and deliberate outages, whereas quantum navigation is 'unjammable'.**Hence statement 2 is incorrect.**
- But quantum navigation systems are unlikely to replace GNSSs anytime soon. This is because, ultra-cold atoms are needed to achieve quantum navigation, and the equipment is currently negligibile. **Hence statement 3 is correct.**
- Source: https://www.bbc.com/news/articles/cz744gpl1dpo

⊙ **Consider the following statements regarding The People's Biodiversity Register (PBR):**

1. It serves as a comprehensive record of various aspects of biodiversity and includes microorganisms and land races.
2. Bengaluru was the first major metropolitan city in India to make a detailed People's Biodiversity Register (PBR).
3. It is mandated by the Biological Diversity Act, 2002.

How many of the above given statements are correct?

a) Only One
b) Only Two
c) All Three
d) None

Ans: B

Why in news: Thazhakara panchayat in Kerala recently published their updated PBR.

Explanation:

- The People's Biodiversity Register (PBR) serves as a comprehensive record of various aspects of biodiversity, including the conservation of habitats, preservation of land races, domesticated stocks and breeds of animals, micro-organisms, and the accumulation of knowledge related to the area's biological diversity. **Hence statement 1 is correct.**
- It is prepared by Biodiversity Management Committees in consultation with local communities. It is mandated by Biological Diversity Act (2002).**Hence statement 3 is correct.**
- As per the Biological Diversity Act 2002, Biodiversity Management Committees (BMC) are created for "promoting conservation, sustainable use and documentation of biological diversity" by local bodies across the country.
- PBR is designed as a tool for formal recording and maintenance of comprehensive information on availability and knowledge of local biological resources, their medicinal or any other use.
- It's also a record of knowledge, perception and attitude of people about natural resources, plants and animals, their utilization and conservation in a village.
- PBR is considered as the first step towards bridging the gap between intellectual property rights of local people and benefits derived from genetic resources and associated traditional knowledge and enabling them to share those benefits.
- **Kolkata was the** first major metropolitan city in India to make a detailed People's Biodiversity Register (PBR). **Hence statement 2 is incorrect.**

- Source: https://www.thehindu.com/news/national/kerala/divulging-fascinating-facts-thazhakara-panchayat-publishes-second-volume-of-peoples-biodiversity-register/article68366976.ece

⊙ **Consider the following statements:**

Statement I:

Model Skill Loan Scheme aims to ensure a steady flow of affordable finance for low-income youth to pursue specialized skill courses

Statement II:

India needs to develop a future-ready workforce for meeting emerging industrial demands.

Which one of the following is correct in respect of to the above statements?

a) Both Statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
b) Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement- I
c) Statement-I is correct but Statement-II is incorrect
d) Statement-I is incorrect but Statement-II is correct

Ans: A

Why in news: Credit guarantee cover extended to ₹7.5 lakh under revamped Model Skill Loan Scheme

Explanation:

- It aims to ensure a steady flow of affordable finance for low-income youth to pursue specialized skill courses.**Hence statement-I is correct.**
- Nodal Ministry: Ministry of Skill Development & Entrepreneurship
- Benefits enhanced**: It offers collateral-free loans ofup** to Rs. 7.5 lakh and expands eligibility to include Non-Banking Financial Companies (NBFCs), NBFC-Micro Finance Institutions (NBFC-MFIs), and small finance banks.
- **Rate of Interest is very low and is around Base** rate + an add on typically up to 1.5%**..**
- This initiative is part of a broader effort to develop a future-ready workforce by facilitating access to high-cost, advanced skill courses essential for meeting emerging industrial demands.**Hence statement-II is correct and Statement-II is the correct explanation for Statement-I**
- The revised Model Skill Loan Scheme builds upon the Credit Guarantee Fund Scheme for Skill Development (CCFSSD), launched in 2015.
- With the help of this initiative, aspiring candidates can choose from a plethora of skill courses in sectors such as healthcare, IT, AI-data science, cloud application, digital marketing, hospitality, animation, gaming, graphic designing, and drone technology.
- These courses, driven by changing industry dynamics, offer substantial placement opportunities and potential for international mobility, he observed.
- Source: https://pib.gov.in/PressReleasePage.aspx?PRID=2037145

⊙ **Which of the following best describes about the term "Greenium"?**

a) Investors are willing to accept lower yields on green bond instruments due to the sustainable nature of the projects.
b) Government's own interest subsidy given to Green bond holders to boost investment in green bonds to accelerate climate change goals
c) Investors are willing to pay high prices on green bond instruments due to higher short term yields it provides
d) It is the act of making false or misleading statements about the environmental benefits of a product or practice

Ans: A

Why in news: Indian sovereign green bonds hardly received any green premiums from private investors: Eco Survey

Explanation:

- Greenium refers to the premium that the issuer receives on green bond issuances wherein investors are willing to accept lower yields on such debt instruments due to the sustainable nature of the projects financed by their proceeds. **Hence option-a is correct.**
- "Despite securing a good rating on its green bond framework, Indian sovereign green bonds have hardly received any 'greenium' (Green Premium) from private investors.
- It is more a 'wall of capital' than a 'flood of capital' that is waiting to fund energy transition in Emerging Markets and Developing Economies (EMDEs), the Survey for FY24, which was placed in Parliament on Monday, pointed out.
- India released the Framework for Sovereign Green Bonds in 2022 enabling the mobilisation of funds from diversified investors for green projects, deepening the bond market.
- The framework has been rated as 'Medium Green' with a 'Good' governance score by CICERO, a Norway-based Second Party Opinion provider, highlighting India's credibility and readiness to issue sovereign green bonds.
- India undertook the issue of sovereign green bonds amounting to ₹16,000 crore in January-February 2023, followed by a second issue of ₹20,000 crore in October-December 2023.
- Even though the Survey flagged the issue of lower premiums on green bonds, the Chief Economic Advisor (CEA) in a presser said that low premiums on green bonds is not just an India issue, but a global one.
- Lack of access to adequate and affordable financial resources remains a significant constraint for developing countries in implementing their climate commitments, the Survey said, adding that finance flows to developing countries from developed nations have been very meagre.
- "Currently, most of the international finance available for developing countries is in the form of loans rather than grants," it added.
- Available, accessible and affordable financial resources are essential to meet the needs of developing countries. UNFCCC and its Paris Agreement mandate that developed countries provide the resources and take the lead in mobilising finance through various sources.
- "However, much of the climate action by developing countries has been done through domestic resources, and the emphasis of the developed countries has mainly been on private finance taking the lead in financing climate action," it pointed out.
- Source: https://www.thehindubusinessline.com/economy/indian-sovereign-green-bonds-hardly-received-any-green-premiums-from-private-investors-eco-survey/article68432557.ece

⊙ **Consider the following statements regarding Windfall Tax:**

1. It is imposed on companies that earn excessive profits due to unforeseen external circumstances.
2. In India, windfall taxes are levied on profits from domestic production as well as exports of specific goods like petroleum and natural gas.
3. Windfall tax rates are fixed and do not vary with changes in global market conditions.

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

Ans: A

Explanation:

- **Statement 1 is correct:** Windfall tax targets extraordinary profits earned by businesses due to external factors such as geopolitical events or supply shortages.
- **Statement 2 is correct:** In India, windfall taxes have been applied to profits from crude oil production and fuel exports when global prices surge unexpectedly.
- **Statement 3 is incorrect:**Windfall tax rates are not fixed and can vary depending on market conditions to ensure fairness.

WINDFALL TAX

- Windfall taxes are designed to tax the profits a company derives from an external or unprecedented event. Example: Russia-Ukraine conflict, when Oil companies benefits.
- The tax rates are reviewed every fortnight based on average oil prices in the previous two weeks.

- Sectors widely used: oil, gas, and coal.

ADVANTAGES OF WINDFALL TAX

- Redistribution of unexpected gains, when high prices benefit producers at the expense of consumers.
- To fund social welfare schemes, to help fund support programmes for those most affected by inflation. It acts as a supplementary revenue stream for the government.

DRAWBACKS

- Retrospective in nature: Companies are confident in investing if there is certainty and stability in a tax regime. Since windfall taxes are imposed retrospectively and are often influenced by unexpected events, they can brew uncertainty in the market about future taxes.
- It has the potential of reducing domestic oil production and increasing imports.
- Uncertainty over implementation: Only the big companies responsible for the bulk of high-priced sales or smaller companies and whether producers with revenues or profits below a certain threshold should be exempted or not.

⊙ **With reference to Sticky Inflation, consider the following statements:**

1. Sticky inflation refers to inflation that persists over time and does not respond quickly to monetary policy interventions.
2. Food and fuel prices are the primary contributors to sticky inflation in India.
3. Sticky inflation is typically associated with supply-side rigidities in the economy.

Which of the statements given above is/are correct?

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

Ans: B

Explanation:

- **Statement 1 is correct:** Sticky inflation denotes a situation where prices remain elevated for an extended period despite policy measures like interest rate hikes.
- **Statement 2 is incorrect:** Sticky inflation is more commonly associated with services, wages, and non-volatile items, while food and fuel prices are considered volatile and contribute to headline inflation.
- **Statement 3 is correct:** Sticky inflation often arises from structural issues like labour market rigidity or long-term contracts.

STICKY INFLATION

- Sticky inflation refers to a phenomenon where prices do not adjust quickly to changes in supply and demand, leading to persistent inflation.
- Rising wages and prices for consumer goods and services are typically the main factors behind inflation stickiness.
- Prices for medical services, education, and housing are some of the most important factors that can contribute to sticky inflation.
- It erodes the purchasing power of consumers and puts pressure on housing affordability.

⊙ **Consider the following statements regarding Greedflation:**

1. Greedflation is primarily a demand-side phenomenon.
2. It is often observed in sectors with limited competition or monopolistic practices.

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

Ans: B

Explanation:

- **Statement 1 isincorrect:** Greedflation is a supply-side phenomenon, stemming from corporate pricing power rather than demand-driven factors.
- **Statement 2 is correct:** It is prevalent in markets with monopolistic or oligopolistic structures, where firms have significant pricing power.
- Greedflation simply means (corporate) greed is fuelling inflation. In other words, instead of the wage-price spiral, it is the profit-price spiral that is in play. In essence, greedflation implies that companies exploited the inflation that people were experiencing by putting up their prices way beyond just covering their increased costs and then used that to maximize their profit margins.

⊙ **Which of the following best explains the Wage-Price Spiral?**

a) A situation where technological advancements reduce costs, leading to lower prices and wage stagnation.
b) A cycle where rising wages lead to higher production costs, which in turn increase prices, further pushing up wage demands.
c) Inflation caused by labor shortages that force employers to offer higher wages.
d) An economic phenomenon where government-imposed wage hikes result in structural inflation.

Ans: B

Explanation:

- The wage-price spiral is a self-reinforcing cycle of inflation where wage increases raise production costs, leading to higher prices. In response, workers demand even higher wages to maintain their purchasing power, perpetuating the cycle. This often occurs in periods of high inflation and strong labor union influence. **Hence, option B is correct.**

⊙ **With reference to Input Service Distribution (ISD)under GST, consider the following statements:**

1. ISD is a mechanism to distribute the credit of input services availed at the head office to branch offices.
2. Only the input tax credit (ITC) of services can be distributed through ISD.
3. ISD is mandatory for all registered GST taxpayers to claim ITC.

Which of the statements given above is/are correct?

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

Ans: B

Explanation:

- **Statement 1 is correct:** ISD allows businesses to distribute input tax credit related to services availed centrally (e.g., at the head office) to their branches or units.
- **Statement 2 is correct:**ISD pertains specifically to the distribution of ITC on services and does not cover ITC on goods.
- **Statement 3 is incorrect:** ISD registration is optional and applicable only to entities with centralized service procurement; it is not mandatory for all GST taxpayers.

Input Service Distributor (ISD)

- An Input Service Distributor (ISD) is a taxpayer that receives invoices for services used by its branches. It distributes the tax paid known as the Input Tax Credit (ITC), to such branches on a proportional basis by issuing ISD invoices. The branches can have different GSTINs but must have the same PAN as that of ISD.

Let's understand with an example:

- The head office of M/s ABC Limited is located in Bangalore having branches in Chennai, Mumbai and Kolkata. The head office incurred annual software maintenance expense (service received) on behalf of all its branches and received the invoice for the same.
- Since the software is used by all its branches, the input tax credit of entire services cannot be claimed in Bangalore. The same has to be distributed to all three locations. Here, the head office at Bangalore is the Input Service Distributor.

Situations where ISD is not applicable

- Where ITC is paid on inputs and capital goods. For instance, raw materials and machinery purchased.
- ITC cannot be distributed to outsourced manufacturers or service providers.

Purpose of registering as ISD

- The concept of ISD is a facility made available to business having a large share of common expenditure and billing or payment is done from a centralized location. The mechanism is meant to simplify the credit taking process for entities and the facility will strengthen the seamless flow of credit under GST.

⊙ **Which among the following are applications of machine learning in present scenario?**

1. Fraud detection in financial sectors
2. To categories spam mails and calls
3. Personalized product recommendation
4. Large actionmodeling
5. Disease diagnosis

Select the correct answer using the codes given below:

a) 1, 2, 3 and 4 only
b) 2,3 and5 only
c) 1, 2, 3 and 5 only
d) 1, 2, 3,4 and 5

Ans: C

Explanation:

Fraud detection in financial sectors:

- **Correct**: Machine learning is widely used in fraud detection, particularly in areas such as **credit card fraud**, **insurance fraud**, and **money laundering**. It helps identify unusual patterns in transaction data and flag suspicious activities.

To categorize spam mails and calls:

- **Correct**: Machine learning is commonly used in **spam filters** for email and **call classification** systems to identify spam or robocalls. ML algorithms classify messages and calls based on features like the sender's address, keywords, and call patterns.

Personalized product recommendation:

- **Correct**: Machine learning powers**recommendation systems** used by e-commerce platforms, streaming services, and social media sites. By analyzing user preferences and behavior, machine learning models suggest products, movies, music, etc., tailored to individual interests.

