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Of

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1. Geography

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1. Consider the following statements with respect to Anti- hail guns.

1. An anti-hail gun is a machine which generates shock waves to disrupt the growth of hailstones in clouds.
2. These shock waves supposedly stop water droplets in clouds from turning into hailstones, so that they fall simply as raindrops.
3. Uttarakhand government has tested the use of 'anti-hail guns' imported from Russia.

Which of the above statements is/are correct?

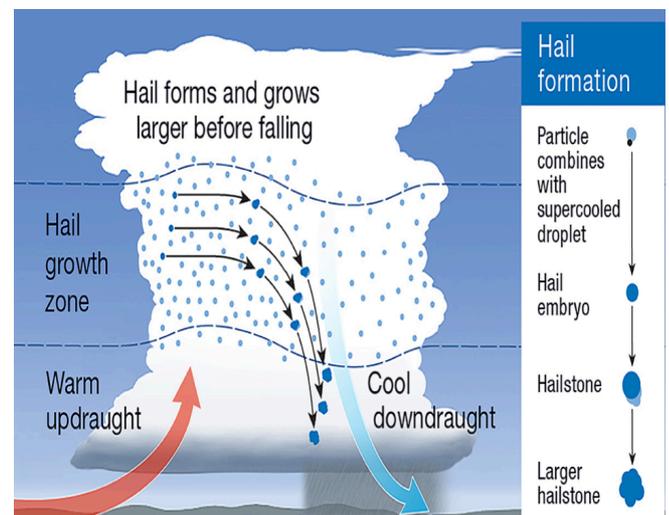
- A. 1 and 2 only
- B. 1 and 3 only
- C. 3 only
- D. 1, 2 and 3

Answer: A

Explanation

- Hail is produced by cumulonimbus clouds, which are generally large and dark and may cause thunder and lightning.
- In such clouds, winds can blow up the water droplets to heights where they freeze into ice.
- The frozen droplets begin to fall but are soon pushed back up by the winds and more droplets freeze onto them, resulting in multiple layers of ice on the hailstones.

- This fall and rise is repeated several times, till the hailstones become too heavy and fall down.
- An anti-hail gun is a machine which generates shock waves to disrupt the growth of hailstones in clouds, according to its makers.
- It comprises a tall, fixed structure somewhat resembling an inverted tower, several metres high, with a long and narrow cone opening towards the sky.
- The gun is "fired" by feeding an explosive mixture of acetylene gas and air into its lower chamber, which releases a shock wave (waves which travel faster than the speed of sound, such as those produced by supersonic aircraft).
- These shock waves supposedly stop water droplets in clouds from turning into hailstones, so that they fall simply as raindrops.



2. A linear feature in a landscape dictated by an underlying geological structure such as a fault is known as which of the following?

- A. Streaming potential
- B. Geophones
- C. Lineament
- D. Quadrature

Answer: C

Explanation

- An unfamiliar lineament is among four factors behind frequent earthquakes in northern Assam's Sonitpur area.
- A lineament is a linear feature in a landscape dictated by an underlying geological structure such as a fault.
- The two faults and the lineament, along with the oblique convergence of the Indian plate, have caused frequent earthquakes.

Seismic Zone Map of India: -2002

About **59 percent** of the land area of India is liable to seismic hazard damage

Zone	Intensity
Zone V	Very High Risk Zone Area liable to shaking Intensity IX (and above)
Zone IV	High Risk Zone Intensity VIII
Zone III	Moderate Risk Zone Intensity VII
Zone II	Low Risk Zone VI (and lower)

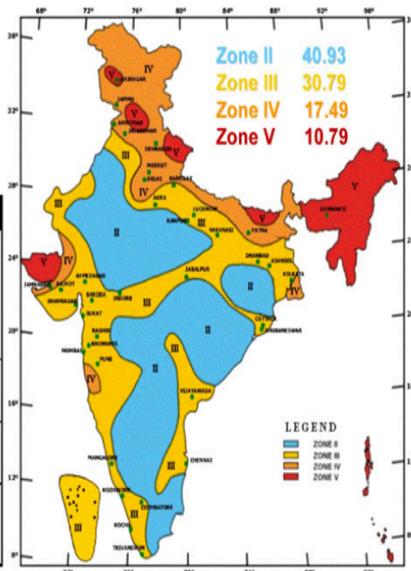


Fig. 1 Seismic zonation and intensity map of India

- The National Centre of Seismology recorded 29 earthquakes of magnitude varying from 2.6 to 4.7 in Sonitpur after the 6.4 tremblor on April 28 that damaged several buildings, bridges and a river embankment.

3. Vorukh, recently heard in news, is a place in which one of the following countries?

- A. Tajikistan
- B. Kyrgyzstan
- C. Uzbekistan
- D. Kyrgyzstan

Answer: A

Explanation

- Vorukh is an exclave of Tajik territory, surrounded by Kyrgyzstan.
- Between Vorukh and the rest of Tajikistan sits the village of Ak-Sai, a road, and a river, which have often been sparks for increasing tensions over the years.
- In 2019, for example, anger over road construction near Ak- Sai led to clashes in which two Tajik villagers were killed by gunfire.
- The April 28-29 clashes began near Vorukh but spread to other hotspots along the Kyrgyz-Tajik border.

