



Daily Current Affairs Prelims Quiz 15-06-2024 (Online Prelims Test)

1) Consider the following statements with respect to Zero Knowledge Proof (ZKP) Data Vault

1. It leverages block-chain technology concepts to create a secure environment where sensitive data sets can be analysed without direct exposure.
2. It allows one party to prove possession of certain information without revealing the information itself.
3. The data remains isolated within each organization's infrastructure, undergoing one-way irreversible anonymization to prevent reverse-engineering of personal information.

How many of the statements given above are correct?

- a. Only one
- b. Only two
- c. All Three
- d. None of the above

Answer : c



Zero Knowledge Proof (ZKP) Data Vault

With increasing incidents of data breach of citizen's personal information, Zero Knowledge Proof (ZKP) Data Vault could be possible solution for it.

- Government agencies collect and manage vast amounts of personally identifiable information (PII) from citizens, but data sharing between departments is currently limited due to privacy concerns.
- To enable effective inter-agency collaboration while protecting data privacy, ZKP data vault can be introduced.
- **Zero Knowledge Proof (ZKP) Data Vault leverages block-chain technology concepts.**
- The ZKP data vault allows one party **to prove possession of certain information without revealing the actual data**, enabling data analysis and insights without direct exposure of sensitive PII.
- **Data remains isolated within each organization's infrastructure, undergoing one-way irreversible anonymization** and probabilistic search with fuzzy logic to prevent leakage and reverse-engineering of personal information.
- The ZKP data vault maintains comprehensive audit logs for transparency and accountability, tracking all data requests and responses without revealing the actual data.
- While the concept is relatively new for PII data, the authors cite successful applications of ZKP data vaults in non-PII contexts.
- Implementing ZKP data vaults would represent a pioneering approach in India, enabling secure real-time access to anonymized data for enhanced inter-departmental collaboration while complying with data protection laws and fostering public trust.
- The authors acknowledge the challenges involved but emphasize the potential benefits of improved governance, enhanced security, and better public services through this innovative approach.

2) Consider the following statements with respect to Kavli Prize

1. It is a biennial award introduced to honour the excellence in all fields of science and engineering relevant to the environment.
2. It is awarded by the Kavli Foundation, in partnership with Norwegian Academy of Science and Letters the Norwegian Ministry of Education and Research.

Which of the above statement(s) is/are correct?

- a. 1 only
- b. 2 only
- c. Both 1 and 2
- d. Neither 1 nor 2

Answer : b

Kavli Prize

Recently eight winners were awarded Kavli Prize for their contributions to astrophysics, neuroscience and nanoscience.

- The Kavli Prize is awarded in honour of Norwegian-American businessman and philanthropist Fred Kavli (1927-2013).
- It is a **biennial award** introduced in 2008 to honour exceptional achievements in **astrophysics, neuroscience, and nanoscience**.
- In 1958, Fred Kavli started his own enterprise, founding Kavlico.
- At present, the company is a leading manufacturer of pressure sensors and related systems, which are used in all kinds of industries, from aviation to home appliances.
- Kavlico's pressure transducers (devices which convert pressure into an electric signal) are known for their high accuracy, stability, and reliability.
- The Kavli Prizes are awarded in 3 areas:
 1. Astrophysics
 2. Nanoscience
 3. Neuroscience
- The Kavli Prize was designed to be like the Nobel in the fields of astrophysics, neuroscience, and nanoscience.
- The Nobel Prize is only awarded for achievements made "during the preceding year" but the **Kavli Prize does not operate under such a restriction**.
- The prize comprises a **USD 1 million cash prize** (per field), a scroll, and a medal, 7 cm in diameter.
- Along with the US-based Kavli Foundation, the prize is given in partnership with the Norwegian Academy of Science and Letters, and the Norwegian Ministry of Education and Research.
- The prize is given in partnership with:
 - US-based Kavli Foundation
 - Norwegian Academy of Science and Letters
 - Norwegian Ministry of Education and Research
- **The 2024 winners are:**
 - David Charbonneau (Harvard University) and Sara Seager (Massachusetts Institute of Technology) for Astrophysics,
 - Robert Langer (Massachusetts Institute of Technology), Armand Paul Alivisatos (University of Chicago) and Chad Mirkin (Northwestern University) for Nanoscience.
 - Nancy Kanwisher (Massachusetts Institute of Technology), Winrich Freiwald (Rockefeller University) and Doris Tsao (University of California, Berkeley) for Neuroscience.

3) Consider the following statements with respect to Low-Temperature Co-fired Ceramic (LTCC)

1. It acts as an efficient alternative to copper cold plates for cooling supercomputers.
2. It allows compact three-dimensional packing of the circuit, making them smaller and more efficient compared to conventional PCB (Printed circuit boards).
3. The thermal conductivity of LTCC is higher than that of copper, making it more efficient for heat transfer.

How many of the statements given above are correct?

- a. Only one
- b. Only two
- c. All Three
- d. None of the above

Answer : b

Low-Temperature Co-fired Ceramic (LTCC)

A team of researchers from IIT Bombay and Centre for Materials for Electronics Technology have proposed LTCC that acts as an efficient alternative to the conventionally used copper for making cold-plates.

