

C3 ASSIGNMENT(PART -A)

NAME-ABHISHEK KUMAR
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TOPIC--ANCIENT SCIENTIFIC HERITAGE OF INDIA

“We owe a lot to the ancient Indians, teaching us how to count. Without which most modern scientific discoveries would have been impossible.” – Albert Einstein.

One of the oldest civilizations in the world, the Indian civilization has a strong tradition of science and technology. Ancient India was a land of sages and seers as well as a land of scholars and scientists. Research has shown that from making the best steel in the world to teaching the world to count, India was actively contributing to the field of science and technology centuries long before modern laboratories were set up. Many theories and techniques discovered by the ancient Indians have created and strengthened the fundamentals of modern science and technology. While some of these groundbreaking contributions have been acknowledged, some are still unknown to most.

Ancient Inventions & Discoveries Of Science That India Gifted To The Rest Of The World :

(A) In The Field of mathematics:

1. The Idea of Zero: Little needs to be written about the mathematical digit 'zero', one of the most important inventions of all time. Mathematician Aryabhata was the first person to create a symbol for zero and it was through his efforts that mathematical operations like addition and subtraction started using the digit, zero. The concept of zero and its integration into the place-value system also enabled one to write numbers, no matter how large, by using only ten symbols.

2. The Decimal System: India gave the ingenious method of expressing all numbers by means of ten symbols – the decimal system. In this system, each symbol received a value of position as well as an absolute value. Due to the simplicity of the decimal notation, which facilitated calculation, this system made the uses of arithmetic in practical inventions much faster and easier.

5. Binary Numbers: Binary numbers is the basic language in which computer programs are written. Binary basically refers to a set of two numbers, 1 and 0, the combinations of which are called bits and bytes. The binary number system was first described by the Vedic scholar Pingala, in his book *Chandahśāstra*, which is the earliest known Sanskrit treatise on prosody (the study of poetic metres and verse).

6. some important algorithms developed by ancient mathematicians included Non-linear Equation', 'Convergence', 'Differentiation', 'Iterative Methods', 'Infinite Series' to solve 'Non-Linear Equation', theories of algebra and trigonometry, 'Rolle's Theorem', 'Differential Calculus'.

(B) In The Field of Physics:

In Vedic Science 'Theory of Relativity', 'Atomic and Molecular Theory' was written 'vaisesika-Sutra' of Maharishi 'Kananda' of 6th century BCE.

'Agni-Puran' has stated that atoms are the smallest particle, measured as one millionth of a meter in dimension. 'Aryabhat' in the 5th century told about day and night due to rotation of earth.

‘Bhaskaracharya’ of the 12th century mentioned gravitational force long before Newton.

Panch-Bhut theory represents soil as solid state, water as liquid, air as gaseous, fire as plasma and sky as nuclear state of physical materials.

(c)In The Field of chemistry:

Greek Historians have written that in the 4th century BCE, Indians were capable of extracting metals by melting various metallic ores harvested from mining.

Some of the most important elements which are of great value today also like Gold, Silver, Tin, Lead and Iron were first developed by ancient Indian scientists.

Pillars of 5th century Gupta Dynasty, made out of rust-proof iron alloys, standing for the last 1500 years is the proof of the advanced knowledge on metal-powder technology.

(c)In The Field of Metallurgy and Production Technology:

Spinning and weaving and colouring was 1st invented in India and were very much developed in Vedic India, as described by various Puranas.

‘Biography of Plinee’ indicates that India was exporting cotton, silk and woollen cloths, wools, coloured carpets, from thin clothes to very thick canvases to Rome.

(D)In The Field of Ship-Building and Navigation:

Vedic India was having trade relations with Cambodia, Java, Sumatra, Borneo, China, Arab, Egypt, Persia etc which states that Ship-building and navigation was very much developed.

By 500 CE, Indian navigators were using compass and sextant, British naval engineer ‘J L Raid’ has written that Vedic scholars were conversant to fix direction by using magnets and were laying foundation in the north-east corner, while constructing buildings.

Vedic Indians were the 1st to build sea-faring ships, by the available hard-woods, which were not available in European countries.