4. Consider the following pre-Monsoon showers and their locations to which they are associated.

1. Mango Shower- Karnataka
2. Loo- Punjab
3. Nor Westers- Assam
4. Blossom shower- Orissa

Which of the above pairs are correct?

- A. 1, 2 and 3
- B. 2, 3 and 4
- C. 1, 2 and 4
- D. All of the above

Answer: A

Explanation

- Some Famous Local Storms of India in Hot Weather Season:

✓Mango Shower: Towards the end of summer, there are pre-monsoon showers which are a common phenomenon in Kerala and coastal areas of Karnataka. Locally, they are known as mango showers since they help in the early ripening of mangoes.

✓Blossom Shower: With this shower, coffee flowers blossom in Kerala and nearby areas.

- Nor Westers: These are dreaded evening thunderstorms in Bengal and Assam.

✓Their notorious nature can be understood from the local nomenclature of 'Kalbaisakhi', a calamity of the month of Baisakhi.

✓These showers are useful for tea, jute and rice cultivation. In Assam, these storms are known as "Bardoli Chheerha".

- Loo: Hot, dry and oppressing winds blowing in the Northern plains from Punjab to Bihar with higher intensity between Delhi and Patna.

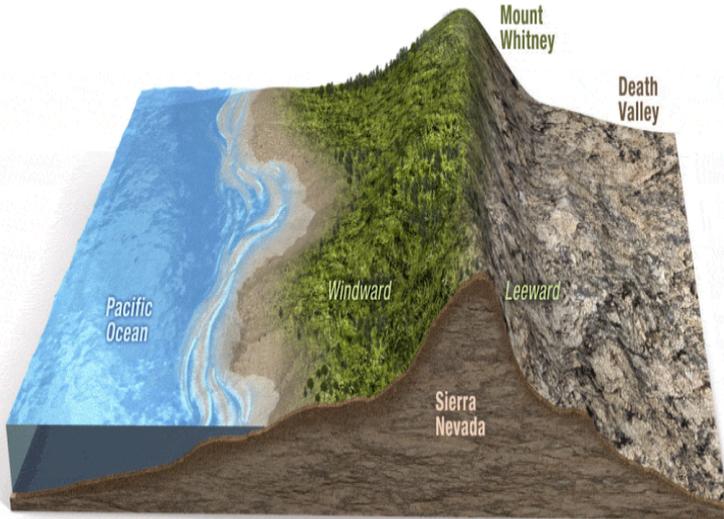
5. Which is the most probable reason for less rainfall in central peninsular India?

- A. Funneling effect
- B. Rain shadow effect
- C. Shoaling effect
- D. Rossby waves

Answer: B

Explanation

- Both western and eastern ghats block any rain bearing winds. Rainfall occurs mostly on seaward side.
- A rain shadow is a dry area on the leeward side of a mountainous area (away from the wind). The mountains block the passage of rain-producing weather systems and cast a "shadow" of dryness behind them.
- Wind and moist air is drawn by the prevailing winds towards the top of the mountains, where it condenses and precipitates before it crosses the top.
- The air, without much moisture left, advances across the mountains creating a drier side called the "rain shadow".



2. History & Culture

Click [here](#) to watch the following questions on YouTube

1. Which of the statements mentioned below is/are incorrect in the context of Chishti tradition and its relations with emperors?

1. The sufis accepted unsolicited grants and donations from the political elites.
2. The Chishtis accepted donations in cash and kind.
3. They accumulated these donations for future use.
4. Kings sometimes sought legitimation from the Sufis.

Select the correct code.

- A. 1 only
- B. 2 and 3 only
- C. 3 only
- D. 1, 2 and 4 only

Answer: C

Explanation

- Of the groups of sufis who migrated to India in the late twelfth century, the Chishtis were the most influential.
- This was because they adapted successfully to the local environment and adopted several features of Indian devotional traditions.
- The sufis accepted unsolicited grants and donations from the political elites.

- The Sultans, in turn, set up charitable trusts (auqaf) as endowments for hospices and granted tax-free land (inam).
- The Chishtis accepted donations in cash and kind.
- Rather than accumulate donations, they preferred to use these fully on immediate requirements such as food, clothes, living quarters and ritual necessities (such as sama’).
- All this enhanced the moral authority of the shaikhs, which in turn attracted people from all walks of life.
- Further, their piety and scholarship, and people’s belief in their miraculous powers made sufis popular among the masses, whose support kings wished to secure.
- Kings did not simply need to demonstrate their association with sufis; they also required legitimation from them.

2. Consider the following festivals

1. **Saga Dawa - Buddhist festival which celebrates birth, enlightenment of Budha.**
2. **Kharchi Puja - it is a folk festival to celebrate the birth of Krishna.**
3. **Hornbill festival - agricultural festival of Nagaland.**
4. **Amumbachi mela - Festival to celebrate harvest.**

Which of the above statements is/are correct?

- A. 1 only
- B. 1 and 3 only
- C. 2 and 4 only
- D. 2 and 3 only



Answer: B

Explanation

- Saga Dawa - It is mostly celebrated in the Buddhist communities living in the State of Sikkim.
 - ✓ It is celebrated on the full moon day that falls in the middle of the Tibetan lunar month called the Saga Dawa.
 - ✓ This day is considered to be a very auspicious day for the Tibetan community.



