Exercise

## 1. Answer the following questions in detail :

### (1) Write about the contribution made by ancient India in metallurgy.

- > Since ancient time the people of India uses metallurgy in their practical life.
- > The tradition of making metallic sculpture developed in the tenth and eleventh century.
- Ancient India made extraordinary progress in the field of metallurgy. A metallic idol of a female dancer discovered at Harappa is an example of achievement of ancient India.
- Moreover statues of Buddha belonging to the Kushan period have been found at Takshashila. In South India during the Chola period numerous metal idols were made.
- The statue of Nataraja a masterpiece in sculpture is famous all over the world. It is preserved in museum at Chennai and well known metal idol of 'Rama the archer' is also wonderful.
- Moreover artistic statues of God-Goddess, birds and animals and betelnut cutters are considered the best example of metallic art.

## (2) Write about the development in chemistry achieved by ancient India.

- This science is very useful for various minerals, plants, seed for agriculture, making of various metals or to bring changes in them and for making medicines from health point of view.
- Chemistry is a science of experiment. Acharya Nagarjuna a learned Buddhist of Nalanda University is known as Acharya in the field of chemistry.
- > Acharya Nagarjuna had written books like Rasratnakar and Arogyamanjari.
- > He advocated the use of allopathy along with herbal medicines.
- > It is believed that the use of mercury ash as a medicine was initiated by him.
- > Nalanda University had its own school of chemistry and furnace for study and research.
- > The copper statues of Buddha reflect an expert knowledge and skill in the field of chemistry.
- The copper statue of Buddha at Sultangunj in Bhagalpur district of Bihar is 71 feet high and weighs one tonne.
- > The statue of Buddha at Nalanda is 18 feet high.
- An exquisite example is of Vijay stambha the 24 feet high iron pillar weights 7 tonnes built by Chandragupta it at Delhi. This is the best example of chemistry of India.

### (3) Discuss ancient India's progress in medical science and surgery.

- Maharshi Charak, Maharshi Shushrut and Vagbhatta pioneered the Indian medical science and surgery through their intense research and reached to the greatest height.
- > Maharshi Charak has mentioned over 2000 medicinal herbs in his book Charak Samhita.
- Maharshi Shushrut has written a book 'Shshrut Samhita' about instruments used in surgery. They were so sharp that they would split a single hair.
- > Vagbhatta has written a book Vagbhatta Samhita is also a very important work.

- Thus, study of Charak Samhita, Shushrut Samhita and Vagbhatta Samhita is very useful for every doctor.
- Hindu herbal science of ancient times is enriched with mineral and medicines from plants and animals.
- This has presented a detailed and complicated process of making medicines, their classification and their usage.
- They could even stop blood circulation with bowl-shaped bandage. They could skillfully operate on abdomen, kidney, cataract, hernia, stone, bladder etc. We can see the expertise of Indians in it.
- > They could do plastic surgery of ruptured ear, nose.
- > They were able to give knowledge to students by surgery on dead body or by wax statues.
- They being expert of women and children, could recognize symptoms and diagnose the disease. They also gave dietary directions.
- Veterinary science also developed in ancient India. They wrote books on diseases related to horses and elephants. Among them Hasti Ayurveda, Shalihotra and Ashwashastra are wellknown.
- The expert writer of medicine 'Vagbhatta' made valuable contribution through his work 'Ashtang Hriday'.
- Thus, since ancient times India attained an unprecedented achievements in the field of medicine and surgery.

## (4) Write about the scientific heritage of ancient India.

- Science means knowledge, while technology means the practical utility of systematic knowledge.
- > The great sages of our ancient India have gifted invaluable heritage of science to the world.
- They have made outstanding contribution in the field of metallurgy, chemistry, science of medicines, surgery, mathematics, astronomy, astrology, vastushastra and physics.
- India has contributed in the field of literature, art and also in the field of science and technology.
- > Modern research has proved that India has scientific attitude along with religious outlook.