Large action modelling:

- **Incorrect**: The term **"large action modelling"** is not commonly associated with machine learning. It is based on deep learning and it's not a widely established or standard term in the context of ML applications. Hence this statement is incorrect

Disease diagnosis:

- **Correct**: Machine learning is increasingly being used for **disease diagnosis** and healthcare applications. For example, ML models are used in **medical image analysis** (e.g., detecting tumors in radiology images), **predicting disease risk** (such as heart disease or diabetes), and even **personalized treatment recommendations**.
- **Thus Option C is the correct answer.**

⊙ **Consider the following statements regarding CRISPR Cas9:**

1. In CRISPR Cas9 technology the cas9 protein is guided to the specific targeted DNA with the help of guide RNA
2. The guide RNA is synthesised and added to cas9 protein

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

Ans: C

Explanation:

- CRISPR is a dynamic, versatile tool that allows us to target nearly any genomic location and potentially repair broken genes. It can remove, add, or alter specific DNA sequences in the genome of higher organisms.
- CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) are sections of DNA and are sections of genetic code containing short repetitions of base sequences followed by spacer DNA segments.
- CAS-9 (CRISPR-associated protein 9) is an enzyme. It uses a synthetic guide RNA to introduce a double-strand break at a specific location within a strand of DNA. It is a system used by bacterial cells to recognize and destroy viral DNA as a form of adaptive immunity.
- **Thus Option C is the correct answer.**

⊙ **Consider the following statements regardingCell free DNA:**

1. Cell free DNAs are fragments of DNA released in the bloodstreams.
2. Chimera, in genetics, an organism or tissue that contains at least two different sets of DNA

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

Ans: C

Explanation:

- Cell-free DNA are short fragments of DNA released into the bloodstream through a natural process of cell death. During pregnancy, the mother's blood contains cell-free DNA (cfDNA), both from her own tissue, and from the fetus via the placenta. Approximately 2-20% of total cfDNA in maternal blood is placental.
- chimera, in genetics, an organism or tissue that contains at least two different sets of DNA, most often originating from the fusion of as many different zygotes (fertilized eggs). Pregnant women exhibit chimerism during and few years after pregnancy
- **Thus Option C is the correct answer.**

⊙ **Consider the following statements regarding Dark Fibre:**

1. Dark fiber is similar to virtual private network.
2. It creates a point-to-point tunnel that encrypts our personal data.
3. Dark fibres are typically deployed by network infrastructure owners

How many of the following statements is/are correct?

a) 1
b) 2
c) 3
d) None

Ans: A

Explanation:

- The term “dark fiber” is not to be confused with a “dark network”. It simply refers to unused fibers in an already installed optical fiber cable, so another common name for dark fiber is “un-lit fiber”.
- Dark fibers are typically deployed by network infrastructure owners, such as telecommunication operators who provide both fixed and mobile services. The installation of a fiber optical cable is a costly exercise thus providers typically install many more fibers than their initial need.
- A VPN, which stands for virtual private network, establishes a digital connection between your computer and a remote server owned by a VPN provider, creating a point-to-point tunnel that encrypts your personal data, masks your IP address, and lets you sidestep website blocks and firewalls on the internet.
- Hence 1st and 2nd statement is incorrect, because dark net and VPN are completely different

- Dark fibers are typically deployed by network infrastructure owners, such as telecommunication operators who provide both fixed and mobile services. The installation of a fiber optical cable is a costly exercise thus providers typically install many more fibers than their initial need.
- **Hence third statement is correct**

⊙ **Consider the following statements:**

1. Plasma carries organic substance like glucose, hormones, vitamins and proteins.
2. Red Blood Cells are the most abundant cell in human body
3. Before maturing red blood cell do not have cell organelles and nucleus, they attain these after getting matured

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

Ans: A

Explanation:

- Blood is the main circulatory medium in the human body. It is a red coloured fluid connective tissue. Components of Blood: The blood consists of two main components. The fluid plasma and the formed elements (blood cells) which are found suspended in the plasma.
- Plasma: It is slightly alkaline, containing non-cellular substance which constitutes about 55% of the blood. Organic substances like proteins, glucose, urea, enzymes, hormones, vitamins and minerals are present in the plasma.
- **Hence first statement is correct.**
- They are the most abundant cells in the human body. RBCs are formed in the bone marrow. The RBCs impart red colour to the blood due to presence of respiratory pigment haemoglobin.
- **Hence 2nd statement is correct**
- Matured mammalian RBCs do not have cell organelles and nucleus. They are biconcave and disc-shaped. Their life span is about 120 days. RBC is involved in the transport of oxygen from lungs to tissues.
- **Hence third statement is incorrect.**

⊙ **Consider the following standards:**

1. Hallmark for jewellery
2. Eco mark
3. Star rating for electrical appliances
4. Agmark for agricultural produce

How many of the above standards are issued by Bureau of Indian standards (BIS)?

a) Only One
b) Only Two
c) Only Three
d) All Four

Ans: B

Why in news: Government makes Indian Standards Institution (ISI) mark mandatory for stainless steel and aluminium kitchen utensils through a Quality Control Order

Explanation:

- The Bureau of Indian Standards (BIS) is the National Standards Body of India under Department of Consumer affairs, Ministry of Consumer Affairs, Food & Public Distribution, Government of India.
- It is established by the Bureau of Indian Standards Act, 2016 which came into effect on 12 October 2017
- One of the major functions of the Bureau is the formulation, recognition and promotion of the Indian Standards.

- Bureau of Indian Standards (BIS) is the National Standard Body of India. BIS has its Headquarters at New Delhi. It has 5 Regional Offices (ROs).
- Hallmark certifies the purity of gold and silver jewelry. Ecomark certifies environmentally friendly products like soap,paints,etc. Both are given by BIS. **Hence statement 1 and 2 are correct.**
- Agmark is issued by the **Directorate of Marketing and Inspection (DMI) under the Ministry of Agriculture and Farmers Welfare**, Government of India. It serves as a quality certification mark for agricultural products, ensuring compliance with specified standards for grading and marketing of agricultural commodities. **Hence statement 4 is incorrect**
- The 5-star rating for electrical appliances in India is issued by the **Bureau of Energy Efficiency (BEE),** which operates under the Ministry of Power, Government of India.**Hence statement 3 is incorrect**
- Source: https://www.ndtv.com/india-news/government-makes-isi-mark-mandatory-for-stainless-steel-aluminium-utensils-6038900

⊙ **Pest attack, drought, earthquake, fire, flood andCloud burst all have one common character in Indian context. Which of the following is the common description for all these?**

a) All states in India are equally vulnerable to all these disasters.
b) State government have full responsibility in mitigating these disasters.
c) Central government has the full responsibility in mitigating these disasters.
d) All the above are classified as Notified Disaster.

Ans: D

Why in news:Centre has no plans to include heatwave as 'notified disaster'

Explanation:

- Disaster Management Act, 2005, defines a disaster as a "catastrophe, mishap, calamity or grave occurrence" arising from natural or man-made causes that result insubstantial loss of life, destruction of property, or damage to the environment.
- Currently 12 disasters are classified as Notified Disaster. These are Cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloud burst, pest attack and frost and cold wave. **Hence option-d is correct.**
- The notified list of disasters eligible for National Disaster Response Fund/State Disaster Response Fund (SDRF) assistance.
- India experienced unprecedented heatwaves this year, which have killed hundreds of people, but there is currently no plan to classify it as a notified disaster, which will make it eligible for financial assistance under the Disaster Management Act, 2005, the government told the Parliament on July 25, 2024.
- According to India Meteorological Department (IMD), the country saw 536 heatwave days this summer — the most in 14 years. IMD calculates heatwave days based on data from all 36 meteorological subdivisions.
- So, for example, if all 36 sub-divisions record heatwave days on a particular day, then that will be recorded as 36 heatwave days.
- The basic criteria for IMD to declare a heatwave are when a place's temperature exceeds 40 degrees Celsius (°C) in the plains, 37°C in coastal areas, and 30°C in the hills.
- These temperature values are the thresholds established by the IMD for the declaration of heatwaves in India.
- Source: https://www.downtoearth.org.in/natural-disasters/centre-has-no-plans-to-include-heatwave-as-notified-disaster

⊙ **In the deepest parts of the ocean, below 4,000 metres, the combination of high pressure and low temperature creates conditions that dissolve calcium carbonate, the material marine animals use to make their shells.This zone is known as the carbonate compensation depth(CCD).In this context,Which of the following can be understood by studying and analysingthe Carbonate Compensation Depth(CCD)?**

1. Ocean Acidification
2. Fuel conservation in Shipping

3. Marine Carbon Cycle Regulation
4. Marine Ecosystem Health
5. Plate Tectonics

Select the correct answer using the codes given below:

a) 1, 3 and 4 only
b) 1, 2 and 3 only
c) 1, 3, 4 and 5 only
d) 1, 2, 3, 4 and 5

Ans: C

Why in news: Research indicates that the Carbonate Compensation Depth (CCD) is expanding

Explanation:

- In the deepest parts of the ocean, below 4,000 metres, the combination of high pressure and low temperature creates conditions that dissolve calcium carbonate, the material marine animals use to make their shells.
- This zone is known as the carbonate compensation depth – and it is expanding.
- This contrasts with the widely discussed ocean acidification of surface waters due to the ocean absorbing carbon dioxide from the burning of fossil fuels.
- But the two are linked: Because of rising concentrations of carbon dioxide in the ocean, its pH is decreasing (becoming more acidic), and the deep-sea area in which calcium carbonate dissolves is growing, from the seafloor up. **Hence statement 1 and 3 are correct.**
- The transition zone within which calcium carbonate increasingly becomes chemically unstable and begins to dissolve is called the lysocline.
- Because the ocean seabed is relatively flat, even a rise of the lysocline by a few metres can rapidly lead to large under-saturated (acidic) areas.
- The upper limit of the lysocline transition zone is known as the calcite saturation depth, above which seabed sediments are rich in calcium carbonate and ocean water is supersaturated with it.
- The calcite compensation depth is its lower limit, below which seabed sediments contain little or no carbonate minerals.
- The position of the CCD impacts the distribution of marine organisms that rely on carbonate shells, such as foraminifera and coccolithophores. Understanding CCD shifts can indicate stressors on marine ecosystem. **Hence statement 4 is correct.**
- The CCD serves as an important proxy for understanding past oceanic and atmospheric conditions.
- By analyzing the distribution of carbonate sediments in ocean cores, scientists can infer past changes in temperature, ocean chemistry, and atmospheric CO_2 levels, providing insights into historical climate shifts.
- Fuel conservation in Shipping has no link with carbonate compensation depth (CCD). **Hence statement 2 is incorrect.**
- The exclusive economic zones of some countries will be more affected than others. Generally, oceanic and island nations lose more, while countries with large continental shelves lose proportionately less.
- Amount of sediments above the CCD and siliceous or clay sediments below it helps reconstruct past tectonic movements, seafloor spreading rates, and sedimentation patterns.**Hence statement 5 is correct.**
- Bermuda's EEZ is predicted to be the most affected by a 300-metre rise of the calcite compensation depth above the present level, with 68 per cent of that country's seabed becoming submerged below the lysocline. In contrast, only 6 per cent of the US EEZ and 0.39 per cent of the Russian EEZ are predicted to be impacted.
- Source: https://www.downtoearth.org.in/wildlife-biodiversity/as-ocean-surfaces-acidify-a-deep-sea-acidic-zone-is-expanding-marine-habitats-are-being-squeezed

⊙ **Match the columns:**

War/Conflict with Pakistan	**Agreement or Declaration signed after the war**
1. Kargil War (1999)	A. Simla Agreement

2.	1965 War	B. Lahore Declaration
3.	1971 War	C. Karachi Agreement
4.	1947 War	D. Tashkent Agreement

Select the correct answer using codes given below:

a) 1-B, 2-D, 3-A, 4-C
b) 1-A, 2-C, 3-B, 4-D
c) 1-C, 2-B, 3-D, 4-A
d) 1-D, 2-A, 3-C, 4-B

Ans: A

Why in news:Recently, 25th anniversary of Kargil Vijay Diwas was celebrated

Explanation:

- The Kargil War officially concluded 25 years ago on July 26, 1999.
- Kargil Vijay Diwas, observed annually on this day, commemorates India's victory over Pakistan and honors the sacrifices of hundreds of Indian soldiers who faced more than just the Pakistani infiltrators to secure victory in Kargil.
- India and Pakistan signed the Lahore Declaration in February 1999, promising to provide a peaceful and bilateral solution to the Kashmir conflict.
- The Karachi Agreement of 1949 was finalized by military representatives from both India and Pakistan under the supervision of the United Nations Commission for India and Pakistan (UNCIP). It established the ceasefire line in Kashmir following the Indo-Pakistani War of 1947.
- Simla Agreement (1972) was signed by Indian PM Indira Gandhi and Pakistani PM Zulfikar Ali Bhutto.Pakistan acknowledged the independence of Bangladesh under this.
- Tashkent Agreement (1966) was mediated by the Soviet Union and signed by Indian PM Lal Bahadur Shastri and Pakistani President Ayub Khan after 1965 War between two countries.
- **Hence option-A is correct.**
- Source:https://www.thehindu.com/news/national/jammu-and-kashmir/kargil-vijay-diwas-pm-modi-kargil-war-memorial-visit-on-june-26/article68448448.ece

⊙ **Which of the following statements about Financial Inclusion Index is not correct?**

a) It has been constructed without any 'base year' and as such it reflects cumulative efforts of all stakeholders over the years.
b) The index incorporates details of banking, investments, insurance, postal as well as the pension sector
c) The annual FI-Index will be published by NITI Aayog.
d) The index comprises of only three broad parameters which are access, usage and quality.

Ans: C

Why in news: Financial inclusion index rises with growth across all segments: RBI

Explanation:

- The Reserve Bank's FI-Index, capturing the extent of financial inclusion across the country, rose to 64.2 in March 2024, showing growth across all parameters.
- The index captures information on various aspects of financial inclusion in a single value ranging between 0 and 100, where 0 represents complete financial exclusion and 100 indicates full financial inclusion.
- "The value of the index for March 2024 stands at 64.2 vis-à-vis 60.1 in March 2023, with growth witnessed across all sub-indices," the Reserve Bank of India (RBI) said in a statement on July 9.
- The improvement in FI-Index is mainly contributed by usage dimension, reflecting deepening of financial inclusion, it added.
- **The annual FI-Index** will be published by RBI. **Hence option-c is incorrect.**
- The index incorporates details of banking, investments, insurance, postal as well as the pension sector in consultation with the government and respective sectoral regulators.**Hence option-B is correct**
- The FI-Index comprises three broad parameters, including access, usage and quality with each of these consisting of various dimensions computed on the basis of on several indicators.**Hence optionD is correct**

- It has been constructed without any 'base year' and as such it reflects cumulative efforts of all stakeholders over the years towards financial inclusion.**Hence option-A is correct**
- Source: https://www.thehindu.com/business/Economy/financial-inclusion-index-rises-with-growth-across-all-segments-rbi/article68386438.ece

⊙ **With reference to the Goods & Services Tax Appellate Tribunal (GSTAT) in India, consider the following statements:**

1. GSTAT is the apex appellate authority for resolving disputes under GST laws in India.
2. The tribunal operates under the Ministry of Law and Justice.
3. GSTAT benches are required to include both judicial and technical members.