- Kharchi Pooja - This festival primarily originates from the State of Tripura.
- While it began as a festival of the royal family of Tripura, currently even the common households celebrate this festival.
- It is celebrated over a period of 10 days and takes place in the month of July each year.
- The festival is celebrated in the honour of Lord Shiva who had ordered the people to worship 14 other deities.

3. Which one of the following statements is incorrect about Buland Darwaza?

- A. It is a part of Fatehpur Sikri complex built in 1601 by Akbar.
- B. It was built to commemorate Akbar's victory over Bengal.
- C. It was beautifully carved with inlay work of white marble.
- D. It even has the verses of Jesus Christ.

Answer: B

Explanation

- Buland Darwaza or the "Gate of Magnificence", was built in 1601 A.D. by Akbar to commemorate his victory over Gujarat.
- It is the main entrance to the palace at Fatehpur Sikri, a town which is 43 km from Agra, India.
- Buland Darwaza is the highest gateway in the world and is an example of Mughal architecture.



- It displays Akbar's empire On the main gateway an Islamic inscription written in Persian reads "Isa (Jesus), son of Mary said:
 - 'The world is a Bridge, pass over it, but build no houses upon it. He who hopes for a day may hope for eternity; but the World endures but an hour. Spend it in prayer for the rest is unseen.' Jesus was advising his followers not to consider the world as a permanent home.
 - Verses from the Quran have been carved in the Naskh (script) along the top.
- 4. The Treaty of Lahore was signed after the First Anglo-Sikh War. Which of the following were the main features of the Treaty?**

- 1. The Jalandhar Doab (between the Beas and the Sutlej) was annexed to the Company's dominions.**
- 2. A British resident was to be established at Lahore under Henry Lawrence.**
- 3. Daleep Singh was removed as the ruler of Punjab.**

Which of the above statements is/are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. All of the above

Answer: A

Explanation

- The end of the first Anglo-Sikh War forced the Sikhs to sign a humiliating treaty on March 8, 1846. The main features of the Treaty of Lahore were as follows:
 - ✓ War indemnity of more than 1 crore of rupees was to be given to the English.
 - ✓ The Jalandhar Doab (between the Beas and the Sutlej) was annexed to the Company's dominions.
 - ✓ A British resident was to be established at Lahore under Henry Lawrence.
 - ✓ The strength of the Sikh army was reduced.
 - ✓ Daleep Singh was recognised as the ruler under Rani Jindan as regent and Lal Singh as wazir.
 - ✓ Since, the Sikhs were not able to pay the entire war indemnity, Kashmir including Jammu was sold to Gulab Singh and he was required to pay Rupees 75 lakh to the Company as the price.
 - ✓ The transfer of Kashmir to Gulab Singh was formalised by a separate treaty on March 16, 1846.
- 5. Consider the following statements about 'the Charter Act of 1813' :**
- 1. It ended the trade monopoly of the East India Company in India except for trade in tea and trade with China.**
 - 2. It asserted the sovereignty of the British Crown over the Indian territories held by the Company.**

3. The revenues of India were now controlled by the British Parliament.

Which of the statements given above are correct?

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2 and 3

Answer: A

Explanation

Main Provision of Charter Act, 1833

- The company was allowed to continued territorial and revenue possession for period of 20 years i.e. from 1833 to 1853. The company was held in trust to the Crown.
- All powers that had full complete and constantly to control, to replace supersede or prevent all proceeding and Act of Governor-General-in-Council were under the British Parliament.

- The Governor-General-in-Council was empowered to make laws and regulation for all person or Court of British India.
- Provisions were made for the representation of natives & their Educational Development.
- All restrictions to European immigrants into India were removed.
- The civil and military power were removed from the Company and its entire control and super tend were vested in Governor-General-in-Council.
- The Act also provided measures for the abolition of slavery trough out in India.
- Prior to 1833, laws made were called as regulation here after the laws made to be called as 'Act'.

3. Polity & Governance

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1. Virtual Court is a concept aimed at eliminating presence of litigant or lawyer in the court and adjudication of the case online. Consider the following statements with respect to the same.

1. Currently, litigant can view the status of a case online through various channels created for service delivery.
2. Litigants can file the plaint electronically through e-Filing and also pay the Court Fees or Fine online.
3. eCourts Mission Mode Project is a project launched by Uttar Pradesh Government.

Which of the above statements is/are correct?

- A. 1 and 2 only
- B. 2 only
- C. 1 and 3 only
- D. 2 and 3 only

Answer: A

Explanation

- In the current scenario facility is provided for Litigants to file the plaint electronically through e-Filing and also pay the Court Fees or Fine online through <https://vcourts.gov.in>
- Litigant can view the status of the case also online through various channels created for service delivery.

- However for adjudication purpose the Litigant may have to appear in person or through the Lawyer in the Court.

The E-Courts Project was conceptualised on the basis of "National Policy and Action Plan for Implementation of Information and Communication Technology (ICT) in the Indian Judiciary - 2005" submitted by e-Committee of the Hon'ble Supreme Court of India.