# 2. Answer the following questions pointwise :

### (1) Write about the progress made by ancient India in mathematics.

- The gift of India to the world are discovery of zero, decimal system, algebra, theorem of Boddhayan, Geometry and Arithmetic.
- > The process of writing figures after zero was discovered by the sage named 'Grutsmad'.
- The ancient Indian mathematicians have decided the numbers made up by placing 53 zeros after 1 (one).

- Decimal system has been seen on the measuring and weighing instruments which have been found from the remains of Harappa and Mohan-Io-Daro and this has been acknowledged by 'Medhatithi' in ancient time.
- Aapstambha has decided the measurement of sacrifical pits used for vedic yagyas in Shulva Sutras (1800 BC).
- ➢ Bhaskaracharya has written books Lilawati Ganit and Bij Ganit in 1150 AD. He discovered sign of addition (+) and substraction (−).
- Aryabhatta has mentioned the value of 1t(pi) is 7 (3.14) in his book Arayabhattiyam he also propounded that n (Pi) is constant to show the ratio of circumference and diameter of circle. Aryabhatta discovered zero.
- Multiplication, addition, substraction, square root, cube root etc. Ashtang method is produced by Aryabhatta in his work.
- > He wrote 'Aryabhattiyam' and 'Dasha Gitika'.
- > He has also found solution of basic questions of maths, arithmatic, geometry.
- He has described main principles of Astronomy in short in his book Aryasiddhanta. Hence, Aryabhatta is known as the father of mathematics.
- Various aspects of mathematics have been discussed by many scholars in their books. Among them the scholars like Boddhayan, Aapastambha, Katyayan, Bhaskaracharya, Brahmagupta are included.

## (2) Write a short-note on : Astronomy of ancient India.

- Many works have been written related to astronomy. An organized and deep study of astrology was made by ancient Universities.
- Planets and their movements, constellations and other celestial objects were used for calculations through which astronomy and astrology were developed.
- Predictions were made on the basis of planetary movement. Astronomy is the most ancient smence.
- Aryabhatta has proved that the earth rotates on its own axis and the basic reason for lunar eclipse is the shadow of the earth. It was addressed as 'Ajarbhar' by the scholars.
- > The first Indian satellite was named 'Aryabhatta' on his name.
- > Brahmagupta popularized the laws of gravitation by writing 'Brahmasiddhanta'.

# (3) Write contribution ofIndia in the field of astrology.

- Astrology's inseparable part is Vastushastra. It is being recognized, dignified and praised by many countries of the world.
- > Varahmihir was the great astrologer and astronomer. He wrote the grantha 'Brihad Samhita'.
- Varahmihir divided astrology into 3 sections named Tantra, Hora and Samhita. He was a great astrologer and astronomer.
- Brihad Samhita is a treasure house of information regarding effects of planets on man's future, his characteristics, various classes of animals, the time of marriage, ponds, wells, gardens and good omen sign for sowing.

We should get pride that our ancestors had art knowledge and expertise in the various sciences.

### (4) Which information are included in Vastushastra?

- Vastushastra is an inseparable part of astrology. It is being recognized, dignified and praised by many countries of the world.
- In ancient India, Brahma, Narad, Brihaspati, Bhrugu, Vashishtta and Vishwakarma have made unique contribution in the field of Vastushashtra.
- In Vastushastra, the principles of construction for dwellings, temple, palace, ashwashala, forts, store house of ammunition and the planning of town in which particular direction. Hence, Vastushastra is also mentioned in Brihad Samhita.
- Rana Kumbha of Mewar revived this science in the 15'h century after improving the previous versions.
- It is believed that Vishwakarma was the first architect of Gods, who divided Vastushastra into eight sections.
- Various informations of Vastushastra like, section of place, shapes, structure, proper planning of things, temples, bhramasthan, dining-room, bedroom etc. are mentioned.
- As time passes, changes are taking place regarding the principles and understanding of vastushastra. It is adopted by the foreigners also.
- It is a blending of science and religion, traditional ideals and practical knowledge, which is rarely seen in the countries of the world.
- Tolerance and equality towards all religions is seen in our culture. Inspite of having diversity in religion, life style and values, we can see unity in our country. Indian culture reflects unique feature of unity in diversity.