Which of the statements given above is/are correct?

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

Ans: B

Explanation:

- **Statement 1 is correct:** GSTAT is the apex appellate authority to hear and resolve appeals against the orders of the appellate authority under GST laws.
- **Statement 2 is incorrect:** GSTAT operates under the Ministry of Finance, not under the Ministry of Law and Justice.
- **Statement 3 is correct:** GSTAT benches are structured to include both judicial members (with legal expertise) and technical members (with expertise in taxation).

⊙ **Which of the following factors are most likely to contribute toimported inflation in an economy?**

1. Depreciation of the domestic currency.
2. Increase in international crude oil prices.
3. Adoption of a free trade policy to boost imports.

Select the correct answer using the codes given below:

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

Ans: A

Explanation:

- **Statement 1 iscorrect:** Depreciation of the domestic currency increases the cost of imported goods, leading to inflation.
- **Statement 2 iscorrect:** Higher international crude oil prices directly affect domestic fuel costs, contributing to inflation.
- **Statement 3 isincorrect:**A free trade policy reduces trade barriers and could lead to lower prices due to increased competition, potentially mitigating inflation.

⊙ **Consider the following statements regarding Advance Pricing Agreements (APAs) in India:**

1. APAs are agreements between a taxpayer and the government to determine the transfer pricing methodology for cross-border transactions.
2. Both unilateral and bilateral APAs require the involvement of India's Double Taxation Avoidance Agreement (DTAA) partners.
3. The primary objective of APAs is to reduce litigation and ensure tax certainty for multinational enterprises.

Which of the statements given above is/are correct?

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

Ans: B

Explanation:

- **Statement 1 iscorrect:** APAs are pre-determined agreements to set transfer pricing methods for transactions between related entities in different countries, ensuring compliance with tax laws.
- **Statement 2 isincorrect:** Unilateral APAs involve only the taxpayer and the Indian tax authority, while bilateral/multilateral APAs include involvement from DTAA partner countries.
- **Statement 3 iscorrect:** The goal of APAs is to minimize disputes and provide tax certainty for multinational corporations.

ADVANCE PRICING AGREEMENTS (APAS)

- It is an agreement between a taxpayer and a tax authority that sets out how international transactions between related companies will be priced, to avoid any confusion or disagreement about the pricing of those transactions.
- It Supplements Double Taxation Avoidance Agreement (DTAA) mechanism for resolving transfer pricing dispute.
- The APA Scheme endeavours to provide certainty to taxpayers in the domain of transfer pricing by specifying the methods of pricing and determining the arm's length price of international transactions in advance for a maximum of five future years.
- Further, the taxpayer has the option to rollback the APA for four preceding years, as a result of which, tax certainty is provided for nine years.
- Arm's length price refers to a deal in which parties act independently without one party influencing the other.
- The Finance Act, 2012 inserted sections 92CC and 92CD in the Income Tax Act, 1961 introducing the provisions of the APA.
- These statutory provisions, effective from July 1, 2012, lent the legal backing to the CBDT to enter into APAs with taxpayers for a maximum period of five years
- There are three types of APA: unilateral, bilateral and multilateralal.

⊙ **With reference to the Financial Intelligence Unit-India (FIU-IND), consider the following statements:**

1. FIU-IND is responsible for analysing suspicious transactions to combat money laundering and terrorism financing.
2. It functions under the Ministry of Corporate Affairs.
3. It is the nodal agency for implementing the Prevention of Money Laundering Act, 2002 (PMLA).

Which of the statements given above is/are correct?

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

Ans: B

Explanation:

- **Statement 1 is correct:** FIU-IND collects, analyzes, and disseminates financial information to identify and counter money laundering and terrorism financing.
- **Statement 2 is incorrect:** FIU-IND functions under the Ministry of Finance, not under the Ministry of Corporate Affairs.
- **Statement 3 iscorrect:** FIU-IND is the nodal agency for the operational implementation of the PMLA, 2002.

FINANCIAL INTELLIGENCE UNIT (FIU)

- Financial Intelligence Unit – India (FIU-IND) is an organisation under the Department of Revenue, Government of India
- It collects financial intelligence about offences under the Prevention of Money Laundering Act, 2002.
- It was set up in November 2004 and reports directly to the Economic Intelligence Council (EIC) headed by the Finance Minister.

- Other Agencies to curb Money Laundering and Terror Financing: Enforcement Directorate (ED), Central Bureau of Investigation (CBI), Financial Action Task Force (FATF);

⊙ **Consider the following statements regarding the Rebate of State and Central Taxes and Levies (RoSCTL):**

1. RoSCTL refunds state and central taxes and levies that are not reimbursed through GST.
2. It is aimed at improving the competitiveness of India's textile exports.
3. The scheme is administered by the Ministry of Commerce and Industry.

Which of the statements given above is/are correct?

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

Ans: B

Explanation:

- **Statement 1 is correct:** RoSCTL refunds state and central taxes and levies that are not reimbursed through GST.
- **Statement 2 iscorrect:** By reducing the tax burden on exporters, the scheme enhances the global competitiveness of Indian textiles.
- **Statement 3 is incorrect:** The scheme is administered by the Ministry of Textiles, not the Ministry of Commerce and Industry.

REBATE OF STATE AND CENTRAL TAXES AND LEVIES (ROSCTL)

- Rebate of State and Central Taxes and Levies (RoSCTL) scheme is a Ministry of Textiles scheme for export
- It replaced the Rebate of State Levies (RoSL) Scheme.
- It is implemented by the Department of Revenue under Ministry of Finance.
- The fresh extension is aimed at enhancing export competitiveness.
- The objective of the scheme is to compensate for state and central taxes and levies in addition to the Duty drawback scheme on the export of apparel or garments and made-ups by way of rebate.
- The scheme is based on the internationally acceptable principle that taxes and duties should not be exported to enable a level playing field in the international market for exports.
- Hence, not only indirect taxes on inputs are to be rebated or reimbursed but also other unrefunded state and central taxes and levies.
- Rebate of state taxes and levies comprises value-added tax (VAT) on fuel used in transportation, captive power, farm sector, mandi tax, duty of electricity, stamp duty on export documents, embedded State Goods and Services Tax (SGST) paid on inputs such as pesticides, fertilizers, etc.
- The rebate of central taxes and levies comprises a central excise duty on fuel used in transportation, embedded Central Goods and Services Tax (CGST) paid on inputs such as pesticides, fertilizer, etc.

⊙ **Generic medicines**

1. There is no generic drug for rare disease
2. Generic drug does not require pre-clinical test
3. Generic drugs are freely available in janaushadikendras
4. The API molecules in generic medicine will be same as branded drugs

How many of the following statements are correct?

a) 1
b) 2
c) 3
d) 4

Ans:B

Explanation:

Source PIB, the Hindu,Topic: IPR

- Recently Generic drugs to treat four rare diseases launched by the Union Health Ministry. Providing relief to patients with rare diseases across India, the Union Health Ministry has made available generic drugs to support the care and treatment of four ailments: Tyrosinemia-Type 1, Gauchers Disease, Wilson's Disease, and the Dravet-Lennox Gastaut Syndrome. This means that the cost of these drugs will be slashed by anywhere between 60 and 100 times of their current market value.
- **Hence first statement is incorrect**
- A generic drug is a medication created to be the same as an existing approved brand name drug in dosage form, safety, strength, route of administration, quality, and performance characteristics.
- In order **to promote sale of quality generic medicines at affordable prices to all citizens,** Pradhan Mantri Bhartiya JanaushadhiPariyojana (PMBJP) has been implemented by Pharmaceuticals & Medical Devices Bureau of India (PMBI)
- **Hence third statement is incorrect**
- **A generic drug is a medication that contains the same active pharmaceutical ingredient (API) as a brand-name drug**. It is identical in dosage form, strength, route of administration, performance characteristics, and intended use.
- **Hence 4th statement is correct**.
- However, unlike brand-name drugs, which are developed and marketed under a patent, generic drugs are typically marketed after the patent protection of the original drug has expired.

⊙ **Recently commercialization of patent was in news, regarding this which among the following statement is incorrect**

a) In India, patent act and rules regarding patent are managed by Promotion of Industry and Internal Trade (DPIIT)
b) Software per se can be patented in india
c) India has signed both Paris convention and Budapest convention.
d) Patent right is a territorial right

Ans: B

Explanation:

- In India, the **Department for Promotion of Industry and Internal Trade (DPIIT)** under the Ministry of Commerce and Industry manages the **Patent Act, 1970**, and the rules governing patents. However, it falls under the **DPIIT**, which is aligned with the Department of Science and Technology in terms of scientific and technological innovations. This statement is essentially **correct**, though the administrative body for patents is the DPIIT.
- **Software per se** cannot be patented in India. According to **Indian patent law**, software as an abstract idea is not patentable. However, if the software is part of an **invention** that provides a **technical solution** to a problem (such as in a **machine or a device**), it may be eligible for a patent. This is in line with the **Indian Patent Act** provisions, which do not grant patents for mere software programs or algorithms. This makes Statement B **incorrect**.
- India is a signatory to both the **Paris Convention for the Protection of Industrial Property** (1883) and the **Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure** (1977). The Paris Convention ensures that countries provide equal patent rights to all members, while the Budapest Convention deals with the international recognition of microbial deposits for patent purposes.
- Patent rights are indeed **territorial** in nature. This means that a patent granted in one country is only valid within that country. If a person wants patent protection in other countries, they must file separate patent applications in each country or region. The **Patent Cooperation Treaty (PCT)** provides a way to file patents internationally, but each country's patent office makes its own decision on granting a patent.

⊙ **With reference to microRNA (miRNA), consider the following statements:**

1. MicroRNAs are small RNA molecules that regulate gene expression by binding to mRNA molecules and preventing their translation.

2. MicroRNA molecules are typically transcribed from DNA in the nucleus and then directly participate in protein synthesis.
3. MicroRNAs play a crucial role in regulating various cellular processes, including development, cell proliferation, and apoptosis.
4. Alterations in microRNA expression have been associated with various diseases, including cancer and cardiovascular disorders.

Which of the statements given above is/are correct?

a) 1 and 2 only
b) 1, 3, and 4 only
c) 2 and 3 only
d) 1, 2, 3 and 4

Ans: B

Explanation:

- **MicroRNAs (miRNAs)** are short, non-coding RNA molecules, usually about 20-24 nucleotides long. They do not encode proteins but play a significant role in regulating gene expression. miRNAs function primarily by binding to messenger RNA (**mRNA**) molecules in the cytoplasm, where they either **prevent the mRNA from being translated into a protein** or cause the **mRNA to be degraded**. This regulation helps control the expression levels of various genes within cells.
- Hence first statement is correct
- miRNAs are involved in regulating a wide range of critical processes in cells. These include:
- **Development**: miRNAs help regulate the expression of genes responsible for proper development and differentiation of cells and tissues.
- **Cell Proliferation**: miRNAs can influence how often and when cells divide, playing a role in maintaining proper cell cycle regulation.
- **Apoptosis**: miRNAs are also involved in controlling **programmed cell death (apoptosis)**. By regulating genes that are involved in cell survival and death, miRNAs ensure that cells are eliminated when necessary (for example, in the case of damaged or infected cells).
- While **miRNAs** are indeed transcribed from DNA in the nucleus, they **do not directly participate in protein synthesis**. Instead, miRNAs regulate gene expression by binding to mRNA molecules in the cytoplasm, preventing their translation or promoting their degradation. They do **not** code for proteins themselves. Their role is more about **regulating gene expression** rather than directly being involved in the synthesis of proteins.
- Hence 2nd statement is incorrect
- Alterations in miRNA expression are associated with several diseases. For example:
- In **cancer**, miRNAs can act as **tumor suppressors** or **oncogenes** (genes that promote cancer). Changes in miRNA expression can influence **cell growth**, **cell migration**, and **resistance to treatment**, all of which are hallmarks of cancer.
- In **cardiovascular diseases**, miRNAs are involved in regulating the genes that control **heart function**, **blood vessel formation**, and **response to injury**. Abnormal miRNA expression in the heart can contribute to conditions like **heart failure**, **arrhythmias**, and **atherosclerosis**.
- **Hence third statement is correct.**

⊙ **Consider the following statements:**

1. Pneumococcal conjugate vaccine is administered among major population to prevent different bacterial infections.
2. Pneumococcal bacteria causes different types of infection which includes, Ear infections, Sinus infections, Meningitis), Bacteremia
3. Most pneumococcal infections are severe and can cause long term complications.

Which of the statements given above is/are *not* correct?

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

Ans: B

Explanation:

- Pneumococcal conjugate vaccine can prevent pneumococcal disease.
- Pneumococcal disease refers to any illness caused by pneumococcal bacteria. These bacteria can cause many types of illnesses, including pneumonia, which is an infection of the lungs. Pneumococcal bacteria are one of the most common causes of pneumonia.
- Besides pneumonia, pneumococcal bacteria can also cause:
  - ✓ Ear infections
  - ✓ Sinus infections
  - ✓ Meningitis (infection of the tissue covering the brain and spinal cord)
  - ✓ Bacteremia (infection of the blood)
- **Hence statement 1 and 2 are correct.**
- Anyone can get pneumococcal disease, but children under 2 years old, people with certain medical conditions or other risk factors, and adults 65 years or older are at the highest risk.
- Most pneumococcal infections are mild. However, some can result in long-term problems, such as brain damage or hearing loss. Meningitis, bacteremia, and pneumonia caused by pneumococcal disease can be fatal. **Hence statement 3 is incorrect**.