- The eCourts Mission Mode Project, is a Pan-India Project, monitored and funded by Department of Justice, Ministry of Law and Justice, Government of India for the District Courts across the country.
- The main objectives of the e-Court Project are as follows:
 - ✓ To provide efficient & time-bound citizen-centric service delivery.
 - ✓ To develop, install & implement decision support systems in courts.
 - ✓ To automate the processes to provide transparency of Information access to its stakeholders.
 - ✓ To enhance judicial productivity both qualitatively & quantitatively, to make the justice delivery system affordable, accessible, cost-effective & transparent.

2. **The doctrine of separation of power is the three pillars of democracy, namely the executive, judiciary and legislature, perform separate functions and act as separate entities. Which of the following articles facilitates Separation of Powers?**

1. **Article 50**
2. **Article 122**
3. **Article 361**

Select the correct code.

- A. 1 and 2 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2 and 3

Answer: D

Explanation

- The doctrine of Separation of Powers deals with the mutual relations among the three organs of the Government namely legislature, executive and judiciary.
- Articles in the Constitution facilitating Separation of Powers are as follows:
 - ✓ Article 50 of the Constitution of India, which contains a Directive Principle of State Policy, provides that the State shall take steps to separate the Judiciary from the Executive in the Public Services of the State.
 - ✓ Article 122 Constitution of India: Courts not to inquire into proceedings of Parliament.

✓ Article 361 is an exception to Article 14 (Right to Equality) of the Indian Constitution.

✓ The President or the Governor is not answerable to any court for the exercise of the powers and duties of his office.

✓ Article 121 and 211: Judicial conduct of a judge of the Supreme Court and the High Courts' cannot be discussed by the Legislature.

3. **Consider the following statements with respect to Finance Bills.**

1. **As per Article 117 of the Constitution of India, the Finance Bill is a Money Bill.**
2. **Article 117 of the Constitution categorically lays down that a Bill pertaining to sub-clauses (a) to (f) of clause (1) shall not be introduced or moved except with the President's recommendation.**
3. **The Speaker of the Lok Sabha is authorised to decide whether the Bill is a Money Bill or not.**
4. **The Finance Bill can makes changes in the existing laws wherever required.**

Which of the above statements is/are correct?

- A. 1, 2 and 3 only
- B. 2, 3 and 4 only
- C. 1 and 4 only
- D. 1, 2, 3 and 4

Answer: B

Explanation

- As per Article 110 of the Constitution of India, the Finance Bill is a Money Bill. The Finance Bill is a part of the Union Budget, stipulating all the legal amendments required for the changes in taxation proposed by the Finance Minister.
- This Bill encompasses all amendments required in various laws pertaining to tax, in accordance with the tax proposals made in the Union Budget.
- The Finance Bill, as a Money Bill, needs to be passed by the Lok Sabha – the lower house of the Parliament. Post the Lok Sabha’s approval, the Finance Bill becomes Finance Act.
- The Union Budget proposes many tax changes for the upcoming financial year, even if not all of those proposed changes find a mention in the Finance Minister’s Budget speech.
- These proposed changes pertain to several existing laws dealing with various taxes in the country.
- The Finance Bill seeks to insert amendments into all those laws concerned, without having to bring out a separate amendment law for each of those Acts.
- For instance, a Union Budget’s proposed tax changes may require amending the various sections of the Income Tax law, Stamp Act, Money Laundering law, etc.
- The Finance Bill overrides and makes changes in the existing laws wherever required.

4. Which of the following states are covered under Inner Line Permit?

1. Arunachal Pradesh
2. Mizoram
3. West Bengal
4. Manipur
5. Sikkim

Select the correct code.

- A. 1, 2 and 4 only
- B. 2 and 4 only
- C. 2, 3, 4 and 5 only
- D. 1, 4 and 5 only

Answer: A

Explanation

- Inner Line Permit (ILP) is an official travel document issued by the Government of India to allow inward travel of an Indian citizen into a protected area for a limited period.
- It is obligatory for Indian citizens from outside those states to obtain a permit for entering into the protected state.
- The document is an effort by the government to regulate movement to certain areas located near the international border of India.
- ILP is required for Manipur, Arunachal Pradesh, Mizoram and Nagaland.

5. **The Chairman of the Rajya Sabha acts as the ex-officio President of which of the following?**

- A. India Parliamentary Group (IPG)
- B. Parliamentary Forum on Population and Public Health
- C. Joint Sitting of both the Houses of the Parliament
- D. Chairman of Rajya Sabha does not preside any of the above

Answer: B

Explanation

- Indian Parliamentary Group is an autonomous body which was formed in 1949 in pursuance of a motion adopted by the Constituent Assembly.
- The Speaker of Lok Sabha is the ex-ocio president of IPG, the Deputy Speaker of Lok Sabha and Deputy Chairman of Rajya Sabha are the ex-ocio vice presidents.
- The Speaker of Lok Sabha is the ex-ocio President of all the Parliamentary Forums except the Parliamentary Forum on Population and Public Health wherein Chairman Rajya Sabha is the ex-ocio President and Speaker is the ex-ocio Co- President.

4. Economy

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1. Consider the following statements with respect to Secured Overnight Financing Rate.