# 3. Answer the following questions in short :

## (1) What is meant by science and technology ?

Science means systematic knowledge and technology means the practical utility of systematic knowledge. Thus, new research occurring between science and technology is like a bridge.

## (2) Write about the contribution of Nagarjuna in the field ofchemistry.

- Acharya Nagarjuna, a learned Buddhist of Nalanda University is known as Acharya in the field of chemistry.
- > He had written books like 'Rasratnakar' and 'Arogyamanjari'.
- > Acharya Nagarjuna advocated the use of alopathy with herbal medicines.
- > It is believed that the use of mercury ash as a medicine was initiated by him.

- > Nalanda University had its own school of chemistry and furnace for study and research.
- (3) Write a note on discoveries made by Aryabhatta in mathematics.
  - > Aryabhatta discovered zero.
  - > Aryabhatta has mentioned the value of n(pi) is 27–2 (3.14) in his book Aryabhattiyam.
  - Multiplication, addition, substraction, square, square root, cube, cube root etc. 'Ashtang' method is introduced by Aryabhatta in his work. Hence, Aryabhatta is known as the father of mathematics.
  - > Besides this he had written many other books like 'Dash Gitika', 'Aryabhattiyam'.
  - > He has described main principles of Astronomy in short in his book "Aryasiddhanta".

#### (4) Into how many sections is astrology divided ?

Varahmihir was the great astrologer and astronomer, who divided astrology into 3 sections — Tantra, Hora and Samhita.

#### (5) Name the pioneers of Vastushastra '?

- In ancient India, Brahma, Narad, Brihaspati, Bhrugu, Vashishtha and Vishwakarma have made unique contribution in the field of Vastushastra.
- According to the traditional belief. Vishwakarma was the first architect of Gods who divided Vastushastra into eight sections.
- Rana Kumbha of Mewar revived Vastushastra in the 15'h century after improving the previous versions.

## 4. Choose the correct option from the following to answer the following question :

- (1) Which sculpture has international significance from the art point of view ?
  - (A) Buddha (B) Nataraja (C) Bodhigaya (D) Ram-the archer

### (2) Which is not correct statement from the following '?

- (A) Nagarjuna is considered as a Acharya of chemistry.
- (B) The use of mercury ash as a medicine has been initiated by Nagarjuna.
- (C) Chemistry is not a science of experiment.
- (D) Description of metallic ashes is seen in the works (books) of chemistry.

#### (3) Maharshi Charak : Charak Samhita ; Maharshi Shushrut : .....

<u>(A) Shushrut Samhita</u>	(C) Vagbhatta Samhita	
(B) Charak Shastra	(D) Shushrut Shastra	

(4) In the class of a school various students discuss about mathematics. Which one is true among

them ?

Shreya : Bhaskaracharya had written book named "Lilawati Ganit" and "Bij Ganit".

Yash : Boddhayan discovered decimal system.

Mansi : Aryabhatta is acknowledged as a father of mathematics.

Harda : India discovered zero (0).

(A) Yash (B) Harda (C) Shreya (D) Shreya, Mansi, Hard

### (5) Book written by Brahmbhava Panchal is .....

(A) Chikitsasangraha (B) Prajananshastra (C) Kamasutra (D) Yantra Sarvaswa

(6) In ancient India, who wrote 'Brahmsidhant' which declares the law ofgravitation ?

(A) Brahmgupta	(B) Vastsyayan	(C) Grutsamad	(D) Maharshi Patanj ali
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### (7) Which science from the following suggests about the principle of direction while constructing

temples, palaces, ashwashala, fort etc. ?

(A) Mathematics (C) Science of medicine

(B) Chemistry (D) Vastushastra