SUBJECT NAME: History Of Science and Technology

in India

SUBJECT CODE: 18BHI 55S

PRESENTED BY: Dr,Elizabeth Lavanya Pappy

Ph.No. 9894875117

DEPARTMENT OF HISTORY

GOVERNMENT ARTS COLLEGE

((AUTONOMOUS),Cbe-18

Unit :I

Meaning :

The English word Science is derived from a Latin Verb 'Scire', which means 'to know' and Latin Noun 'Scientia' which means 'knowledge'. Meaning of Science is based on German word ' Wissenchaft', which means systematic, organized knowledge. Thus, Science is a systematized knowledge.

"Science as the organization of our knowledge in such a way that it commands or makes possible the explanation of more of the hidden potentialities found in the environment".**- Bronowski, J.**

Scope of Science and Technology:

Science is a body of knowledge obtained by methods based upon observation. Observation is authentic and that it is only through the senses of man that observations can be made. Thus, anything outside the limits of man's senses is outside the limits of science. In other words, science deals with the universe and galaxies in the forms of matter and energy which is in the form of living and non-living.

Science and technology are linked to each other. Discoveries in science have paved the way for the evolution of new technologies. At the same time technology has been instrumental in the development of science.

In science we inquire how a natural phenomenon occurs, while in technology we deal with how the scientific processes can also be used for human welfare. Technology as a discipline has its own autonomy and should not be regarded as a mere extension of science.

Technology is often equated to applied sciences and its domain is generally thought to include mechanical, electrical, optical, electronic devices and instruments, the house hold and commercial gadgets, equipment used in physics, chemistry, biology, nuclear science etc. These various sub-domains of technology are interrelated. Modern technology is an applied science because the basic principles of sciences are applied to develop the technology.

Science as an Approach to Investigate and as a Process of Constructing Knowledge:

1. The investigations in science involve some form of scientific method.

2. Scientists for seeking solution to a problem use different methods like observation,

prediction and sometimes experimentation to study the cause and effect relationship.

3. Whatever we observe through our senses (information) is sent to the brain and the brain processes the information by registering, classifying, generalising etc., and converts into knowledge. Sensory perception is primary in knowledge development.

4. Here, the individual constructs the knowledge on his own by applying their own mental abilities and intelligence to process the information received through senses.

5. The basic unit of knowledge is fact. In science any repeatedly verifiable observation becomes a fact.

6. Scientific approach always is based on cause and effect relation.

Importance of Science and Technology:

In today's world, the role of science and technology is indispensable. We need Science and Technology in every sphere of our life like to treat diseases such as cancer or even to book a cab or train/flight ticket.

One of the most important aspects of Science and Technology is that it has solution to the difficult of the difficult problems, the problems which have the potential to become major bottlenecks to the overall growth of the country. Some of these problems could be −

- Health aspects
- Standard of education
- Availability of healthy food and safe drinking water
- Infrastructure

On the other hand, once mitigating solutions are found for these problems, then the second major issue is the under-development in the field of scientific research and technology that directly affects the development of the country's economy, infrastructure, higher education, and a few other fields listed below −

- Development of nuclear technology
- Defense technology
- Development of satellites
- Biotechnology
- Meteorological science
- Space technology
- Nanotechnology
- Wireless communication, etc.

All these technologies, in turn, provide favorable conditions for the country's growth and increase healthy competition nationally and also internationally.

In today's world, more often, we get to read or listen that developed countries, developing countries, underdeveloped countries, or even third-world countries, all these designate the level of development of Science and Technology in other countries, they have the influence on.

Government has also created an exclusive department to emphasize on the development of Science and Technology and a separate budget is also allocated for the same.

Brahmagupta:

He was born and grew up in western India. The great 7th Century Indian mathematician and astronomer Brahmagupta wrote some important works on both mathematics and astronomy. He was from the state of Rajasthan of northwest India (he is often referred to as Bhillamalacarya, the teacher from Bhillamala), and later became the head of the astronomical observatory at Ujjain in central India. Most of his works are composed in elliptic verse, a common practice in Indian mathematics at the time, and consequently have something of a poetic ring to them.

In his time **discovering** and proving that the product of two negative numbers is a positive number was quite an intellectual achievement. Even today most people remember the product of negative being positive as a rule but do not have the least idea of how to prove it.

Brahmagupta's works, especially his most famous text, the "Brahmasphutasiddhanta", were brought by the 8th Century Abbasid caliph Al-Mansur to his newly founded centre of learning at Baghdad on the banks of the Tigris, providing an important link between Indian mathematics and astronomy and the nascent upsurge in science and mathematics in the **Islamic word.**

Aryabhata, also called **Aryabhata I** or **Aryabhata the Elder**, (born 476, possibly Ashmaka or Kusumapura, India), astronomer and the earliest **Indian mathematician.**whose work and history are available to modern scholars. He is also known as Aryabhata I or Aryabhata the Elder to distinguish him from a 10th-century Indian mathematician of the same name. He flourished in Kusumapura—near Pataliputra (Patna), then the capital of the **Gupta dynasty**—where he composed at least two works, *Aryabhatiya*(c. 499) and the now lost *Aryabhatasiddhanta*.