1. It is the rate of interest charged by The Central Bank of India against loans offered to commercial banks.
2. It is a replacement for USD LIBOR (London Inter-bank Offered Rate).
3. It is based on the Treasury repurchase market (repo), Treasuries loaned or borrowed overnight.

Which of the above statements are incorrect?

- A. 1 only
- B. 2 only
- C. 3 only
- D. None of the above

Answer: A

Explanation

- The secured overnight financing rate (SOFR) is a benchmark interest rate for dollar-denominated derivatives and loans that is replacing the London interbank offered rate (LIBOR).
- SOFR is based on transactions in the Treasury repurchase market and is seen as preferable to LIBOR since it is based on data from observable transactions rather than on estimated borrowing rates.

- While SOFR is becoming the benchmark rate for dollar-denominated derivatives and loans, other countries have sought their own alternative rates, such as SONIA and EONIA.

News

- State Bank of India (SBI) and Indian Oil Corporation Limited (IOCL) will be inking the first SOFR (Secured Overnight Financing Rate) linked external commercial borrowing (ECB) deal as the world moves away from London Interbank Offered Rate (LIBOR), the de facto international benchmark reference rate.

2. Consider the following statements with respect to Limited Liability Partnership (LLP).

1. In an LLP, one partner is not responsible or liable for another partner's misconduct or negligence.
2. The provisions of Indian Partnership Act, 1932 are applicable to an LLP.

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: A

Explanation

- Limited liability partnerships (LLPs) allow for a partnership structure where each partner's liabilities are limited to the amount they put into the business.
- Having business partners means spreading the risk, leveraging individual skills and expertise, and establishing a division of labor.
- LLP shall be a body corporate and a legal entity separate from its partners. It will have perpetual succession.
- LLPs are common in professional business like law firms, accounting firms, and wealth managers.
- Being the separate legislation (i.e. LLP Act, 2008), the provisions of Indian Partnership Act, 1932 are not applicable to an LLP and it is regulated by the contractual agreement between the partners.
- The LLP structure is available in countries like United Kingdom, United States of America, various Gulf countries, Australia and Singapore.
- On the advice of experts who have studied LLP legislations in various countries, the LLP Act is broadly based on UK LLP Act 2000 and Singapore LLP Act 2005.
- Both these Acts allow creation of LLPs in a body corporate form i.e. as a separate legal entity, separate from its partners/members.

3. Consider the following statements with respect to CGST Act.

1. A person under the CGST Act can only be arrested, if the amount of tax evasion is more than ₹2 crore.
2. Offences involving tax evasion of ₹2 crore and above are non-bailable and cognisable.

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: A

Explanation

- Section 69 of the Central Goods and Service Tax (CGST) Act gives power to authorities to arrest any person if there is "reason to believe" that he has committed tax evasion.
- Both Sections 69 and 132 of the CGST Act are constitutional and fall within the legislative competence of Parliament.
- The scope of Article 246A is "significantly wide" as it not only empowers both Parliament and State Legislatures to levy or enact GST Act, but also grants the power to make all laws 'with respect to' GST.
- A person under the CGST Act can only be arrested, if the amount of tax evasion is more than ₹2 crore.

- All offences in which tax evasion is less than ₹5 crore are bailable and only grave offences involving tax evasion of ₹5 crore and above are non-bailable and cognisable.
- The Delhi High Court gave the decision on a petition challenging the Sections 69 (power to arrest) and 132 (punishment for certain offences) of the CGST Act.

4. The government has used financial innovation to recapitalise Punjab & Sind Bank by issuing the lender Rs 5,500-crore worth of special types of zero coupon bonds. Which of the following are the characteristics of these Zero Coupon Bonds?

1. Non-interest bearing
2. Non-transferable
3. Maturity of 10-15 years
4. Tradable

Select the correct code

- A. 1, 2 and 4
- B. 2, 3 and 4
- C. 1, 2 and 3
- D. 1, 2, 3 and 4

Answer: C

Explanation

- The government has used financial innovation to recapitalise Punjab & Sind Bank by issuing the lender Rs 5,500-crore worth of non-interest bearing bonds valued at par.

- The funds raised through issuance of these instruments, which are a variation of the recapitalisation bonds issued earlier to public sector banks, are being deployed to capitalise the state-run bank.
- Characteristics of these special type of Zero-Coupon Bonds:
 - ✓ Not tradable
 - ✓ Non-interest bearing
 - ✓ Non-transferable special GOI securities
 - ✓ Maturity of 10-15 years
 - ✓ Issued specifically to Punjab & Sind Bank.

5. Consider the following statements with respect to Financial Inclusion Index.

1. It is launched by Reserve Bank of India.
2. The value of index ranges between 0 and 10, where 0 represents complete financial inclusion.
3. The base year used for FI-index calculation is 2016.

Which of the above statements is/are correct?

- A. 1 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 1, 2 and 3

Answer: A

Explanation



- The Reserve Bank of India (RBI) announced the formation of a composite Financial Inclusion Index (FI-Index) to capture the extent of financial inclusion across the country.
- The annual FI-Index for the period ended March 2021 stood at 53.9 compared with 43.4 for the period ended March 2017.
- The index has been conceptualised as a comprehensive index incorporating details of banking, investments, insurance, postal as well as the pension sector in consultation with the government and respective sectoral regulators.
- 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 FI-Index has been constructed without any 'base year' and as such it reflects cumulative efforts of all stakeholders over the years towards financial inclusion.