⊙ **A disease which is degenerative long-term, mainly the central nervous system that affects both the motor system and non-motor systems, Tremors, rigidity, bradykinesia, and postural instability, As the disease progresses, medications become less effective, and causes mostly environmental rarely genetic factors.**

The following statements talks about

a) Alzheimer's disease
b) Parkinson disease
c) Huntington disease
d) Wilson's disease

Ans: B

Explanation:

- **Scientists discovered a new genetic variant linked to Parkinson's that sheds light on the evolutionary origin of multiple forms of familial parkinsonism, opening doors to better understand and treat the disease.**
- Parkinson's disease (PD), is a long-term neurodegenerative disease of mainly the central nervous system that **affects both the motor system and non-motor systems.**
- **Symptoms:**
  - ✓ **Motor:** Tremors, rigidity, bradykinesia, or slow movement, and postural instability.
  - ✓ **Non-Motor:** As the disease progresses, non-motor symptoms like cognitive decline, sleep disturbances, mood disorders often emerge.
- **Diagnosis** is mainly based on signs and symptoms, usually motor-related, found via neurological examination, though medical imaging like neuromelanin MRI can support the diagnosis. Usual onset is in people over 60 years of age of whom about one percent are affected. In those younger than 50, it is termed early-onset PD.
- **Treatment:**
  - ✓ No cure is known, and treatment aims to mitigate symptoms.
  - ✓ As **the** disease progresses, **these medications become less effective and produce a side effect marked by involuntary muscle movements.**
  - ✓ **Diet** and certain forms of rehabilitation have shown some effectiveness at improving symptoms.
- **Causes:** The underlying cause of PD is unknown, yet is assumed to be influenced primarily by an interaction of genetic and environmental factors.
- **Reasons**
  - ✓ **Genetics: estimated to lie between 22 and 40 percent. Notable risk genes include SNCA (Synuclein alpha gene), LRRK2.**
  - ✓ **Environmental:** Most noteworthy environmental factors include pesticide exposure and contact with heavy metals. Harmful heavy metals include mainly manganese, iron, lead,

mercury, aluminium, and cadmium. On the other hand, magnesium shows neuroprotective features.

⊙ **With reference to India's neighbouring countries, how many of the following states share border with more than two neighbouring countries?**

1. West Bengal
2. Assam
3. Uttarakhand
4. Sikkim.
5. Arunachal Pradesh

Select the correct answer using the codes given below:

a) Only One
b) Only Two
c) Only Three
d) All Five

Ans: C

Why in news: China building base on land India held until 2020: Kharge

Explanation:

- The Sino-Indian border dispute remains one of the most complex and enduring border issues in the world.
- Unlike China's borders with Russia and Vietnam, which have seen conflicts but eventually led to settled agreements, the border with India, particularly the region of Arunachal Pradesh, remains a point of contention.
- India also has border conflicts with Pakistan which has strained relations for a long and Kalapani issue with Nepal has found political milage in recent years.
- Arunachal Pradesh borders with China, Bhutan, and Myanmar ;West Bengal borders Bangladesh, Bhutan, and Nepal and Sikkim borders with China, Bhutan, and Nepal.**Hence statements 1, 4 and 5 are correct.**
- Assam borders Bangladesh and Bhutan, while Uttarkand borders with Nepal and China. **Hence statements 2 and 3 are incorrect.**
- Source: https://www.thehindu.com/news/national/take-nation-into-confidence-on-border-situation-at-lac-kharge-to-govt/article68378627.ece

⊙ **In Clarion-Clipperton Zone (CCZ) scientists have found that there are coal-like mineral rocks which typically contain manganese and iron. These mineral rocks produce oxygen without the process of photosynthesis. Which of the following regions is the above mentioned CCZ discovered?**

a) Sahara Desert
b) Planitia in Mars
c) Shiv Shakti Point in Moon
d) Pacific Ocean

Ans: D

Why in news:'Dark' oxygen found in deep ocean 13,000 feet below sea level, may provide insights into origin of life

Explanation:

- Scientists have discovered 'dark' oxygen being produced more than 13,000 feet below sea level.
- The "dark" oxygen was being produced on the seafloor while assessing marine biodiversity in a potential mining area. This area contains polymetallic nodules.
- These have been formed over millions of years through chemical processes involving shell fragments, squid beaks and shark teeth.
- This region is called the Clarion-Clipperton Zone (CCZ), which spans 4.5 million square kilometres (1.7 million square miles) in the Pacific Ocean.**Hence Option D is correct**.

- Photosynthetic organisms like plants, plankton and algae use sunlight to produce oxygen. Then, it cycles into the ocean depths.
- Previous deep-sea studies have shown that organisms there only consume oxygen and do not produce it.
- This discovery has shown that, well, maybe there was another source of oxygen a long time ago and aerobic life or life that breathes oxygen could have persisted before the rise of photosynthesis — and if it's happening on our planet could it be happening on other planets too.
- Source: https://www.livemint.com/science/news/dark-oxygen-found-in-deep-ocean-13-000-feet-below-sea-level-may-provide-insights-into-origin-of-life-11721722516550.html

⊙ **With reference to National Security Council (NSC) of India, consider the following:**

1. It was established during the first Prime Ministerial tenure of Narendra Modi.
2. It is an executive agency tasked with advising the Parliament on matters of national security and strategic interest.
3. It is the apex body of the 3-tiered structure of the national security management system in India.

Which of the statements given above is/are *not* correct?

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

Ans: B

Why in news: The Union Government has restructured reporting relationships within National Security Council Secretariat (NSCS).

Explanation:

- The National Security Council (NSC) of India is an executive government agency tasked **with advising the Prime Minister's Office on matters** of national security and strategic interest. **Hence statement 2 is incorrect.**
- It was established by the former Prime Minister of India Atal Bihari Vajpayee. **Hence statement 1 is incorrect.**
- The NSC is the apex body of the 3-tiered structure of the national security management system in India. **Hence statement 3 is correct.**
- The 3-tiers are the Strategic Policy Group, the National Security Advisory Board and a secretariat from the Joint Intelligence Committee (JIC).
- National Security Council Secretariat (NSCS) is the apex agency looking into the political, economic, energy and strategic security concerns of India.
- National Security Council Secretariat is a permanent body that provides technical support to the 'Council Proper' of National Security Council
- While the NSA now presides over a much bigger organisation, with an ANSA and three deputy NSAs, his new role appears more advisory and less operational.
- The NSA would deal with advisory outfits such as the National Security Advisory Board and the Strategic Policy Group.
- While the Chief of Defence Staff (CDS) and the three service chiefs, the Union defence, home, foreign and other secretaries are also required to report to the NSA, each of them also reports to a minister in their daily functioning.
- Source:https://indianexpress.com/article/opinion/columns/what-it-means-and-could-mean-to-be-indias-national-security-advisor-9438924/

⊙ **Bourbon, Typica, and Heirloom are varieties of crop X. Both Karnataka and Kerala together account for around 90% of the total X produced in India. X is grown from November to January at elevations ranging from 600 to 2000 metres in subtropical, cold, and moist climates. X thrives in large, shaded plantations with nutrient-rich soil.**

X in above passage refers to which of the following crops?

a) Tea
b) Rubber
c) Coffee
d) Redwood

Ans: C

Why in news:The Prime Minister has lauded the efforts of the Girijan Cooperative Corporation (GCC) for playing a key role in the promotion of Araku Valley Coffee at the global level.

Explanation:

- Araku coffee is named after the deep green Araku valley in Andhra Pradesh.
- It is a species of Arabica coffee which is originally indigenous to the forests of the southwestern highlands of Ethiopia.
- In India, it is cultivated mainly in the regions around Visakhapatnam and Koraput district of Odisha.
- These areas provide the necessary climate and altitude for coffee cultivation.
- A good crop of Araku coffee requires a humidity of between 68 to 92 per cent along with an average rainfall of 1250 to 1500 mm.
- Araku Valley Coffee was awarded the Geographical Indication tag in 2019.
- Arabica and Robusta are the two most important coffee varieties on the market today.
- The most common Arabica varieties are Bourbon, Typica, and Heirloom.
- It is grown from November to January at elevations ranging from 600 to 2000 metres in subtropical, cold, and moist climates.
- It thrives in large, shaded plantations with nutrient-rich soil. Arabica growers work hard to produce high-quality beans while protecting them from pests.
- Source:https://www.newindianexpress.com/states/andhra-pradesh/2024/Jul/01/andhra-pradesh-araku-coffee-receives-high-praise-from-pm-modi-gcc-tribal-farmers-elated

⊙ **Consider the following statements regarding Tiger:**

1. They are predominantly social animals that live as small community and communicate through vocalizations, scent marks, and visual signals.
2. Male tigers are larger in size than female tigers.
3. Female tigers have larger territories than males because they take care of cubs.

Which of the statements given above is/are correct?

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

Ans: A

Why in news: International tiger day is observed on July 29

Explanation:

- International Tiger Day, observed on July 29, raises global awareness about tiger conservation and the threats faced by these endangered animals.
- Established in 2010, the day promotes efforts to protect tigers, celebrate their role in ecosystems, and inspire collective action for their survival
- Tigers **are territorial and usually solitary in** nature. Their social system is connected through visual signals, scent marks and vocalizations.
- **Tigers are usually solitary in nature**, interacting briefly only for mating purposes and occasionally to share their kill. **Hence statement 1 is incorrect**
- However, there has been a few rare instances documented in which tigers have collaborated on a hunt, similar to a pride of lions.
- Tigers are the largest big cats, with adult males generally larger than females. **Hence statement 2 is correct.**
- **Males have larger territories than females**. An adult male's territory will usually overlap several females' territories. **Hence statement 3 is incorrect.**

- The larger area contains more than enough food, water and shelter resources, but is larger to accommodate more females' territories. Therefore, females are the most coveted resource for males.
- Aggression amongst adult male tigers can be influenced by the number of tigers in a given area (density) and whether there is a social disruption in which males are competing to take control of a territory.
- Tigers, unlike many other cat species, readily enter water to cool themselves and in the pursuit of prey. They are powerful swimmers and capable of traversing lakes and rivers.
- Tigers coexist with other predators such as leopards, Asiatic wild dogs, brown bears and wolves throughout most of their range.
- Usually there is little interaction between species especially since tigers are mostly nocturnal (active at night) and the other species are mainly diurnal (active during the day).
- Source: https://indianexpress.com/article/when-is/international-tiger-day-2024-know-the-date-theme-history-and-significance-9468091/

⊙ **Consider the following statements regarding the Goods and Services Tax (GST) Council:**

1. The GST Council is a constitutional body created by the 101st Constitutional Amendment Act.
2. The GST Council has a provision for the participation of municipalities or local bodies.
3. The GST Council's decisions are binding on both the Union and State governments.

How many of the statements given above is / are correct?

a) 1
b) 2
c) 3
d) None

Ans: A

Explanation:

- **Statement 1 is correct:** The GST Council was established under Article 279A of the Indian Constitution through the 101st Constitutional Amendment Act, making it a constitutional body.
- **Statement 2 is incorrect:** While the GST Council includes Union Territories with legislative assemblies, local bodies like municipalities are not part of the Council. Only representatives of States and Union Territories with legislatures participate.
- **Statement 3 is incorrect:**The recommendations of the GST Council are the product of a collaborative dialogue involving the Union and the states. They are recommendatory in nature. The recommendations only have a persuasive value. To regard them as binding would disrupt fiscal federalism when both the Union and the states are conferred equal power to legislate on GST. The court emphasised that Article 246A (which gives the States power to make laws with respect to GST) of the Constitution treat the Union and the States as "equal units"."It confers a simultaneous power (on Union and States) for enacting laws on GST. Article 279A, in constituting the GST Council, envisions that neither the Centre nor the states are actually dependent on the other," Justice Chandrachud interpreted.

⊙ **What is the primary purpose of the GST Compensation Cess?**

1. To compensate States for any revenue loss arising from the implementation of GST.
2. To fund the GST Council's administrative expenses.
3. To ensure a sustainable GST rate structure in the long run.

Select the correct answer using the codes given below:

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

Ans: A

Explanation:

- **Statement 1 is correct:** The GST Compensation Cess was introduced to compensate States for any revenue loss that arises due to the implementation of GST for a specified period of 5 years.

- **Statement 2 is incorrect:** The GST Compensation Cess is not used to fund the administrative expenses of the GST Council. It is exclusively for compensating States for their potential revenue shortfalls.
- **Statement 3 is incorrect:** The GST Compensation Cess does not affect the long-term sustainability of the GST rate structure. Its only purpose is to address short-term revenue losses during the transition to GST.

⊙ **Which of the following statements best defines disinflation?**

1. Disinflation refers to a reduction in the rate of inflation, but the inflation rate remains positive.
2. Disinflation occurs only during periods of economic recession.

Select the correct answer using the codes given below:

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

Ans: A

Explanation:

- **Statement 1 is correct**: Disinflation refers to a decrease in the rate of inflation, meaning inflation is still positive, but it is lower than before.
- **Statement 2 is incorrect:** Disinflation is not limited to periods of economic recession. It can occur during times of economic growth as well, when inflation slows but does not turn negative.

⊙ **The GDP deflator is a measure used to calculate:**

1. The productivity growth rate in an economy.
2. The rate of inflation in an economy.
3. The difference between nominal GDP and real GDP.

Select the correct answer using the codes given below:

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

Ans: B

Explanation:

- **Statement 1 is incorrect:** The GDP deflator does not measure the productivity growth rate. It primarily reflects changes in prices, not the efficiency of production.
- **Statement 2 is correct:** The GDP deflator is used to measure the rate of inflation in an economy by comparing the nominal GDP (which includes inflation) with real GDP (which is adjusted for inflation).
- **Statement 3 is correct:** The GDP deflator is used to determine the difference between nominal GDP and real GDP, which reflects the changes in the price level across the economy.

⊙ **An inflationary gap occurs when:**

1. The actual GDP exceeds the potential GDP in an economy.
2. There is too much demand for goods and services in the economy relative to its capacity.
3. The inflation rate is falling due to a decline in aggregate demand.

Select the correct answer using the codes given below:

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

Ans: A

Explanation:

- **Statement 1 is correct:** An inflationary gap occurs when the actual GDP exceeds the potential GDP of the economy, indicating that the economy is operating above its sustainable capacity.

- **Statement 2 is correct:** An inflationary gap happens when there is excessive demand for goods and services, which drives up prices, creating inflationary pressures.
- **Statement 3 is incorrect:** The inflationary gap is associated with rising inflation, not falling inflation. It arises when demand outpaces supply, pushing prices higher.