- Low-Temperature Co-fired Ceramic (LTCC) is an advanced packaging technology that has gained significant attention in the electronics industry.
- It involves the manufacturing of multilayer ceramic substrates by laminating and co-firing multiple layers of ceramic green tapes at relatively low temperatures (around 900°C).
- This technology enables the creation of compact, **three-dimensional integrated circuits with embedded components and interconnections.**
- Researchers from IIT Bombay and C-MET, Pune have demonstrated the use of **LTCC as an efficient alternative to copper cold plates for cooling supercomputers.**
- **The thermal conductivity of LTCC is 100 times less compared to copper, which makes it relatively less efficient at conducting heat.**
- **Advantages of LTCC Technology:**
 - **Compact and Lightweight Design** - LTCC technology allows for the integration of various components, such as resistors, capacitors, and inductors, into a single ceramic module.
 - **High Thermal Conductivity** - LTCC substrates exhibit excellent thermal conductivity, which is crucial for effective heat dissipation in electronic devices.
 - **Hermetic Sealing** - LTCC modules can be hermetically sealed, providing protection against harsh environments, including moisture, dust, and chemical exposure.
 - **High-Frequency Performance** - The ceramic material used in LTCC technology exhibits low dielectric loss and low signal propagation delay.
- This makes it suitable for high-frequency applications, such as wireless communication systems and radar systems.
- **Applications of LTCC Technology** - It can be used in the following industries:
 - Automotive Electronics
 - Aerospace and Defence
 - Biomedical Devices
 - Wireless Communication
- LTCC technology has emerged as a powerful solution for miniaturized and high-performance electronic systems.

4) Consider the following statements with respect to Seabirds

1. It refers to any bird species that adapts to live and feed in the saltwater environment of the ocean.

2. Seabirds act as biological transporters, transferring nutrients from marine to terrestrial environments.
3. The adult seabirds abandon their nests and offspring during any cyclone.

How many of the statements given above are correct?

- a. Only one
- b. Only two
- c. All Three
- d. None of the above

Answer : b

Seabirds

A recent study has found that the Tropical Cyclone Ilsa, wiped out 90% of seabirds on a Bedout Island, Australia.

- The term “seabird” doesn't refer to a specific family of birds, but rather to any bird species adapted to live and feed in the saltwater environment of the ocean.
- Seabirds are a diverse group of birds that rely on marine environments for their survival.
- Contrary to normal behaviour, the adult seabirds during the Tropical Cyclone Ilsa **did not abandon their nests and offspring during the cyclone.**
- **Cyclone Ilsa** was reported to be **category 5** cyclone with sustained winds of 230 kilometres per hour.
- **Ecological Importance of Seabirds:**
- **Nutrient Cycling** - Seabirds act as biological transporters, transferring nutrients from marine to terrestrial environments through their guano (excrement) and carcasses.
- This nutrient transfer supports the growth of coastal vegetation and enhances soil fertility, contributing to the overall productivity of island ecosystems.
- **Ecosystem Engineers** - Many seabird species, such as burrowing shearwaters and petrels, actively modify their nesting habitats by digging burrows or creating mounds.
- These activities facilitate soil aeration, nutrient cycling, and provide nesting sites for other species, shaping the overall biodiversity of island ecosystems.
- **Indicators of Environmental Change** - Seabirds are often considered sentinels of marine ecosystems due to their sensitivity to environmental changes.
- **Examples of sea birds** - Albatrosses, Petrels, Pelican, Gulls, Penguins, Laughing gull, Great black-backed gull and Masked Booby.

5) Consider the following statements with respect to Rift Valley fever (RVF)

1. It is a mosquito-borne viral disease characterised by abortions and perinatal mortalities in livestock.
2. The human-to-human transmission of RVF virus is not possible.

Which of the above statement(s) is/are **incorrect**?

- a. 1 only
- b. 2 only
- c. Both 1 and 2
- d. Neither 1 nor 2

Answer : d

Rift Valley fever (RVF)

A recent study published in the *BMJ Global Health* journal has revealed that the geographical range of Rift Valley fever disease clusters is expanding across eastern Africa.

- Rift Valley fever (RVF) is a mosquito-borne viral disease caused by Rift Valley fever virus (RVFV).
- It is known for extreme weather-associated large epidemics characterised by abortions and perinatal mortalities in livestock.
- RVF virus is a member of the Phlebovirus genus.
- The virus was **first identified in 1931** during an investigation into an epidemic among sheep on a farm in the **Rift Valley of Kenya**.
- **Causes** - Fever, jaundice, encephalitis, retinitis and haemorrhagic syndrome in humans.
- **Transmission** - The majority of human infections result from direct or indirect contact with the blood or organs of infected animals.
- **To date, no human-to-human transmission of RVF virus has been documented.**
- **Prevention** - Outbreaks of RVF in animals can be prevented by a sustained programme of animal vaccination.
- **Impacts** - The disease results in significant economic losses due to death and abortion among RVF-infected livestock.
- **Recent discovery about the disease** - Contrary to previous beliefs that RVF predominantly causes large outbreaks, the study found that **RVF occurs mainly in small clusters**.
- The study revealed that the geographical range of **RVF disease clusters is expanding across eastern Africa**.
- Significantly, 35% of these clusters occurred in regions that had never reported RVF cases before. This **expansion is linked to climatic changes and land use alterations in the region**.
- The study challenged the previously held notion that RVF is strongly associated with El Niño events.
- Instead, it highlighted that **increases in temperature and changes in precipitation patterns are more closely associated with the occurrence of RVF clusters**.
- The study found that the hotter and wetter highlands are seeing an increasing frequency of RVF clusters.
- In Uganda and Kenya, 76% and 43% of the RVF clusters, respectively, were observed in these highland areas.