5. Environment

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1. Consider the following statements with respect to Black Softshell Turtle.

1. It is a brackish-water species.
2. It enjoys legal protection under the Indian Wildlife (Protection) Act of 1972.
3. The International Union for Conservation of Nature had in 2021 listed the turtle as 'critically endangered'.

Which of the above statements is/are incorrect?

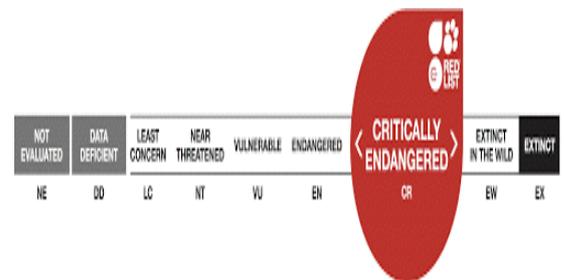
- A. 1 only
- B. 2 and 3 only
- C. 2 only
- D. 1 and 2 only

Answer: D

Explanation

- Until sightings along the Brahmaputra River's drainage in Assam, the black softshell turtle was thought to be 'extinct in the wild' and confined only to ponds of temples in northeastern India and Bangladesh.
- The International Union for Conservation of Nature had in 2021 listed the turtle as 'critically endangered'.

- But it does not enjoy legal protection under the Indian Wildlife (Protection) Act of 1972 although it has traditionally been hunted for its meat and cartilage, traded in regional and international markets.



- A major temple in Assam has signed a memorandum of understanding with two green NGOs, the Assam State Zoo cum Botanical Garden and the Kamrup district administration for long-term conservation of the rare freshwater black softshell turtle (*Nilssonina nigricans*).



2. 'Carbon Watch' was recently heard in news. Consider the following statements with respect to the same.

1. It is a Smart Watch which will be positioned in prime regions of a city to calculate carbon emissions in that region.

2. Chandigarh became the first state or Union Territory in India to launch Carbon Watch.

Which of the above statements is/are correct?

- A. 1 only
- B. 2 only
- C. Both 1 and 2
- D. None of the above

Answer: B

Explanation

- Chandigarh became the first state or Union Territory in India to launch Carbon Watch, a mobile application to assess the carbon footprint of an individual.
- Although the app can be accessed by everyone, it has specific options for the residents of Chandigarh to compile a detail study.
- As a person downloads the application, they will need to fill details in four parts –
 - ✓ Water
 - ✓ Energy
 - ✓ Waste Generation and
 - ✓ Transport (Vehicular movement).
- In the category of Water, the person will be required to inform about the consumption of water.
- In the Energy category, the details regarding the electricity units consumed every month at the house, monthly bill etc and usage of solar energy will have to be furnished.

- In the Waste category, the individual will need to inform about the waste generation on their part and their family.
- In the transport section, the individual will have to inform about the mode of transport used by them- four wheeler, two-wheeler or bicycle.
- With the mentioned information, the mobile application will automatically calculate the carbon footprint of the individual.

3. The report, titled Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions was recently released by which of the following?

- A. Climate and Clean Air Coalition
- B. United Nations Environment Programme
- C. Both A and B
- D. Intergovernmental Panel on Climate Change

Answer: C

Explanation

- Recently, a report, titled Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions was released by the Climate and Clean Air Coalition and the United Nations Environment Programme (UNEP).
- Key Findings:
 - ✓ Human-caused methane emissions must be cut by 45 per cent

- ✓ to avoid the worst effects of climate change.
- ✓ It would prevent 260,000 premature deaths, 775,000 asthma-related hospital visits annually, as well as 25 million tonnes of crop losses.
- ✓ Methane in the atmosphere reached record levels last year, according to the data from the United States National Oceanic and Atmospheric Administration.
- ✓ Most human-caused methane emissions came from three sectors: Fossil fuels, waste and agriculture.
- The assessment found that the mitigation potential varied between countries and regions. Europe had the greatest potential to curb methane emissions from farming, fossil fuel operations and waste management.
- The European Commission had adopted the European Union Methane Strategy in October 2020. It outlined measures to cut methane emissions in Europe and internationally.
- Three behavioural changes – reducing food waste and loss, improving livestock management and adopting healthy diets (vegetarian or with a lower meat and dairy content) – could reduce methane emissions by 65–80 million tonnes per year over the next few decades