⊙ **Match the following disorders with their associated symptoms or affected organs:**

Disorder	**Symptoms/Affected Organs**
1. Tyrosinemia-Type 1	A. Liver failure, developmental delays, and seizures
2. Gaucher's Disease	B. Hepatic dysfunction, renal failure, and cabbage-like odor
3. Wilson's Disease	C. Neurological symptoms, bone pain, and splenomegaly
4. Dravet-Lennox Gastaut Syndrome	D. Copper accumulation in the liver, brain, and cornea

Select the correct answer using the codes given below:

a) 1 - B, 2 - C, 3 - D, 4 – A
b) 1 - A, 2 - C, 3 - D, 4 – B
c) 1 - D, 2 - A, 3 - C, 4 – B
d) 1 - C, 2 - B, 3 - A, 4 - D

Ans: A

Explanation:

- Recently generic medicines were approved for these rare diseases
- **Tyrosinemia-Type 1**: This is a rare metabolic disorder that primarily affects the **liver** and **kidneys**. Symptoms include **liver failure**, **renal failure**, **developmental delays**, and **seizures**. It is associated with a deficiency in the enzyme fumarylacetoacetate hydrolase.
- **Gaucher's Disease**: This is a genetic disorder caused by a deficiency in the enzyme glucocerebrosidase. It affects the **liver**, **spleen**, and **bone marrow**. Symptoms include **splenomegaly (enlarged spleen)**, **bone pain**, and **neurological symptoms** in certain types of Gaucher disease.
- **Wilson's Disease**: This is a disorder of copper metabolism, leading to **copper accumulation** in the **liver**, **brain**, and **cornea (Kayser-Fleischer rings)**. Symptoms include liver dysfunction, psychiatric problems, and neurological signs.
- **Dravet-Lennox Gastaut Syndrome**: This is a severe form of epilepsy that typically manifests in **early childhood**, leading to **seizures**, developmental delays, and cognitive impairments. It affects the **neurological system**.

⊙ **Consider the following statements:**

1. Some pox viruses can expand and contract their genome
2. Mutation in DNA based viruses are known as genome accordion
3. Tropism refers to environmental condition in which microorganism can survive

How many of the following statements is/are correct?

a) 1
b) 2
c) 3
d) None

Ans: A

Explanation:

- Recently there were many articles about the host pathogen relationship and the different ways adopted by viruses to infect organism. Hence this question is being asked

Genome accordion

- Genome accordion is a mechanism adopted by DNA viruses to evade host immune system. This viruses do this by **either expanding or contracting its genome** through gene duplication or gene deletion. Such rhythmic expansions and contractions are called **genomic accordions.**
- **Hence first statement is correct.**

Genome accordion is different from gene mutation

- mutations refer to changes in the DNA sequence of an organism, genomic accordion might refer to the dynamic structural changes that occur within the genome over time. **Hence 2nd statement is incorrect.**
- Mostly RNA viruses easily undergo mutation but DNA viruses are more stable hence to compensate DNA viruses adopt gene accordion technique
- Tropism refers the specific tissues or cell types that a virus can infect and replicate within. Different viruses exhibit different tropisms, which are determined by interactions between viral surface proteins and receptors on the surface of host cells.
- Understanding the tropism of a virus is important for predicting its pathogenesis, designing antiviral drugs, developing vaccines, and implementing infection control measures. Additionally, studying viral tropism can provide insights into the molecular mechanisms underlying viral entry and replication within host cells.
- **Hence 3rd statement is incorrect.**

⊙ **Consider the following pairs:**

Vector borne diseases	**Causative agent**
1. Filaria	Virus
2. Kala Azar	Protozoan
3. Japanese encephalitis	Virus
4. Chikungunya	Protozoan

Which of the pairs given above is/are correctly matched?

a) 1 and 2 only
b) 2 and 3 only
c) 2 and 4 only
d) 1,2 and 3

Ans: B

Explanation:

- Filariasis is caused by several round, coiled and thread-like parasitic worms belonging to the family filaridea. The disease is caused by the nematode worm, either Wuchereriabancrofti or Brugiamalayi and transmitted by ubiquitous mosquito species Culex quinquefasciatus
- These parasites after getting deposited on skin penetrate on their own or through the opening created by mosquito bites to reach the lymphatic system. **Hence 1st pair is incorrectly matched**
- Visceral leishmaniasis is commonly known as kala-azar (KA), a word coined in the late nineteenth century in India, which means "black disease", referring to the greyish or blackish discoloration of the skin during infection
- Kala-azar is a slow progressing indigenous disease caused by a protozoan parasite of genus Leishmania
- In India Leishmania donovani is the only parasite causing this disease
- The parasite primarily infects reticuloendothelial system and may be found in abundance in bone marrow, spleen and liver. **Hence 2nd pair is correctly matched**
- Japanese Encephalitis (JE) is zoonotic viral disease which is caused by JE virus. The virus is transmitted from animals, birds, pigs, particularly the birds belonging to family Ardeidae
- the case fatality rate of this disease is high and those who survive may suffer with various degrees of neurological sequelae.
- **Hence 3rd pair is correctly matched**
- Chikungunya (chik'-en-GUN-yah), also called chikungunya virus disease or chikungunya fever, is a viral illness that is spread by the bite of infected mosquitoes.
- The disease resembles dengue fever, and is characterized by severe, sometimes persistent, joint pain (arthiritis), as well as fever and rash. It is rarely life-threatening.
- Chikungunya occurs in Africa, India and Southeast Asia. It is primarily found in urban /peri-urban areas.
- There is no specific treatment for chikungunya.
- Prevention centers on avoiding mosquito bites in areas where chikungunya virus may be present, and by eliminating mosquito breeding sites.

- **Hence 4th pair is not correctly matched**

⊙ **Consider the following statements regarding "Zero-Day Vulnerabilities":**

1. A zero-day vulnerability refers to a security flaw in a system that is unknown to both the public and the software developers at the time of discovery.
2. Zero-day vulnerabilities are critical as they can be exploited by malicious actors before a patch or fix is released by the software vendor.
3. The term "zero-day" is used because there is zero time for the software vendor to prepare or release a patch once the vulnerability is discovered by hackers.

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

Ans: D

Explanation:

- A **zero-day vulnerability** is a security flaw or bug in a software application or system that is **unknown** to the vendor (the developer or organization responsible for the software). This flaw can be exploited by malicious actors (such as hackers) **before** the vendor becomes aware of it and releases a fix or patch. The term **"**zero**-day"** signifies that the software vendor has **zero days** to address the issue because the vulnerability is already being exploited in the wild by attackers.
- The risk of zero-day vulnerabilities is high because once discovered, attackers can exploit them immediately, often leading to serious security breaches, data theft, or system compromises. Therefore, a zero-day vulnerability is a very dangerous flaw because there is no patch or mitigation available when it is first discovered.
- While a zero-day vulnerability is unknown to the **software vendor**, it **does not have to be unknown to the public**. In fact, it is often the case that **attackers** (malicious actors) are the ones who first discover and exploit the vulnerability**. hence first statement is incorrect**
- The primary reason why zero-day vulnerabilities are so dangerous is that they can be **exploited** by attackers before any fix (patch) is available from the software vendor. Once an attacker identifies a zero-day vulnerability, they can potentially use it to **gain unauthorized access** to systems, steal data, or cause other types of damage.
- **Hence 2nd statement is correct**
- The term "zero-day" originates from the idea that the vendor has zero days to fix the vulnerability once it has been discovered. The flaw is already known to attackers, and they can exploit it immediately.
- **Hence 3rd statement is correct.**

⊙ **Consider the following statements regarding number plate readable cameras which was often in news:**

1. Number plate readable cameras use Optical Character Recognition (OCR) technology to capture and interpret vehicle registration numbers.
2. These systems use machine learning algorithms to improve the accuracy of number plate recognition, reducing errors in vehicle identification.
3. These camera uses Radio Frequency identification to read number plates
4. Satellite based toll collection mainly relays on number plate readable cameras

How many of the following statement is/are correct?

a) 1
b) 2
c) 3
d) 4

Ans:B

Explanation:

Source: The Indian express

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- Number plate readable cameras commonly use **Optical Character Recognition (OCR)** technology to capture the images of vehicle number plates and convert them into machine-readable text. OCR is widely used in automated vehicle identification systems for toll collection, law enforcement, and security purposes. It reads the alphanumeric characters on the number plate and converts them into digital data.
- **Hence 1st statement is correct**
- Modern number plate recognition systems often incorporate **machine learning (ML)** algorithms, especially **deep learning** models, to improve the accuracy of plate recognition. These systems can **learn** from a large number of images, improving their performance over time. This helps in reducing errors, particularly in challenging conditions such as low light, blurred images, or partially obscured number plates.
- **Radio Frequency Identification (RFID)** is a different technology, typically used in systems like **electronic toll collection (ETC)** where RFID tags on vehicles are read by RFID readers. Number plate readable cameras, on the other hand, use **OCR** to visually capture and interpret vehicle number plates, not RFID. RFID does not require optical imaging or interpretation of visual characters; it works through radio waves and tags.
- While **satellite-based toll collection systems** may rely on location data from GPS satellites to track vehicles, the **primary technology** used for toll collection is often **RFID** or **infrared cameras**, not number plate readable cameras. Satellite-based systems can track vehicles as they cross toll points, but they don't typically **read the number plates** directly via cameras. Instead, the satellite system can help in **location tracking** and other functions, with cameras or RFID tags used to handle the actual tolling.
- **Hence statement 4 is incorrect**

⊙ **Match the columns:**

Event/Development	Context
A. UK Election	1. Chinese platform promoting efficiency and public services
B. Doctors Without Borders (MSF)	2. Bring together military forces from around the world to collaborate and enhance their peacekeeping capabilities
C. Exercise KHAAN QUEST	3. An international humanitarian organization providing medical aid in crisis zones
D. Qifa	4. Labour Party returned to power after 14 years
	5. Help countries navigate the difficult path from conflict to peace.

Select the correct answer from the code given below:

a) A-2, B-3, C-5 ,D-1
b) A-4, B-3, C-2, D-1
c) A-2, B-1,C-4, D-3
d) A-4, B-3, C-5 D-2

Ans: B

Why in news:UK elections: Labour sweeps to power, ends 14-year rule of Conservatives

Explanation:

- Keir Starmer vowed to rebuild Britain as its next prime minister after his Labour Party on Friday surged to a landslide victory in a parliamentary election, ending 14 years of often tumultuous Conservative government. The centre-left Labour won a massive majority in the 650-seat parliament
- The European Parliament elections were held from June 6 to 9, 2024. The European People's Party (EPP) retained its status as the largest group in parliament, amid notable gains by far-right political groups.
- Doctors without borders (MSF) is an international, independent medical humanitarian organisation. They provide medical assistance to people affected by conflict, epidemics, disasters, or exclusion from healthcare.

- Their teams are made up of tens of thousands of health professionals, logistic and administrative staff - most of them hired locally.
- Their actions are guided by medical ethics and the principles of impartiality, independence and neutrality.
- Context: Beginning August, 37-year-old Dr Roshni Changalath, a consultant obstetrician and gynaecologist from Palakkad, Kerala, plans to 'take a break' from her corporate career to spend three months in Afghanistan on an MSF mission on maternal and child health.
- Qifa is a Chinese digital platform, primarily focuses on enabling financial services and digital transformation. It is an innovative platform integrating fintech solutions, offering services like loans, insurance, and investment tools tailored to the needs of small and medium-sized enterprises (SMEs) and individual users.
- Context: China's digital platform Qifa delays Moscow IPO as high interests rates bite
- Source: https://ddnews.gov.in/en/uk-elections-labour-sweeps-to-power-ends-14-year-rule-of-conservatives/#

⊙ **Consider the following about India's Act East policy:**

1. Trade deficit with ASEAN has reduced significantly
2. North-East Development has got increased focus
3. Regional Connectivity with eastern neighbourhood has improved
4. Defence cooperation with ASEAN countries has increased.
5. China's presence and influence in ASEAN region has reduced.

Which of the above given statements are India's achievements after 10 years of Act East policy?

a) 1,2,4 and 5 only
b) 2,3 and 4 only
c) 1, 2 and 4 only
d) 1,2, 3, 4 and 5

Ans: B

Why in news: 10 years of Act East policy

Explanation:

- This year marks the completion of 10 years of India's Act East Policy (AEP), an upgrade from its earlier Look East Policy
- The announcement marked a new shift in India's strategic outlook, elevating Southeast Asia's stature in India's geostrategic calculus. Since then, India's Act East Policy has also influenced India's engagement with the Indo-Pacific region, playing the role of a North Star.
- Projects like the Kaladan Multimodal Transit Transport Project ($484 million) and the India-Myanmar-Thailand Trilateral Highway have strengthened physical connectivity with Southeast Asia.
- India became an integral member of regional groupings like the ASEAN Regional Forum (ARF) and participated in East Asia Summits.
- Defense cooperation with Vietnam included a $500 million defense line of credit for maritime security and capacity building.
- In January 2022, the Philippines concluded a $375 million deal with India for three batteries of shore-based anti-ship variant of the BrahMos supersonic cruise missiles, showing enhanced defence cooperation in last 10 years.Hence statement 4 is correct.
- Trade between India and ASEAN grew from $65 billion in 2016 to $110 billion in 2023, making ASEAN India's fourth-largest trading partner. But, **India's trade deficit with ASEAN rose to $43 billion in 2023 from $14 billion**, driven by imports of electronics and machinery.**Hence statement 1 is incorrect**
- India spent approximately ₹53,000 crore on connectivity projects in its northeastern states under the policy. New trade hubs like Moreh in Manipur facilitated cross-border commerce. Many bridges, railway lines, airports have been constructed in the last 10 years in this region. **Hence statement 2 and 3 is correct.**

- Despite multiple efforts in economic, cultural, political and diplomatic fronts, India has found it difficult to overcome Chinese influence in the region. China has adopted aggressive military and economic methods, thus negating Indian efforts in the region. **Hence statement 5 is incorrect.**
- Source: https://economictimes.indiatimes.com/opinion/et-commentary/indias-foreign-policy-priorities-under-modi-3-0/articleshow/110823738.cms?from=mdr

⊙ **Consider the following statements:**

1. Paris became the second city in the world after Tokyo to hoist summer Olympics more than once.
2. Number of participants from India was highest ever in an edition at the Paris Olympics.
3. The record for the farthest Olympic medal competition to be staged outside the host city was broken in Paris Olympics.