He became famous as a mathematician and astronomer. In his surviving work, Aryabhatiya, he covered a wide range of topics, such as extracting square roots, solving quadratic equations, and predicting eclipses.

He also correctly believed that the planets and the moon shine by reflected sunlight and that the motion of the stars is duo to Earth's rotation.

Varahamihira:

He also called **Varaha** or **Mihira**, Indian philosopher, astronomer, and mathematician, author of the *Pancha-siddhantika* ("Five Treatises"), a compendium of Greek, Egyptian, Roman, and Indian **astronomy**.

He was an Indian astrologer whose main work was a treatise on mathematical astronomy which summarised earlier astronomical treatises. He **discovered** a version of Pascal's triangle and worked on magic squares. His contribution to physics is his statement that reflection is caused by the back-scattering of particles and refraction (the change of direction of a light ray as it moves from one medium into another) by the ability of the particles to penetrate inner spaces of the material.

Sushruta (c. 600 BCE) is considered as the "founding father of surgery". His period is usually placed between the period of 1200 BC - 600 BC. He was an ancient Indian physician. He is one of the most important surviving ancient treatises on medicine and is considered a foundational text of Ayurveda. Sushruta (c. 600 BCE) is considered as the "founding father of surgery". His period is usually placed between the period of 1200 BC - 600 BC.

The **Charaka Samhita** is the oldest known Hindu text on Ayurveda (life sciences), and it was followed by the **Sushruta Samhita .....** The **Sushruta** and **Charaka** texts differ in one major aspect, with **Sushruta Samhita** providing the foundation of surgery, while **Charaka Samhita** being primarily a foundation of medicine.

Charaka was one of the principal contributors to **Ayurveda**, a system of medicine and lifestyle developed in **Ancient India**. He is known as the compiler or editor of the medical treatise entitled *Charaka Samhita.*

He is generally considered as the first physician to present the concept of **digestion**, **metabolism** and immunity. A body functions because it contains three *dosha* or principles, namely movement (vata), transformation (pitta) and lubrication & stability (kapha). The doshas correspond to the Western classification of humors wind, bile, and phlegm. These doshas are produced when *dhatus* (**blood, flesh and marrow)** act upon the food eaten.

Charaka contributions to the fields of physiology, etiology and embryology have been recognised. He is generally considered as the first physician to present the concept of digestion, metabolism, and immunity.

In addition to initial recitations, uses the foundational assumptions and values embedded in various layers of the **Vedas**.These assumptions include the Vedic doctrine that a human being is a microcosmic replica of the universe, and the ancient Hindu theory of six elements. Three humors (Vata, Pitta, Kapha), three **Guṇas** (Sattva, Rajas and Tamas) as constituent forces innate in a human body, The Charaka Samhita is premised on the Hindu assumption that **Atman (**soul) exists, it is immutable, and thereafter the text defines physical and mental diseases as caused by a lack of correlation and imbalance in body, or mind, or both, because of external factors (Prakriti, objects of senses), age or a want of correlation (appropriate harmony, equilibrium) between the three humors or the three *Gunas*.

Medieval Science and Technology:

Science and technology help each other advance. Scientific **knowledge** is used to create new technologies. New technologies often allow scientists to explore nature in different ways and make new discoveries.

Examples of technologies that have helped science advance include the telescope and microscope The period saw major **technological** advances, including the adoption of gunpowder, the invention of vertical windmills, spectacles, mechanical clocks, and greatly improved water mills, building techniques (Gothic architecture, **medieval** castles), and agriculture in general (three-field crop rotation).

Inventions of the Middle Ages

- Knights in shining armour. ...
- Weapons of mass production. ...
- Toilet talk. ...
- Fortunes in Fleece. ...
- Creating a spectacle. ...
- Hold the press.

The four sources of medieval technology:

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The greatest accomplishment of the Middle Ages:
1. The Printing press was revolutionary. The printing press is probably the most important invention of the **Middle Ages**. It wrenched control of information distribution from The State and The Church and laid the path for Protestant Reformation, The Renaissance, and The Enlightenment.

Top-10 Science and Technology Achievements of 2019

- World's First 'Bunched-beam' Electron Cooling at Collider. ...
- Sea Quark Surprise Reveals Deeper Complexity in Proton Spin Puzzle. ...
- Equipment Delivered for Global High-energy Physics Experiments. ...
- Going the Distance for Quantum. ...
- Understanding Thin Films for Future Applications. ...
- Advances in Catalysts for Energy Production

5 Examples of Technology You Can Use Now

- Smart phones.
- Automatic lights. Falls are the number one cause of fatal and non-fatal injuries among older adults. ...
- Activity and health monitoring. **Technology** you can use can take many forms. ...
- Tablet computers. ...
- Automated cabinets.