4. Which of the following are the sites that has been recognized under the 1971 Ramsar Convention on Wetlands?

1. Thol Lake Wildlife Sanctuary
2. Kabartal Wetland
3. Carambolim lake
4. Sultanpur National Park
5. Varthur lakes

Select the correct code

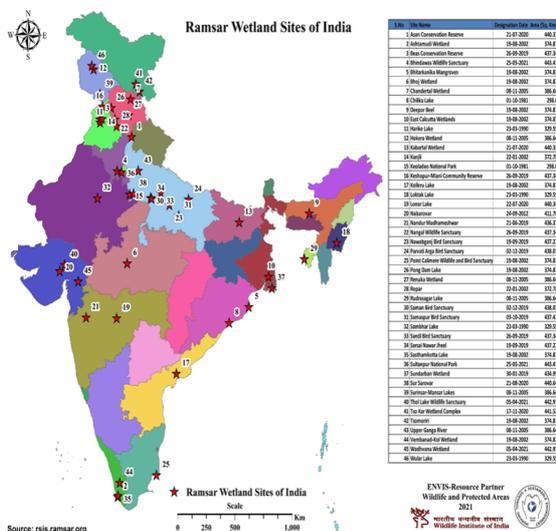
- A. 1, 2 and 4 only
- B. 1, 3 and 4 only
- C. 1, 3, 4 and 5 only
- D. 1, 2, 3, 4 and 5

Answer: A

Explanation

- India added another feather in its cap when four more sites - two each from Haryana and Gujarat - were recognised as wetlands of international importance under the Ramsar Convention.
- Sultanpur National Park in Gurgaon and Bhindawas Wildlife Sanctuary in Jhajjar (both in Haryana) have been added to the list this year. Apart from that, Thol and Wadhvana from Gujarat too have now become a part of the convention.
- The Ramsar Convention on Wetlands is an intergovernmental treaty adopted on February 2, 1971 in the Iranian city of Ramsar, on the southern shore of the Caspian Sea.

- It came into force for India on February 1, 1982. Those wetlands which are of international importance are declared as Ramsar sites.



5. Consider the following regarding biofuels

1. First generation biofuels are produced directly from food crops.
2. Third generation biofuels are aimed at capturing and storing carbon dioxide also.
3. Fourth generation biofuels use specially engineered energy crops such as algae.

Which of the above statements is/are correct?

- A. 1 only
- B. 2 and 3 only
- C. 1 and 3 only
- D. 3 only

Answer: A

Explanation

- First Generation biofuels are produced directly from food crops by abstracting the oils for use in biodiesel or producing bioethanol through fermentation.
- Crops such as wheat and sugar are the most widely used feedstock for bioethanol while oil seed rape has proved a very effective crop for use in biodiesel.
- Second Generation biofuels are produced from non-food crops such as wood, organic waste, food crop waste and specific biomass crops.
- Cellulosic ethanol technology fits in here, as do non-food crop technologies such as jatropha-based biofuels.
- Third Generation of biofuels is based on improvements in the production of biomass.
 - ✓ It takes advantage of specially engineered energy crops such as algae as its energy source.
 - ✓ The algae are cultured to act as a low-cost, highenergy and entirely renewable feedstock.
- Fourth Generation Biofuels are aimed at not only producing sustainable energy but also a way of capturing and storing CO2.

6. Science & Technology

Click [here](#) to watch the following questions on YouTube

1. Indian Institute of Technology Ropar has developed a first-of-its-kind Internet of Things (IoT) device - AmbiTag. Which of the following correctly defines it?

- A. Device used to engrave electronic tags on products for quality assurance.
- B. Device that continuously records the temperature of its immediate surroundings from -40°C to 80°C .
- C. Device, when installed in a vehicle, monitors its speed and informs emergency when vehicle has a solid impact.
- D. None of the above

Answer: B

Explanation

- Indian Institute of Technology in Punjab's Ropar has developed a first-of-its-kind Internet of Things (IoT) device - AmbiTag.
- The institute stated that the device records real-time ambient temperature during the transportation of perishable products, body organs, and blood, vaccines, etc.
- AmbiTag is a USB-shaped device that continuously records the temperature of its immediate surroundings from -40°C to 80°C in any time zone for a full 90 days on a single charge.

- Most of the similar devices available in the international market record data only for a duration of 30 - 60 days. AmbiTag has a range of inbuilt features to customise logging intervals, time zone, and alarms.



2. Agni-P (Prime) missile was successfully test-fired by the Defence Research and Development Organisation (DRDO). Which of the following is/are the characteristics of this missile?

1. Surface-to-air ballistic missile
2. Range of 500 to 1000 km
3. Nuclear capable

Select the correct code

- A. 1 and 3 only
- B. 2 and 3 only
- C. 3 only
- D. 1, 2 and 3

Answer: C

Explanation

- A new generation nuclear capable ballistic missile Agni-P (Prime) was successfully test-fired by the Defence Research and Development Organisation (DRDO).
- Agni-P is a new generation advanced variant of Agni class of missiles. It is a canisterised missile with range capability between 1,000 and 2,000 km.
- Various telemetry and radar stations positioned along the eastern coast tracked and monitored the missile.
- Canisterisation of missiles reduces the time required to launch the missile while improving its storage and mobility.

- The longest of the Agni series, Agni-V, an Inter-Continental Ballistic Missile (ICBM) with a range of over 5,000 km, has already been tested several times and validated for induction.



