UPSC Syllabus Topic : GS paper3-Science and technology- developments and their applications and effects in everyday life.

Radiocarbon Dating-What is radiocarbon dating? | Explained

Radiocarbon dating is a method used to determine the age of organic materials by measuring the amount of carbon-14 they contain. It was devised by American chemist Willard Libby in the 1940s. This technique relies on the continuous production of carbon-14 in the atmosphere through cosmic ray interactions with nitrogen-14, which living organisms absorb. When an organism dies, it stops absorbing carbon-14, and the isotope begins to decay at a known rate, with a half-life of about 5,730 years. By measuring the remaining carbon-14 in a sample, scientists can estimate the time of death.

Tools used in Radiocarbon Dating:

1. **Geiger Counter**: Initially employed to detect radioactive decay in early experiments, detecting and measuring carbon-14 decay.
2. **Anti-Coincidence Counter**: An improved version that ignores background radiation and offers precise measurements using purified samples.
3. **Accelerator Mass Spectrometry (AMS)**: The preferred modern tool, allowing for highly precise dating with smaller sample sizes. AMS separates carbon isotopes using a particle accelerator to count individual carbon-14 atoms, enhancing accuracy and efficiency.

Significance of Radiocarbon Dating:

1. **Objective Dating Method**: Revolutionized archaeology and geology by introducing a numerical dating system.
2. **Understanding Human History**: Refines timelines of human activities and civilizations, aiding historical understanding with improved accuracy.
3. **Technological Advances**: Evolution from Geiger counters to AMS has enabled more precise dating of smaller samples.
4. **Global Impact**: Used beyond artifacts to study ancient climate patterns by dating organic remains in sediment layers. Also significant in dating culturally important structures worldwide, including in India for dating temples and mosques, revealing cultural heritage and environmental history.

UPSC Syllabus Topic : GS paper3 –Internal Security –Money Laundering and its prevention.

Virtual Digital Assets regulations in India-Why did FIU IND act against virtual asset providers?

Virtual Digital Assets (VDAs) are digital representations of value that can be digitally traded, transferred, and used for payment or investment purposes, as defined by the Financial Action Task Force (FATF).

In India, regulations for Virtual Digital Asset Service Providers (VDA-SPs) were introduced under the Anti Money Laundering/Counter Financing of Terrorism (AML-CFT) provisions of the Prevention of Money Laundering Act (PMLA) in March 2023. VDA-SPs are required to register with the Financial Intelligence Unit India (FIU-IND) and adhere to reporting and record-keeping obligations. While 31 VDA-SPs have registered, several offshore entities serving Indian users remain unregistered, posing challenges to enforcing compliance in the virtual digital assets space.

The Indian government aims to enforce PMLA regulations on both domestic and offshore VDA-SPs, aligning with global cryptocurrency standards.

The Bureau for International Settlements (BIS) has highlighted three main regulatory strategies for

cryptocurrencies: an outright ban, containment, and comprehensive regulation. It suggests that outright bans may not be fully effective due to the pseudo-anonymous nature of crypto assets,

potentially leading to reduced market oversight. The containment approach aims to control interactions between crypto markets and traditional finance systems but may not address all vulnerabilities or mitigate financial stability risks. BIS emphasizes that while challenging, regulation might be necessary to manage inherent risks in the crypto market and uphold financial stability. The way forward involves stricter enforcement of AML laws for both domestic and offshore VDA-SPs. It necessitates balancing regulatory strategies to navigate the pseudo-anonymous nature of the crypto market while preserving financial stability.