

It is unfair to assume that the people of ancient India only focused on the spiritual world and disregarded the material realm. We should not only consider religious figures like Buddha, Mahavira, and Shankaracharya, but also acknowledge the significant contributions of scientific thinkers like Aryabhata, Brahmagupta, and Charaka. By doing so, we can truly appreciate the wide-ranging accomplishments of the people of ancient India in various aspects of life and practical knowledge.

■ **Mathematics-** Ancient Indians made significant contributions to mathematics, including the development of three distinct achievements: the notation system, the decimal system, and the concept of zero.

- The Europeans acquired knowledge of numerical systems from India, as seen in Ashoka's inscriptions from the third century BC.
- The Indians invented "Zero" in the second century BC, a concept unknown to ancient Europeans.
- The Indians were the first to utilize the decimal system, with mathematician Aryabhata being well-versed in its use. The Chinese learned this system from Buddhist missionaries.
- The bricks of the Harappan civilization suggest that people in Northwest India had knowledge of measurement and geometry, which later influenced the Vedic people as evident in the Shulva Sutras from around the fifth century BCE.
- Indian mathematicians developed the systems of square roots and cube roots.
- Trigonometry was developed by Aryabhata.
- Both Indians and Greeks made contributions to algebra, with Western Europe receiving algebraic knowledge from Arabia, which itself obtained it from India.
- Mathematicians Brahmagupta and Bhaskaracharya played significant roles in

the development of mathematics, with Brahma Magupta introducing the use of negative numerals.

■ **Astronomy** - In ancient times, there was a close connection between religion and science, with the planets being revered as deities.

- Indians had a longstanding interest in observing the planets due to their religious significance.
- Studying the planets was important as they were associated with seasons, weather, and agricultural practices crucial for the developing economy.
- Aryabhata and Varahamihir were eminent scholars of ancient astronomy.
- Aryabhata made remarkable discoveries, such as the identification of lunar and solar eclipses. His estimation of the Earth's radius, with certain adjustments, remains widely accepted and accurate. In his book 'Aryabhatiyam,' he proposed the concept of a stationary Sun and a rotating Earth, establishing a principle that significantly influenced astronomical understanding.
- Varahamihira's renowned work, the Brihadsamhita, was written in the sixth century. He stated that the moon revolves around the Earth.
- Another notable astronomer was Brahmagupta, who authored the book 'BrahmaSiddhanta'.

■ **Physics-** Physics in ancient India was influenced by religious beliefs and doctrines, leading to diverse interpretations and definitions. Despite the variations, the common understanding across religions was that the earth was formed by the combination of five elements: earth, water, fire, air, and sky. Most religious sects held the belief that atoms corresponded to each element, and the combination of atoms formed molecules. In the Vaisheshika philosophy, these molecules were

considered Anishvara, while Buddhists saw them as transient manifestations of nature, appearing like a wheel and then disappearing. Thus, the atomic theory was a prominent aspect of Vaisheshika philosophy.

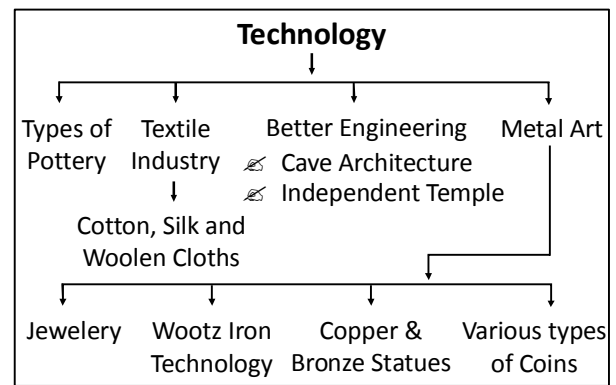
■ **Chemistry-** The people of ancient India were advanced in the field of chemistry.

- Vedic Aryans had the ability to produce various items using animal hides and skins.
- The Charak Samhita and Sushruta Samhita provided information on medicinal preparations using plant juices.
- Ancient Indians excelled in the creation of different types of colors.
- They possessed knowledge of producing vibrant blue colors and long-lasting hues.
- The remarkable paintings of Ajanta showcase the enduring luster of these colors.