How many of the above given statements are correct?

a) Only One
b) Only Two
c) All Three
d) None

Ans: A

Why in news: Paris Olympics began in grand fashion at Seine River

Explanation:

- Cities that have hosted the Summer Olympics more than once are Athens (1896, 2004), Paris (1900, 1924, 2024), London (1908, 1948, 2012), and Los Angeles (1932, 1984).
- Los Angeles is also set to hoist the next Olympics in 2028.**Hence statement 1 is incorrect.**
- The highest number of participants from India in an edition of the Olympics was at the Tokyo 2020 Olympics, where 126 Indian athletes competed.For the Paris 2024 Olympics, India is set to send a contingent of 117 athletes. **Hence statement 2 is incorrect.**
- For the first time ever, the Olympic Games extend to Tahiti, French Polynesia, for its surfing competition. This breaks the record for the farthest Olympic medal competition to be staged outside the host city—15,000 km from Paris, to be exact.**Hence statement 3 is correct.**
- In a nod to Paris' rich history, the Olympic medals contain iron that was once part of the Eiffel Tower. These pieces were salvaged during renovations over the years and will now be transformed into symbols of athletic excellence.
- Source: https://timesofindia.indiatimes.com/technology/tech-news/paris-olympics-2024-know-the-dates-venue-new-events-and-where-to-watch/articleshow/111637076.cms

⊙ **Consider the following:**

1. Light Weight
2. High elasticity
3. High Shock Absorption
4. High durability

Which of the above characteristics make Kashmiri Willow more suitable for making cricket bats?

a) 1, 3 and 4 only
b) 1, 2 and 3 only
c) 2, 3 and 4 only
d) 1, 2, 3 and 4

Ans: D

Why in news:Kashmir willow hitting global boundaries

Explanation:

- Salix alba, the white willow, is a species of willow native to Europe and western and central Asia
- It is a medium to large deciduous tree growing up to 10–30 m tall, with a trunk up to 1 m diameter and an irregular. The wood is tough, strong, and light in weight, but has minimal resistance to decay.

- It is primarily found in the Kashmir region of India, where it was extensively planted by the British.
- Willows are known for their extensive fibrous root system and their ability to form symbiotic associations with mycorrhizal fungi.
- Willow is a relatively lightweight wood, allowing cricketers to handle the bat easily and swing it quickly.Willow has a distinctive straight-grain pattern that enhances the bat's strength while maintaining its lightness.
- The natural properties of willow enable it to absorb the shock from high-impact hits. This reduces the transmission of shock to the hands and wrists, providing comfort and reducing injury risks.
- Willow is strong enough to withstand the repeated impact of cricket balls without cracking easily.
- The flexible and highly elastic nature of willow provides excellent rebound properties, meaning that when the ball hits the bat, it can spring off, contributing to powerful strokes.
- **Hence all statements are correct.**
- Source: https://www.thehindubusinessline.com/news/bats-made-of-kashmiri-willow-has-been-attracting-global-attention/article68403845.ece

⊙ **Consider the following statements regarding Mangrove:**

1. There has been significant loss in global mangrove cover the last three decades.
2. India is one of the few countries that has seen an increase in mangrove cover over the last three decades.
3. West Bengal has the highest mangrove cover among all states/UTs in India

Which of the statements given above is/are correct?

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

Ans: D

Why in news: 26 July, is marked as the International Day for Conservation of Mangrove Ecosystems

Explanation:

- The day is marked to raise awareness towards mangrove ecosystems as "a unique, special and vulnerable ecosystem" and to promote solutions for their sustainable management, conservation and uses.
- Mangroves are often called 'sentinels of the coast' given their ability to protect shorelines, absorb impacts of storms and cyclones, support fish nurseries, lock up carbon and nutrients, provide a gene pool, and offer a host of other benefits.
- The Global Mangrove Alliance, which maintains consistent global datasets on mangrove cover, has estimated that worldwide, since 1996, there has been a net global loss of mangrove cover by 3.4 per cent, with the losses having occurred globally at rates twice the gains. **Hence statement 1 is correct.**
- India is one of the few countries with positive trends in mangrove cover. This success is attributed to immense efforts in mangrove plantations based on localised models, community engagement in their protection and upkeep and strengthening coastal zone regulation architecture. **Hence statement 2 is correct.**
- States like Maharashtra have established a separate Mangrove Cell to ensure a consistent focus on the conservation and management of these ecosystems.
- Climate change is altering our coastline in fundamental ways — the sea levels are rising, sea-surface temperatures are increasing, and the frequency and severity of coastal storms are on the rise.
- A 2-degree warmer world may increase mangrove growth and productivity. Yet, these ecosystems stand to be adversely impacted by the increase in cyclonic activity, sea level rise and decline in summer precipitation.

Table 3.2 Mangrove Cover Assessment 2021 (in sq km)

Sl. No.	State/UT	Very Dense Mangrove	Moderately Dense Mangrove	Open Mangrove	Total	Change with respect to ISFR 2019
1.	Andhra Pradesh	0	213	192	405	1
2.	Goa	0	21	6	27	1
3.	Gujarat	0	169	1,006	1,175	-2
4.	Karnataka	0	2	11	13	3
5.	Kerala	0	5	4	9	0
6.	Maharashtra	0	90	234	324	4
7.	Odisha	81	94	84	259	8
8.	Tamil Nadu	1	27	17	45	0
9.	West Bengal	994	692	428	2,114	2
10.	A&N Islands	399	168	49	616	0
11.	D&NH and Daman & Diu	0	0	3	3	0
12.	Puducherry	0	0	2	2	0
	Total	**1,475**	**1,481**	**2,036**	**4,992**	**17**

- **Hence statement 3 is correct.**
- Source: https://www.downtoearth.org.in/environment/world-mangrove-day-mangrove-conservation-in-india-is-an-impressive-turnaround-story-but-challenges-remain

⊙ **The Phillips Curve demonstrates the relationship between:**

a) Unemployment and inflation in the short run.
b) Economic growth and fiscal deficit.
c) Inflation and interest rates.
d) Unemployment and wage growth in the long run.

Ans: A

Explanation:

- The Phillips Curve depicts an inverse relationship between unemployment and inflation in the short run, suggesting that lower unemployment rates are associated with higher inflation, and vice versa. However, in the long run, the relationship weakens, as demonstrated by the concept of the natural rate of unemployment, where inflation does not influence unemployment. **Hence, option A is correct.**

⊙ **With reference to Indian Economy, consider the following statements:**

1. Core inflation excludes volatile items like food and fuel from the inflation calculation.
2. Headline inflation provides a broader measure of price changes across all goods and services present in CPI basket.

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

Ans: C

Explanation:

- **Statement 1 is correct:** Core inflation excludes volatile items such as food and fuel to reflect underlying inflation trends better.
- **Statement 2 is correct:Headline inflation (CPI - COMBINED)** refers to the total inflation in an economy, including all goods and services, such as food and energy prices, that are typically

included in a broad inflation index. It is a key measure of the overall cost of living and reflects the price changes in the entire basket of goods and services consumed by households. Headline inflation is often contrasted with **core inflation**, which excludes volatile items like food and energy prices to provide a clearer picture of underlying long-term inflation trends. Headline inflation, by including these volatile items, can be more susceptible to short-term fluctuations.

⊙ **Which of the following best describes Skewflation?**

a) Uniform price rise across all sectors of the economy.
b) Inflation caused by excessive demand in a specific sector.
c) Inflation where price rises are confined to certain commodities or sectors, while others remain stable.
d) A sudden and broad increase in prices due to global supply chain disruptions.

Ans: C

Explanation:

- Skewflation refers to uneven inflation, where certain goods or sectors experience sharp price increases, while others see little to no change. For example, a rise in food prices without corresponding increases in other sectors can lead to skewflation. This phenomenon complicates monetary policy as it creates uneven pressure across the economy. **Hence, option C is correct.**

⊙ **Consider the following:**

1. Increase in wages without a proportional rise in productivity.
2. Sharp rise in crude oil prices globally.
3. Higher consumer demand for goods and services.

Which of the above causes can lead to Cost-Push Inflation?

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

Ans: A

Explanation:

- **Statement 1 is correct:** An increase in wages without a productivity rise raises production costs, causing prices to rise (cost-push inflation).
- **Statement 2 is correct:** A sharp rise in crude oil prices increases production and transportation costs, pushing prices upward.
- **Statement 3 is incorrect:** Higher consumer demand leads to demand-pull inflation, not cost-push inflation.
- Cost-push inflation is a type of inflation that occurs when the cost of producing goods and services increases, forcing businesses to raise prices:
- Cost-push inflation can be caused by:
  - ✓ Increased production costs: When the price of inputs like raw materials, labor, or energy increases, businesses face higher production costs.
  - ✓ Supply disruptions: Natural disasters, shortages, or unusual weather can disrupt the supply of goods and services, leading to higher production costs.
  - ✓ Decreased aggregate supply: When aggregate supply decreases but aggregate demand remains the same, prices are pushed higher

⊙ **Consider the following:**

1. It may lead to inflation in the economy.
2. It can increase the government's debt burden.
3. It always leads to higher economic growth.

A deficit budget will have which of the above effects on the economy?

a) 1 and 2 only
b) 2 and 3 only
c) 1 and 3 only

d) 1, 2 and 3

Ans: A

Explanation:

- **Statement 1 is correct:** A deficit budget (where government expenditure exceeds revenue) is often financed by borrowing or printing money. If excessive money is pumped into the economy without a corresponding rise in output, it can lead to demand-pull inflation.
- **Statement 2 is correct:** A deficit budget increases government borrowing, leading to a higher debt burden and interest payments in the future.
- **Statement 3 is incorrect:** While deficit spending can boost growth (by increasing public investment and demand), it does not always lead to higher economic growth. If funds are misallocated or if high inflation results, it may even slow growth.

⊙ **Consider the following statements regarding Network as a Service (NaaS):**

1. Network as a Service (NaaS) refers to a cloud-based model where users can rent networking resources and services such as bandwidth, VPN, and firewalls on a pay-as-you-go basis.
2. NaaS allows organizations to design and manage their entire physical network infrastructure remotely without any physical hardware.
3. NaaS primarily relies on software-defined networking (SDN) technologies to dynamically provision and manage network resources.

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

Ans: D

Explanation:

Source: The Hindu

Topic information technology

- **Network as a Service (NaaS)** is a **cloud computing model** that offers virtualized networking services to customers, allowing them to **rent** or **subscribe to network resources** (such as bandwidth, firewalls, VPNs, etc.) on-demand. This model provides flexibility, scalability, and cost-effectiveness, as customers can use network infrastructure without having to invest in or manage physical hardware.
- **Hence first statement is correct**
- While **NaaS** provides **virtualized network resources**, it **does not eliminate the need for physical hardware**. The infrastructure provided by NaaS is still **hosted and managed by the service provider** (such as a cloud service provider like AWS, Google Cloud, or Azure) in their data centers.
- In other words, **NaaS** allows businesses to access **virtualized networking services** (e.g., VPNs, firewalls, load balancers, etc.) over the internet, but the underlying **physical hardware** (such as routers, switches, and data centers) is still owned and operated by the service provider.
- **Hence 2nd statement is incorrect**
- **Network as a Service (NaaS)** allows users to rent network resources, like internet bandwidth, firewalls, or Virtual Private Networks (VPNs), over the cloud. For NaaS to be flexible and easy to scale, it relies on **SDN** to manage these resources dynamically (i.e., adjust them in real-time as needed).
- **Software-Defined Networking (SDN)** is a modern way of managing networks using **software** instead of relying on hardware devices to do all the work. With SDN, the control over the network is done through **software programs** that can easily change how the network behaves, without needing to physically touch or reconfigure hardware.
- **Hence 3rd statement is also correct.**

⊙ **Consider the following statementsregardingLarge Action Model:**

1. Large action model is designed to translate human intention into action

2. LAMs can execute complex, interconnected actions, balancing both textual and external, interactive contexts.

How many of the following statements is/are correct?

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

Ans: C

Explanation:

Source: The Indian express

Topic: information technology

- Large action models (LAMs) are a type of AI designed to **translate human intent into action** (potentially) autonomously. LAMs aspire to be platform-agnostic, general-purpose, action-oriented agents capable of performing tasks across any website or service.
- A LAM adds an advanced twist to eminent large language models. Unlike LLMs, large action models move beyond natural language understanding and generation by adding another core element into the equation — action. Amplified by advanced multi-step logical reasoning, LAMs can execute complex, interconnected actions, balancing both textual and external, interactive contexts.
- Techwise, large action models build on neural models like LLMs, but the neuro-symbolic programming core of LAMs also integrates the strengths of symbolic artificial intelligence, a technology known for empowering intelligent systems with human-like reasoning. An open-source large action model can also pair logic programming with and language models to enhance reasoning and planning.
- **Thus, Option C is correct answer**

⊙ **Consider the following statements regardingJumping Gene:**

1. Jumping genes can move within the genome
2. Jumping genes are also known as transposable genes
3. Jumping genes can also be used in bioremediation and biosensor

How many of the following statement is/are correct?

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

Ans: D

Explanation:

Source: the Hindu

Topic: biotechnology

- "Jumping genes" which are sequences of DNA that can change their position within the genome. They can move or "jump" from one location to another within the genome, either within the same chromosome or to a different chromosome. This movement can have significant effects on gene expression and genome structure. **Hence first statement is correct**
- "Jumping genes" are indeed known as **transposable elements (TEs)** or **transposons**. These elements are called "transposable" because they can move from one position to another in the genome. There are two main types of transposable elements: **DNA transposons**, which move directly by a cut-and-paste mechanism, and **retrotransposons**, which move through an RNA intermediate.
- **Hence 2nd statement is correct**
- Transposons can be used to modify microorganisms, plants, or other organisms to help them break down pollutants or toxins. For example, engineered transposons might carry genes that allow organisms to metabolize environmental pollutants, making them useful in cleaning up polluted environments.

- Transposons can be utilized in genetic engineering to develop organisms that can detect specific chemical or environmental signals. For instance, a transposon might carry a gene that produces a visible signal (like fluorescence) when it interacts with a specific chemical, making it useful in biosensor applications.
- **Hence third statement is also correct**

⊙ **Which among the following statement about vaccine derived polio is *not*correct?**

a) A vaccine-derived poliovirus is a strain related to the weakened version of the live poliovirus
b) The main reason for vaccine induced polio is oral polio vaccine
c) Oral polio vaccine is a dead vaccine
d) The weakened virus can continue circulating from child to child, gaining back its ability to transmit quickly

Ans: C

Explanation:

- A vaccine-derived poliovirus is a strain related to the weakened version of the live poliovirus contained in the oral polio vaccine (OPV). 'Polio drops' are by and large safe — they have led to the successful eradication of the infection in most countries — but on rare occasions can trigger the disease in children with weak immune systems.
- The virus in the vaccine can also cause chronic infection in children with weakened immune systems, replicating in their gut for years and slowly gaining its ability to cause severe infection. The oral polio vaccination is live attenuated and not dead. **Hence third statement is incorrect.**
- India was declared polio-free in 2014 after successfully preventing any wild polio infections for three years.
- The OPV is extremely effective in preventing the spread of poliovirus from one individual to another. Moreover, the ease of administering the oral drops, led to the OPV becoming the mainstay of the global polio eradication programme.
- one of its drawbacks is that in rare cases it can not only trigger the infection, but can also lead to its spread to others.
- This is why some experts have recommended switching to the injectable polio vaccine (IPV).
- India still uses both — IPV is administered to children during routine immunisation while oral polio vaccine is given to children up to the age of five years during Pulse Polio Days

⊙ **Recently ministry of defence funded a startup under innovations for Defence Excellence, to secure LiFi technology, regarding this consider the following statements:**

1. Light fidelity is a bidirectional wireless system that uses terahertz frequency of the range of 400-800THz.
2. When compared to WIFI, LiFi is faster and cheaper
3. LiFi is suitable for aircrafts to provide in-flight communication

Which of the statements given above is/are correct?