- A. 1 and 2 only
- B. 2 and 3 only
- C. 3 only
- D. 1, 2 and 3

Answer: B

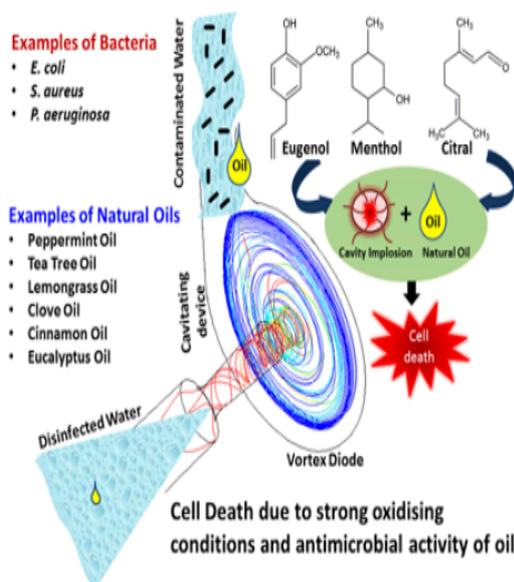
Explanation

- Scientists at CSIR-NCL Pune has developed the novel hybrid technology called SWASTIIK' that involves boiling of a liquid as a result of pressure reduction (cavitation) and also uses natural oils having antimicrobial properties.
- This technology can eliminate harmful bacteria, including antimicrobial-resistant bacteria, economically.
- It not only integrates Indian traditional knowledge of Ayurveda for complete disinfection of water but also may offer possible health benefits of natural oils.

3. Consider the following statements with respect to SWASTIIK Technology.

1. This technology is a platform for early diagnosis of dengue.
2. The technique used in SWASTIIK is hydrodynamic cavitation.
3. The technology has been developed by CSIR-National Chemical Laboratory (CSIR-NCL) at Pune.

Which of the above statements is/are correct?



Mechanism of the new hybrid cavitation technology using natural oils

- The technique used ---hydrodynamic cavitation combines chemistry, biology, and chemical engineering along with natural resources in the form of natural oils and plant extracts.
- The novel strategy of SWASTIIK (Safe Water and Sustainable Technology Initiative from Indian Knowledge base) can have significant benefits in terms of providing SAFE WATER and also possible health benefits that can also boost immunity, an important aspect as underlined in the current COVID-19 era.

4. Which of the following countries are the founding members of Global Partnership on Artificial Intelligence?

1. Canada
2. France
3. India
4. Slovenia
5. Russia

Select the correct code.

- A. 1, 3 and 4 only
- B. 2, 3 and 5 only
- C. 1, 2, 3 and 4 only
- D. 1, 2, 3, 4 and 5

Answer: C

Explanation

- The Global Partnership on Artificial Intelligence (GPAI) is a multi-stakeholder initiative which aims to bridge the gap between theory and practice on AI by supporting cutting-edge research and applied activities on AI-related priorities.
- Built around a shared commitment to the OECD Recommendation on Artificial Intelligence, GPAI brings together engaged minds and expertise from science, industry, civil society, governments, international organisations and academia to foster international cooperation.
- 19 international partners have joined together to guide the responsible development and use of artificial intelligence, grounded in human rights, inclusion, diversity, innovation and economic growth:
 - ✓ Australia, Brazil, Canada, France, Germany, India, Italy, Japan, Republic of Korea, Mexico, Netherlands, New Zealand, Poland, Singapore, Slovenia, Spain, United Kingdom, United States and European Union.

5. Consider the following statements with respect to Propellants.

1. The propellant is the chemical mixture burned to produce thrust in rockets and consists of a fuel and an oxidizer.
2. Cryogenic propellants contain solids stored at very low temperatures.

3. Solid propellant motors can be shutdown during any part of the journey.

Which of the above statement is/are incorrect?

- A. 1 only
- B. 1 and 2 only
- C. 2 and 3 only
- D. 1, 2 and 3

Answer: C

Explanation

Propellants

- The propellant is the chemical mixture burned to produce thrust in rockets and consists of a fuel and an oxidizer.
- A fuel burns when combined with oxygen producing gas for propulsion. An oxidizer is used that releases oxygen for combination with a fuel.
- Ammonium nitrate, Ammonium dinitramide, Ammonium perchlorate, potassium nitrate are used as oxidizers.
- Propellants are classified into liquid, solid, or hybrid.

Liquid Propellants

- In a liquid propellant rocket, the fuel and oxidizer are stored in separate tanks and are fed through a system of pipes, valves, and turbo pumps to a combustion chamber where they are combined and burned to produce thrust.

- Liquid oxygen (LOX), highly refined kerosene (RP-1), liquid hydrogen, Dinitrogen tetroxide (N_2O_4), hydrazine (N_2H_4) are some of the common liquid propellants.

Cryogenic propellants

- Cryogenic propellants are liquefied gases stored at very low temperatures, most frequently liquid hydrogen (LH_2) as the fuel and liquid oxygen (LOX) as the oxidizer.
- Hydrogen and oxygen remain liquid at temperatures of $-253^\circ C$ and $-183^\circ C$ respectively.

Solid Propellants

- Solid propellant consists of a casing filled with a mixture of solid compounds (fuel and oxidizer) which burn at a rapid rate, expelling hot gases from a nozzle to produce thrust.
- When ignited, a solid propellant burns from the center out towards the sides of the casing.
- The shape of the center channel determines the rate and pattern of the burn, thus providing a means to control thrust.
- Unlike liquid-propellant engines, solid propellant motors cannot be shut down. Once ignited, they will burn until all the propellant is exhausted.