(E)In The Field of Medicine and surgery:

Ayurveda - Ancient India Medicine:Ayurveda, meaning the science of longevity, was an indigenous system of medicine in ancient India. The oldest known Ayurvedic texts are the Suśruta Saṃhitā and the Charaka Saṃhitā. It contains information about diseases, their diagnosis and expected cures.

Atreya and Agnivesha - Ancient scholars of India:Ancient scholars of India like Atreya, and Agnivesa have dealt with principles of Ayurveda as long back as 800 BC. Agnivesa was a famous physician who wrote an encyclopedic treatise in the eighth- century B.C. Their works and other developments were consolidated by Charaka who compiled a compendium of Ayurvedic principles and practices in his treatise Charaka-Samahita.

Charaka - Ancient India Medicine:Charaka was a noted Ayurveda practitioner who wrote the famous treatise on medicine Charaka Samahita. He wrote extensively on digestion, metabolism and immune system. According to him, the body functions because it contains three doshas - bile, phlegm and wind. These are produced when dhatus - blood, flesh and marrow act after food is consumed. The body becomes sick when there is imbalance between three doshas. He prescribed drugs to restore this balance.

Sushruta - Ancient Indian Surgery:Sushruta- Samhita is the oldest treatise dealing with the practical problems of surgery and obstetrics.It was written by Shushruta who studied human anatomy in great detail with aid of a dead body. Shushruta- Samhita records the detailed description of the steps to be taken during the performance of a surgical operation.

Yoga - Ancient System of Medicine: Yoga, a system of exercise for physical and mental nourishment was part and parcel of the ancient system of medicine.

(F)In The Field of Engineering and Architecture:

5000 years ago, knowledge of planned town construction technology was developed by our

Vedic sages, as observed from 'Harappa' and 'Mohenjo-Daro'.Buildings with planned water-supply and sewage disposal was invented in Vedic India.

Rope-way and hanging bridges by steel blocks and ropes, were prevalent in Vedic India, as written by the Chinese travellers.

Some ancient architecture of India that makes us proud:The Ajanta cave,The Taj-Mahal,The Vijayanagar Empire-Hampi,Konark Temple,Ellora caves,Chola Temples,temples of khajuraho.

(G)In The Field of Aeronautics and Space Engineering :

Maharshi Gautam in his text 'Baimanik-Sastra' has described about 32 models of air-crafts like 'Pushpak-Viman' used during Treta-Yuga i.e. 7000 years ago, 'Tripura-Biman' using solar power was capable of motion in land, water and air, 'Sakun-Biman' was an aircraft propelled by rocket technology like our present day space-crafts.

Prof. Shiv Sankar Talpade of Bombay in 1895, using the technology given in the Baimanik-Sastra of Gautam, constructed the 1st air-craft of world, which flew up to 1500 ft height, he has written a book 'Prachin Biman-Bidya' in Marathi, after accidental death of Prof.Talpade, Britishers purchased the prototype from his son and with some modifications Wright Brothers got all the credit in 1902,

'Bruhad-Sanhita' of Baraha Mihir describes the use of satellite and space technology.

(H)In The Field of astronomy and geography:

The ancient Indian scholars had a very good knowledge of the various dwipas (continents), mountain systems, rivers, fauna and flora of the brahmavar (sub continent) and the land lying in its vicinity.

The ancient Indian literature describes the Universe as brahmand, which means very immense and wide. The ancient Indian astronomers believed in the geocentric Universe. They were also conscious of the causes of grahnas (eclipses). They believed in the spherical shape of the earth. About the size of the earth, no definite information was given in Vedic and Puranic literature, but later literature of the 5th and 6th centuries A.D on astronomy gave some convincing information about the dimensions of the earth.

Only 5 planets, Mercury, Venus, Mars, Jupiter, Saturn were known to the west before 1781,before discovery of Uranus, Neptune and Pluto by Herschel, but Indians were aware of all the 9 planets from 5000 years .

Vedik sages were aware of other planets with life, as revealed from Vishnu-Puran, which tells Earth is one of the many planets having life on them in the Cosmos.