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

Ans: D

Explanation:

Source: Times of India

Topic: communication technology

- MoD funded a start-up under the Innovations for Defence Excellence (iDEX) to secure Li-Fi technology for the Indian Defence sector, particularly focusing on the Navy.
- iDEX fosters innovation and technology development in Defence and Aerospace sector.
- Managed by Defence Innovation Organization under MoD.
- A bidirectional wireless system that uses visible light (400-800 Terahertz) for communication, unlike Wi-Fi which uses radio waves. Hence 2nd
- Transmits data with the help of Light Emitting Diode (LED).

- On/off activity of **the LED transmitter** enables data transmission in accordance with the **incoming binary codes** (switching ON is a logical '1', switching it OFF is a logical '0').
- **Applications:** Aircrafts, hospitals (operation theatres), power plants etc. where electromagnetic (Radio) interference creates security issues.
- **Hence third statement is also correct**

⊙ **"White category Industries", which was recently seen in news refers to**

a) Industries which are highly vulnerable to money laundering practices due to high velocity of transactions
b) Industries where Foreign Direct Investment is allowed up to 100% without any government approval.
c) Industries will no longer need prior permissions from state pollution control boards to operate.
d) Industries which have very low foreign dependence for raw materials and technologies, thus making it less vulnerable to global shocks.

Ans: C

Why in news:'White Category' industries no longer need State Pollution Board approval

Explanation:

- In a major regulatory relief to non-polluting industries, the Center has announced that industries categorised under the 'White Category' by the Central Pollution Control Board (CPCB) will no longer require prior approval from state pollution control boards to establish and operate.
- These permissions are known officially as 'Consent To Establish' (CTE) and 'Consent To Operate' (CTO). The consent to establish is granted by the state pollution control board.
- Under the new rules, industries falling under the white category won't need permission from the state pollution board, and the permissions have been merged with the environmental clearance granted by the Ministry of Environment.
- White Category industries are those considered to have minimal or negligible pollution potential, such as biscuit tray manufacturing, etc.
- The 2016 classification lists 39 sectors, including the assembly of air coolers, electric lamps, solar modules, fly ash brick manufacturing, and the repair of electric motors and generators, among others.
- These operations are primarily dry, mechanical, or non-emission processes, aligning with sustainability and minimal environmental impact.
- The criteria for categorization based on Pollution Index: Red category- 60 and above; Orange category- 41 to 59; Green category- 21 to 40; White category- up to 20
- **Hence option-c is correct**
- Source: https://www.business-standard.com/industry/news/white-category-industries-no-longer-need-state-pollution-board-approval-124111302019_1.html

⊙ **"Apna Radio 90.0 FM", was recently in news for which of the following unique achievement?**

a) First community radio to provide content in Sanskrit
b) India's first community radio station, which recently celebrated 25th anniversary.
c) Became India's 500th community radio station.
d) First community radio station in India to be fully run by visually impaired people

Ans: C

Why in news:Union Minister Shri Ashwini Vaishnaw inaugurates India's 500th Community Radio Station- Apna Radio 90.0 FM at IIMC Aizawl

Explanation:

- Announcing this milestone in India's community radio journey, Shri Vaishnaw said that this initiative will bring a substantive change in the lives of people in the coverage area of Apna Radio station.**Hence option-C is correct.**

- Establishing a community radio station for the farmer community would be highly beneficial, providing them with daily weather updates, government schemes and agriculture related information.
- He commended the Ministry of I&B and all other stakeholders for their unwavering support and dedication in turning this project into a reality.
- Radio Udaan has been registered in 'India Book of Records' for being the first online radio station run by people with visual impairment.
- The first Sanskrit community radio station in India is Divyavani Sanskrit Radio, which was launched on 15th August 2013, initiated by Dr.Sampadananda Mishra from Puducherry
- India's first community radio station was Sangham Radio, which began broadcasting in 2008 from Pastapur village in Andhra Pradesh
- Source: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2036696

⊙ **Consider the following statements:**

Assertion (A):
Vaquita is the world's rarest marine mammal is on the edge of extinction with less than 10 individuals remaining.
Reason (R):
Vaquitas have a slow reproduction rate, with females only giving birth once every two years.
Which one of the following is correct in respect of to the above statements?

a) Both (A) and (R) are correct and (R) is the correct explanation for (A)
b) Both (A) and (R) are correct and (R) is not the correct explanation for (A)
c) (A) is correct but (R) is incorrect
d) (A) is incorrect but (R) is correct

Ans: A
Why in news:Vaquita On The Brink: Population Plummets In Mexico's Gulf
Explanation:

- The world's most endangered marine mammal, the vaquita, is teetering on the edge of extinction. A recent survey revealed a devastating decline, with only 6-8 individuals spotted compared to 8-13 just a year ago. Hence (A) is correct.
- These shy porpoises, found exclusively in Mexico's upper Gulf of California, face a constant threat from entanglement in illegal fishing gear.
- Despite their critical status, vaquitas remain shrouded in a bit of mystery. Their secretive nature, with most of their time spent underwater and a lack of flashy displays like jumps, makes precise population estimates challenging.
- The vaquita gets accidentally caught in gillnets set for catching totoaba fish, whose swim bladders are highly valued on the black market, contributing to significant population declines
- They have a slow reproduction rate, with females only giving birth once every two years, which limits their ability to recover from population declines.**Hence (R) is correct and is the correct explanation of (A)**
- Higher temperatures and other climate-related changes could further affect their food sources and habitat, pushing them closer to extinction.
- Discovered as recently as the 1950s, these fascinating creatures boast unique physical features. Dark rings around their eyes and lips, along with a coat of varying grey tones, set them apart.
- Source: https://www.ndtv.com/science/vaquita-on-the-brink-population-plummets-in-mexicos-gulf-6049146

⊙ **With reference to National Maritime Domain Awareness Centre (NMDAC), consider the following:**

1. It will house people from 15 agencies under seven Ministries enabling exchange of maritime information.
2. DRDO is entrusted with the responsibility of providing all the requisite hardware and software necessary for the NMDAC

Which of the statements given above is/are *not* correct?

a) 1 only

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

Ans: B

Why in news: National Maritime Domain Awareness centre to be ready in three years

Explanation:

- The Indian Navy's Information Management and Analysis Centre (IMAC) in Gurugram, the nodal agency for maritime information and monitoring, set up after the 26/11 Mumbai terror attacks, is on track to upgraded into the National Maritime Domain Awareness (NMDA) centre in about three years.
- Once operational, the NDMA Centre will house people from 15 agencies under seven Ministries enabling exchange of maritime information in real-time across the board, officials said. **Hence statement 1 is correct**
- The contract for setting it up is set to be concluded shortly and it should be ready in under three years, according to official sources while expressing confidence that the time can be compressed further.
- Ministry of defence will be the nodal ministry and will be responsible for establishing this.
- **Bharat Electronics Limited (BEL),** a defense public sector undertaking, is entrusted with the responsibility of providing all the requisite hardware and software necessary for the NMDAC.**Hence statement 2 is incorrect**
- Source: https://www.thehindu.com/news/national/national-maritime-domain-awareness-centre-to-be-ready-in-three-years/article67698773.ece

⊙ **Consider the following statements aboutInternational Centre for Audit of Local Governance (iCAL):**

1. Centre of excellence for capacity building of local government auditors.
2. Enhance the local government auditors' independence.
3. Regulates the CA profession.
4. It underscores the importance of Local Governments in achieving Sustainable Development Goals (SDGs)

How many of the above are functions of iCAL?

a) Only One
b) Only Two
c) Only Three
d) All Four

Ans: C

Why in news: Comptroller and Auditor General (CAG) of India Girish Chandra Murmu inaugurated the International Centre for Audit of Local Governance (iCAL) in Rajkot.

Explanation:

- iCAL will be a collaborative platform for policymakers, administrators and auditors linked with local governments.
- It will enhance the local government auditors' independence to ensure improved financial performance assessment, service delivery, and data reporting.**Hence statement 2 is correct.**
- It will serve as a centre of excellence for capacity building of local government auditors.**Hence statement 1 is correct.**
- It will act as a knowledge centre and think tank for addressing governance issues at grassroot levels across nations through interactive workshops, knowledge sharing sessions, peer exchanges.**Hence statement 4 is correct.**
- Certification and regulation of CA profession/Charted accountants is not a function of iCAL. Exams for Charted accounts are conducted by ICAI. **Hence statement 3 is incorrect.**
- The institute, a first in the country as per the CAG office, will function out of the office building of the Accountant General (account & entitlement and Audit-1) in Rajkot and aims to set global standards for auditing local governance bodies.

- Source:https://indianexpress.com/article/explained/centre-audit-local-governance-gujarat-9460978/

⊙ **Match the following types of deficits with their appropriate definitions:**

	Type of Deficit	**Definition**
A.	Fiscal Deficit	1. Excess of revenue expenditure over revenue receipts.
B.	Primary Deficit	2. Total expenditure minus total receipts, excluding borrowings.
C.	Revenue Deficit	3. Fiscal deficit minus interest payments.

Select the correct answer using the codes given below:

a) A-2, B-3, C-1
b) A-1, B-2, C-3
c) A-3, B-2, C-1
d) A-2, B-1, C-3

Ans: A

Explanation:

- **A matches with 2:** Fiscal deficit represents the gap between total expenditure and total receipts (excluding borrowings).
- **B matches with 3:** Primary deficit is calculated by deducting interest payments from the fiscal deficit.
- **C matches with 1:** Revenue deficit refers to the shortfall of revenue receipts compared to revenue expenditure.

⊙ **Which of the following measures are examples of Contractionary Fiscal Policy?**

4. Increasing direct taxes such as income tax.
5. Reducing government spending on subsidies.
6. Increasing public investment in infrastructure projects.
7. Reducing excise duties on essential goods.

Select the correct answer using the codes given below:

e) 1 and 2 only
f) 2 and 3 only
g) 3 and 4 only
h) 1, 2 and 4 only

Ans: A

Explanation:

- **Statement 1 is correct:** Increasing taxes reduces disposable income, thereby reducing aggregate demand.
- **Statement 2 is correct:** Reducing subsidies limits government expenditure, contributing to demand reduction.
- **Statement 3 is incorrect:** Public investment boosts aggregate demand, making it expansionary, not contractionary.
- **Statement 4 is incorrect:** Reducing excise duties is expansionary as it lowers prices and increases consumption.
- Contractionary fiscal policy is a government policy that reduces aggregate demand in the economy. The goal is to decrease spending, increase taxes, or both, to close an expansionary gap, which is when actual output is higher than potential output.
- Contractionary fiscal policy is often used during times of economic prosperity to fix booms. It can lead to: lower output, higher unemployment, and lower price level.

⊙ **Consider the following statements regarding the Fiscal Responsibility and Budget Management (FRBM) Act, 2003:**

1. It mandates the government to reduce the fiscal deficit to 3% of GDP.
2. It includes provisions for transparency in fiscal operations.
3. The act has no escape clause to deal with economic emergencies.

Which of the statements given above is/are correct?

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

Ans: B

Explanation:

- **Statement 1 is correct:** The FRBM Act set targets to reduce the fiscal deficit to 3% of GDP to ensure fiscal discipline.
- **Statement 2 is correct:** It promotes transparency by requiring the government to publish fiscal data regularly.
- **Statement 3 is incorrect:** The FRBM Act includes an escape clause that allows deviations in case of unforeseen economic emergencies like a financial crisis or natural disaster.
- The Fiscal Responsibility and Budget Management (FRBM) Act, 2003 was enacted with the objective of ensuring inter-generational equity in fiscal management and long-term macro-economic stability. This objective was to be achieved by containing deficits, removing fiscal impediments in the effective conduct of monetary policy and through prudential debt management. The Act stipulates enhanced transparency in the fiscal operations of the Central Government and the conduct of fiscal policy in a Medium-Term Framework. FRBM Rules 2004 framed under Section 8 of the Act, came into force in July 2004. The Act and Rules have thereafter, been amended from time to time with the latest amendment having been made in April 2018.

⊙ **Which of the following measures contribute to Fiscal Consolidation?**

1. Increasing the Goods and Services Tax (GST) compliance rate.
2. Reducing non-essential government expenditure.
3. Financing fiscal deficits entirely through external borrowings.
4. Rationalizing subsidies to improve efficiency.

Select the correct answer using the codes given below:

a) 1 and 2 only
b) 1, 2 and 4 only
c) 2, 3 and 4 only
d) 1, 2, 3 and 4

Ans: B

Explanation:

- Fiscal consolidation refers to the policies and strategies adopted by a government to reduce its fiscal deficit and public debt to sustainable levels, ensuring long-term fiscal stability and economic growth.
- **Statement 1 is correct:** Improving tax compliance increases revenue, reducing fiscal deficits.
- **Statement 2 is correct:** Curtailing unnecessary expenditure strengthens fiscal balance.
- **Statement 3 is incorrect:** External borrowings increase fiscal vulnerability and are not a sustainable consolidation strategy.
- **Statement 4 is correct:** Rationalizing subsidies makes spending more efficient, aiding fiscal health.

⊙ **With reference to Tax Buoyancy, consider the following statements:**

1. Tax buoyancy measures the responsiveness of tax revenue growth to changes in the Gross Domestic Product (GDP).
2. A tax buoyancy greater than one implies that tax revenue grows faster than the GDP.

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

Ans: C

Explanation:

- **Statement 1 is correct:** Tax buoyancy is an indicator that measures how tax revenues respond to changes in the GDP. A higher GDP typically leads to increased income and consumption, which results in higher tax collection.
- **Statement 2 is correct:** If the tax buoyancy value is greater than one, it indicates that tax revenues are growing at a rate faster than GDP growth, reflecting an efficient tax system or expansion of the tax base.

⊙ **Consider the following statementsregarding "Bharat Operating System Solution":**

1. Bharat operating System solution was development under Free and Open Source software initiative
2. Bharat operating system solution is an example for Software as a service
3. BOSS is a localized Operating System distribution that supports 18 Indian languages

Which of the statements given above is/are correct?