■ **The science of Medicine**

- The Atharvaveda discusses diseases and their diagnosis, including diarrhea, fever, and ascites.
- Jivaka, physician to Magadha Emperor Bimbisara, made a significant contribution to medicine.
- Sushruta and Charaka, prominent physicians in the second century AD, authored the Sushruta Samhita and Charak Samhita respectively.
- Sushruta is credited with advancements in surgery, while Charaka Samhita is considered an Indian “Encyclopedia of Medical Science” covering various diseases and treatments.
- Physicians such as Dhanvantari and Bhagwat made important contributions to medicine during the Gupta period.
- The Gupta period also saw the composition of ‘Hastayurveda’ on animal science and ‘Navaneetakam’ on medicine.

■ **Technological Advancement**



• **Various types of Pottery-** The people of ancient India showcased remarkable technological advancements, especially in the realm of pottery. From the Neolithic period onwards, they had mastered the art of pottery production. This expertise further flourished during the Harappan and Chalcolithic cultures, where a diverse range of pottery styles emerged, including black and red pottery, painted gray pottery, Ochre painted pottery, and the polished Northern Black Polished Ware (NBPW). The NBPW stood out as an exceptionally refined and superior form of pottery. Additionally, the Malwa culture gained prominence for its exceptional craftsmanship in pottery, leaving a lasting legacy in the field of ancient Indian technology.

• **Textile Industry-** In ancient times, people had a rich tradition of textile manufacturing, using materials like yarn, silk, and wool for clothing. The Rigveda mentions the production of beautiful woolen cloth in the Gandhara and Sindh regions. During the Maurya period, textile manufacturing was a thriving industry, with Arthashastra noting the use of cotton, wool, and silk for clothing. In the post-Mauryan era, Mathura became renowned for its special cloth called ‘Shatak.’ The remarkable paintings found in the Ajanta caves provide evidence of the use of high-quality fabrics during that period.

• **Advanced Engineering Technology-** Ancient India demonstrated remarkable advancements in engineering technology. The construction of magnificent chaityas, viharas, and temples stands as a testament to their expertise. Notably, the Kailash temple at Ellora showcases their mastery

of cave carving, with intricate details hewn from the mountains during the Maurya period. Equally impressive is the Brihadeeswarar temple of the Chola period, a remarkable example of independent temple construction that highlights their extraordinary engineering skills.

- **Jewelry making-** Jewelry has been adorned by people since ancient times. The necklace, crafted from animal horns found in the region of 'Mahadaha,' serves as evidence of early jewelry usage. During the Harappan period, high-quality beads were intricately fashioned into stunning jewelry pieces. In the Gupta period, jewelry and ornament-making became significant crafts. Even Vatsyayana's Kamasutra acknowledges jewelry making as one of the 64 arts.

- **Iron Technology-** The people of ancient India excelled in the iron and steel industry, producing renowned steel known as 'Wootz'. This superior steel gained worldwide recognition. During the Mauryan, post-Mauryan, and Gupta periods, metal art reached new heights, showcasing their exceptional craftsmanship. The iron pillar at Mehrauli (Delhi), built during the Gupta period, stands as a testament to their remarkable skill and aesthetic beauty. It is worth acknowledging that India's swords were unparalleled and unmatched globally.

- **Copper and Bronze Technology-** The advancement of copper and bronze smelting techniques highlights the remarkable technological progress of ancient India. The inhabitants of the Harappan civilization mastered the art of creating bronze by combining copper and tin. Of special mention is the bronze sculpture of a dancing girl discovered at MohenjoDaro, which was crafted using the lost-

wax casting technique. Additionally, a one-ton bronze statue of Buddha from Sultanganj in Bihar, dating back to the Gupta period, stands as a rare testament to the exceptional metallurgical skills of ancient times.

- **Minting of various types of Coins** –The advanced metal technology of ancient India is evident in the remarkable diversity of currency shapes. Coinage in ancient India began around the fifth century BCE with the introduction of Punch-Marked coins made of silver, copper, or a combination of both metals. These coins featured intricate engravings depicting a variety of designs. During the Gupta period, the artistry in coin production reached its pinnacle, reflecting the same level of excellence found in Gupta sculpture and paintings. For example, Chandragupta I's 'Emperor and Empress' coins portrayed a seated Durga on a lion, while Samudragupta issued notable coin types like Asvemadh, Vyaghra, and Veena-playing coins. Chandragupta II's coins depicted archers, and Kumaragupta I's coins showcased the image of Lakshmi seated on a lotus. These coins serve as outstanding examples of the exceptional artistic achievements of the time.

#### **Practice Questions-**

1. 'The achievements of the people of ancient India in the field of science have been incomparable.' Examine this statement.
2. Discuss the significant technological advancements made by the people of ancient India, highlighting their contributions in various fields of technology.
3. The caves built by Ashoka proved to be a milestone in the history of architecture. Comment