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

Ans: C

Source: Major FOSS Initiatives | Ministry of Electronics and Information Technology, Government of India

Topic: information technology

- The National Resource Centre for Free & Open Source Software (NRCFOSS) has been established to provide design, development and support services to the FOSS community in the country and also strengthen the global FOSS ecosystem by contributing to the open source pool.
- Several milestones have been achieved including indigenized GNU/Linux Operating system distribution "Bharat Operating System Solutions (BOSS)" with Indian languages support, National Help-Desk for FOSS, National FOSS portal and Human Resource development in FOSS. The participating agencies in this consortium mode project are CDAC (Chennai, Mumbai, Hyderabad, Delhi), AUKBC Research centre, Chennai and IIT (Bombay, Madras).
- **Hence first and third statement is correct.**
- BOSS, Bharat Operating System Solutions, is a GNU/Linux based localized Operating System distribution that supports 18 Indian languages - Assamese, Bengali, Bodo, Gujarati, Hindi, Kannada, Kashmiri, Konkani, Maithili, Malayalam, Manipuri, Marathi, Oriya, Punjabi, Sanskrit, Tamil, Telugu and Urdu. BOSS has been certified by Linux Foundation and is expected to meet the stringent demands of e-governance. Desktop and Server versions are available for BOSS. Also an educational variant EduBOSS has been brought out for schools.
- **Bharat Operating System Solutions (BOSS)** is not a Software as a Service (SaaS). It is a **Linux-based operating system.**
- **Hence 2nd statement is incorrect.**
- Open-source software is software with source code that anyone can inspect, modify, and enhance. "Source code" is the part of software that most computer users don't ever see; it's the code computer programmers can manipulate to change how a piece of software—a "program" or "application"—works. Programmers who have access to a computer program's source code can improve that program by adding features to it or fixing parts that don't always work correctly.

⊙ **Consider the following statementsregardingGene Therapy:**

1. Gene therapy can be used to correct genetic diseases by removing, replacing, or adding a corrective gene.
2. In-vivo type of gene therapy is presently in use
3. Germline gene therapy is considered unethical in many countries
4. CAR-T cell therapy used for cancer treatment is an example for gene therapy

How many of the following statements is/are correct?

a) 1
b) 2
c) 3
d) 4

Ans: C

Explanation:

- Gene therapy is a rapidly advancing field in biotechnology that aims to treat genetic diseases by modifying the expression of disease-causing genes. It involves introducing healthy genes to **replace or supplement** faulty ones and correcting genetic abnormalities. This approach represents a shift from traditional treatments by targeting the root cause of genetic diseases instead of just managing symptoms.
- Unlike traditional drugs, gene therapy targets the **root genetic causes inside cells.**
- Active clinical trials approach various inherited and acquired disorders. Approaches include **ex vivo modification of hematologic stem cells, T lymphocytes,** and other immune cells, and **in vivo delivery of genes or gene editing** reagents to relevant target cells.
- In-vivo gene therapy refers to delivering the therapeutic gene directly into a patient's body (such as through injections or viral vectors). While in-vivo gene therapy is under research and has seen limited applications (for example, in certain types of genetic disorders like inherited retinal diseases), it is **not yet widely used for most conditions**.**Hence 2nd statement is correct**
- **Somatic cell gene therapy:** It introduces genes into **somatic cells** that are **not** passed onto **future generations**. It treats living persons by targeting their somatic cells.
- **Germline gene therapy:** It inserts genes into **egg or sperm cells** thereby modifying the genome transmitted to children and future generations. It is banned in most countries due to ethical and safety concerns. **Hence third statement is correct**
- Gene therapy has primarily focused on treating **monogenic disorders** caused by a mutation in a single gene, such as **SCID, haemophilia,** and **muscular dystrophy.**
- CAR-T cell therapy (Chimeric Antigen Receptor T-cell therapy) is considered a form of gene therapy. It involves modifying a patient's own T cells by introducing a new gene that encodes a receptor (the CAR) to recognize and attack cancer cells. This genetic modification enhances the T cells' ability to target specific cancer cells, making it a type of gene therapy that involves altering the genetic material of immune cells to treat diseases, particularly cancer.
- **Thus Option C is the correct answer.**

⊙ **"Which of the following are possible applications of blockchain technology by Indian government in the present scenario,"?**

1. Block chain technology can be used in blood bank system is to ensure that the patient gets safe blood.
2. BCT can be used in public distribution system
3. Block chain technology is used in land registration
4. Blockchain technology can be used in e-voting
5. Blockchain technology is used in supply chain management

Select the correct answer using the codes given below:

a) 1,2 and 5 only
b) 2,3,4and 5 only
c) 2,3 and 5 only
d) 1,2,3,4 and 5

Ans: D

Explanation:

Source: MINISTRY OF ELECTRONICS & INFORMATION TECHNOLOGY NATIONAL INFORMATICS CENTRE OF EXCELLENCE IN BLOCKCHAIN TECHNOLOGY

Topic: Information technology

- The objective of using BlockChain Technology (BCT) in blood bank system is to ensure that the patient gets safe blood. This can be achieved by the different entities in the chain; verifying the quality / expiry of blood from the blockchain that provides the trust factor that is required. The donor details could also be verified by the collection centres to ensure unsafe donors are excluded
- **Hence first statement is correct**
- A major feature of the PDS is the general lack of accountability down the entire supply chain, leaving the leakages that occur at different points completely unaccounted. BlockChain technology can be useful in managing supply chain effectively using distributed ledger technology. Entire supply chain starting from procurement till disbursement can be part of blockchain.
- **Hence 2nd statement is correct**
- Blockchain powered property management system enables the availability of common ledger of the property faciliating a single source of truth. The property details and all the transactions on the property (pledge, release of pledge, inheritence mutation, sale, gift, acquisition initiation, allienation, etc.) would be stored in the blockchain so that even while the process of the mutation is being executed in the land records system to reflect the transactions on the property, all the stakeholders will be able to see the complete history before taking decision.
- Bhoomi, e-asthi, e-swathu applications of Karnataka are getting integrated with Property Chain for recording the transactions and state of the property.
- **Hence 3rd statement is correct**
- The remote voting system is Blockchain-based distributed system developed to enable migrants and other in-service voters posted at different locations to cast their votes from their place of work (Host Constituency) without commuting to their Parent constituencies, thereby saving time and money, and enabling higher voter turnout. A Proof of Concept (PoC) was developed as per the directions of Election Commission of India and demonstrated.
- **Hence 4th statement is correct.**
- One of the use cases of Logistics chain is the online Supply Chain Management System for medicines (Aushada) of Karnataka. The Aushada system is integrated with Blockchain to record the transactions related to movement of drugs from the manufacturer to supplier to warehouse and then to the hospitals including quality checks.
- **Hence 5th statement is also correct**

⊙ **Consider the following statements regardingQuantum Technology:**

1. Quantum navigation focuses on the movement of a single atom tracked undercryogenic conditions.
2. Quantum interference is a direct result of the wave nature of quantum particles.

How many of the following statement is/are correct

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

Ans: B

Explanation:

Source: The Indian express

Topic: communication technology

- RecentlyThe United Kingdom recently carried out two separate quantum navigation tests, one aboard a Royal Navy ship and another on a small jet plane.
- Where satellite navigation relies on the signal bouncing back from space, quantum navigation focuses on the movement of a single atom tracked under cryogenic conditions, explains science publication New Atlas.
- Instead of a satellite floating in space, a quantum navigation system is within each individual vehicle, with measurements being made “at point of use”.

- Global navigation satellite systems (GNSS) like GPS are susceptible to accidental and deliberate outages, whereas quantum navigation is 'unjammable'
- But quantum navigation systems are unlikely to replace GNSSs anytime soon.
- This is because, ultra-cold atoms are needed to achieve quantum navigation, and the equipment is currently sizable.
- quantum interference is one of the important principle of quantum technology
- **Quantum interference** refers to a phenomenon in quantum mechanics where the probability amplitude of different quantum states can combine in such a way that they either enhance or cancel each other out. This occurs because, in quantum mechanics, particles like photons, electrons, and atoms are described by **wavefunctions** rather than definite positions or momenta. These wavefunctions can interfere with each other in a manner similar to how classical waves (like sound or light) can interfere.
- **Thus Option B is the correct answer.**

⊙ **Consider the following statements regardingBharatgen:**

1. Bharatgen is a generative AI to generate high-quality text and multimodal content in various Indian languages.
2. BharatGen will cater to both text and speech
3. The Bharatgen world's first government-funded Multimodal Large Language Model project

Which ofthe following statement is/are correct?

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

Ans: D

Explanation:

- BharatGen, a pioneering initiative in generative AI designed to revolutionize public service delivery and boost citizen engagement through developing a suite of foundational models in language, speech and computer vision, was inaugurated in the virtual presence of Dr. Jitendra Singh, Union Minister of State (Independent Charge) for Science and Technology, Minister of State (Independent Charge) for Earth Sciences, MoS PMO, Department of Atomic Energy and Department of Space and MoS Personnel, Public Grievances and Pensions, today in New Delhi.
- BharatGen will deliver generative AI models and their applications as a public good by prioritizing India's socio-cultural and linguistic diversity. It strives to address India's broader needs such as social equity, cultural preservation, and linguistic diversity, while ensuring that generative AI reaches all segments of society.
- "BharatGen is aligned with the goal of making AI accessible to all citizens, using AI not only for industrial and commercial purposes but also to address national priorities like cultural preservation and inclusive technology development, said DST Secretary Professor Abhay Karandikar.
- The four key distinguishing features of BharatGen are the multilingual and multimodal nature of foundation models; Bhartiya data set based building, and training; open-source platform and development of an ecosystem of generative AI research in the country. The project is expected to be completed in two years along with plans to benefit several government, private, educational, and research institutions.
- BharatGen will cater to both text and speech, ensuring coverage across India's diverse linguistic landscape. By training on multilingual datasets, it will deeply capture the nuances of Indian languages, which are often underrepresented in global AI models. Further, unlike models that rely on global datasets, BharatGen focuses on developing processes for collecting and curating India-centric data, ensuring that the country's diverse languages, dialects, and cultural contexts are accurately represented. This emphasis on data sovereignty strengthens India's control over its digital resources and narrative.
- **Hence all the three statements are correct.**

⊙ **Which of the following best defines Treaty Shopping?**

a) Establishing operations in a country to benefit from its favorable tax treaties.
b) Negotiating for more favorable terms in existing tax treaties.
c) Using a third-country entity to benefit from tax treaties between other nations.
d) Implementing measures to counter Base Erosion and Profit Shifting (BEPS).

Ans: C

Explanation:

- **Option C is correct:** Treaty shopping involves structuring investments through a third country to exploit favorable tax treaties.
- Treaty shopping typically involves the attempt to indirectly access the benefits of a tax treaty between two jurisdictions by a person who is not a resident of one of those jurisdictions, often through complex structures and arrangements.
- Taxpayers engaged in treaty shopping and other treaty abuse strategies undermine tax sovereignty by claiming treaty benefits in situations where these benefits were not intended to be granted, thereby depriving jurisdictions of tax revenues.
- **Example:** A U.S. company wanting to invest in India creates a shell company in Mauritius to take advantage of the India-Mauritius tax treaty, even though it has no real business in Mauritius.

⊙ **Capital receipts of the government include:**

1. Grants received from foreign governments
2. Special Securities like Oil Bonds, Food Bonds
3. Sale of shares in PSUs
4. Recovery of loans

Select the correct answer using the codes given below:

a) 1, 2 and 3 only
b) 1, 2 and 4 only
c) 1, 3 and 4 only
d) 2, 3 and 4 only

Ans: D

Explanation

- Grants from other countries form a part of revenue receipts. **Hence, statement 1 is incorrect.**
- Special securities are a type of capital receipt, which are non-recurring cash inflows that can reduce the asset value or create liabilities for a government: These are issued to public sector banks, oil marketing companies, fertilizer companies, and the Food Corporation of India in lieu of cash subsidies.
- **Other capital receipts:** These include debt capital receipts, such as market loans, treasury bills, and securities issues, and non-debt receipts, such as recovery of loans and advances, disinvestment, and issuance of bonus shares. **Hence, statement 2, 3 and 4 is correct.**

⊙ **Financial Repression policies are aimed to**

1. credit and interest rate ceilings
2. high reserve ratios
3. capital controls
4. allocating credit to preferred sectors
5. large presence of government banks

Select the correct answer using the codes given below:

a) 1, 2 and 4 only
b) 3, 4 and 5 only
c) 1, 2, 3 and 5 only
d) 1, 2, 3, 4 and 5

Ans: D

Explanation

- Financial Repression (FR) means government policies which are aimed at imposing restrictions on financial industry. Financial repression policies are aimed at reducing the cost of government debt and enabling governments to manage high levels of public debt. These policies can involve a range of measures that limit the ability of individuals or institutions to freely allocate their capital in financial markets.
- Examples of FR are credit and interest rate ceilings, high reserve ratios, capital controls, allocating credit to preferred sectors, large presence of government banks and so on.**Hence, option D is correct.**

⊙ **In India, Consumer Price Inflation (CPI) is not an accurate reflection of consumer spending. Why?**

1. The weightage of food and beverages in the CPI is close to 50%
2. CPI focuses on certain goods and services more than others
3. CPI does not reflect up-to-date expenditure patterns.

Select the correct answer using the codes given below:

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

Ans: D

Explanation

- CPI is not the cost-of-living index, and is, therefore, not an accurate reflection of consumer spending. The weightage of food in the CPI is close to 50%, but most households don't spend nearly that much of their overall expenditure on food. What people spend more on are services such as education, health care and transportation, where inflation levels are much higher.
- While CPI is the most relevant index for the consumer as it shows the increase in their actual outgo, it is not a completely accurate cost of living indicator since it focuses on certain goods and services more than others. CPI basket is not revised every year and does not reflect up-to-date expenditure patterns. **Hence, option D is correct.**

⊙ **With reference to Effective Revenue Deficit(ERD), consider the following statements:**

1. Effective Revenue Deficit is the difference between Revenue Deficit and the grants given to states for creating capital assets.
2. A positive Effective Revenue Deficit implies that the government is generating a revenue surplus.

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

Answer: A

Explanation:

- **Statement 1 is correct:** Effective Revenue Deficit (ERD) is the difference between the Revenue Deficit and grants given to states for creating capital assets. It adjusts revenue expenditure by deducting productive components.
- **Statement 2 is incorrect:** A positive ERD does not indicate a revenue surplus. It shows that part of the revenue expenditure contributes to capital formation, but the overall revenue receipts are still less than the revenue expenditure.