India's Heritage of Science and Technology Class 10 GSEB Solutions Social Science Chapter 5

Gujarat Board Class 10 Social Science India's Heritage of Science and Technology Textbook Questions and Answers

I. Answer the following questions in detail.

Question 1.
Write about the contribution made by ancient India in metallurgy.
Answer:
The branch of science and technology-related with the properties of metals and their production and purification is called metallurgy. People of India have been making the use of metallurgy in their daily life since the ancient time.

Ancient India made extraordinary progress in the field of metallurgy. The proof of this is the metallic idol of a female dancer discovered from the Indus Valley Civilization. Metal statues of Buddha belonging to the Kushan period were also found at Takshashila which further proves our excellence in metalwork.

Several idols were made in south India during the Chola period. The finest example of this is the metal statue of Nataraja, which has become world-famous. At present, this statue is preserved in a museum of Chennai. The museum also has the ancient statue of Lord Rama (the archer). Fine ancient metal artistic statues of Gods-Goddesses, birds and animals and betel-nut cutters, etc. are also wonderful examples of our rich metallic art.

Question 2.
Write about the development in chemistry achieved by ancient India.
Answer:
Chemistry is an experimental science. It helps in studying various minerals, plants, seeds for agriculture, making various metal and understanding their properties.

Acharya Nagarjuna's contribution in Chemistry:
Acharya Nagarjuna, a learned Buddhist of Nalanda University, is known as the pioneer of Chemistry. He suggested that people should use allopathic medicines also along with herbal medicines. It is believed that it was Acharya Nagarjuna who first introduced the use of mercury ash as a medicine. He wrote books namely, TRasa-Ratnakar i.e. (juice Ratnakar)' and 'Arogya-manjari'.

In his book Rasaratnakar, he mentioned about the main juices i.e. 'maha rasa', "uprasa' and 10 types of poisons, various types of salts and ash of minerals that are found in chemistry. Nagarjuna was the head of Nalanda University where he had set up school of chemistry and furnace for study and research purpose.

Question 3.
Discuss ancient India's progress in Medical Science and Surgery.
Answer:
Maharishi Charak, Maharishi Sushruta and Vaghatta were the pioneers of ancient India's medical and herbal science and surgery. These people did extensive research and reached great heights. Maharishi Charak wrote a book 'Charak Samhita' in which he has mentioned about over 2000 medicinal herbs. Maharishi Sushruta wrote a book 'Sushruta Samhita' in which he has mentioned instruments used in surgery. The instruments were so sharp that they could split a single in two parts vertically. Vagbhatta wrote a book Vagbhatta Samhita'. Even today, all these three books serve as a very important reference for doctors. Vaghatta also wrote 'Ashtang Hriday' which is an excellent book for diagnosis.

(a) Knowledge about medicines: Ancient Hindu culture's herbal science is enriched with huge collection of minerals and medicines that can be made from plants and animals. Our ancient literature on these sciences explains in detail all the complicated processes of making medicines, classifying them and their usage inproper way. They could recognize symptoms and diagnose the disease. Based on this they used to provide ayurvedic medicines.

(b) Surgery: The ancient Indian doctors were so skilled that to perform surgeries they could stop blood circulation using a special type of bowl-shaped bandage. They could skillfully operate abdomen, kidney, cataract, hernia, stone, piles, bladder, etc. They were expert enough to classify our bones. They could also join the broken or displaced bones and extract things pierced into the body easily and skilfully. They were skilled in plastic surgery as well joining nose and ears. Our ancient doctors had a deep interest in teaching . students the method of surgery. They used to demonstrate surgeries to students either on dead bodies or on wax statues. They also conducted risky operations during delivery. They were also expert gynaecologists and paediatricians and could treat related problems.

Veterinary Science: Veterinary science (Science of treating animals) also developed in ancient India. Ancient India had books written on diseases related to the horses (Ashwa) and elephants (Hasti). Among them 'Hasti Ayurveda', Shalihotra and 'Ashwashastra', are well-known.

Question 4.
Write about the scientific heritage of ancient India.
Answer:
India has an extremely rich heritage of science and technology. India has made enumerable contribution in the fields of metallurgy. Chemistry, mathematics, medicines and surgery, astrology and astronomy, Vastushastra, etc. The statue of Nataraja made during Chola period is a finest example of metallurgy in the world. Acharya Nagarjuna has made us pround with his immense and rich work in chemistry. 'Rasa- ratnakar and 'Arogya-manj ari ' are two of his great books describing about various chemicals found in chemistry.

Due to his knowledge and legacy that Nalanda University had setup school of chemistry in the university campus for research and studies in ancient time. Several structures such as the copper statue of Buddha of Sultanganj, statue of Buddha at Nalanda, Vijay Stambha, are a few of the best examples of our excellence in chemistry.

Maharshi Charak, Maharshi Sushruta and Vagbhatta were the pioneers of ancient India's medical and herbal science and surgery. These people did extensive research and reached great heights. Their books 'Charak Samhita', 'Sushruta Samhita' and Vagbhatta Samhita' are still in use as reference by modem doctors. The ancient Indian doctors were so skilled that to perform surgeries they could stop blood circulation using a special type of bowl-shaped bandage.

They could skillfully operate abdomen, kidney, cataract, hernia, stone, piles, bladder, etc. Veterinary science also developed quite well in ancient India. India has made a notable contribution in the field of mathematics. India's some of the finest gifts to the world are discovery of '0' (zero), decimal system, algebra, theorem of Baudhayana, Geometry and Arithmetic. Aryabhatta discovered 'zero' (0), gave an approximate value of % (pi) as '3.14 or say 22/7'. Brahmagupta gave the knowledge about the types of equations in mathematics. Baudhayana gave another version of Pythagoras theorem. Many works related to astronomy have been written in India.

Ancient universities of India did systematic and deep study of astrology. Aryabhatta made a remarkable contribution in the field of astronomy. As a result, when India launched its first satellite, it named it 'Aryabhatta'. He declared that the earth rotates on its own axis. Brahmagupta mentioned about the laws of gravitation in his book 'Brahmasiddhant'. One of the greatest astrologers and astronomer Varahmihir divided astrology into three sections namely Tanta', 'Hor' and 'Samhita'. Ancient India had also made tremendous contribution in vastushastra. Brahma, Narad, Brahaspati, Bhrugu, Vashishtha and Vishwakarma have made unique contributions in the field of Vastushastra. Today, the western countries have also adopted Vastushatra in various aspects. Thus, India had a rich ancient heritage in science and technology which made India world famous.

II. Answer the following questions pointwise.

Question 1.

Write about the progress made by ancient India in mathematics.

Answer:

India has made a notable contribution in the field of mathematics. India's some of the finest gifts to the world are discovery of '0' (zero), decimal system, algebra, theorem of Baudhayana, Geometry and Arithmetic. Aryabhatta discovered 'zero' (0) whereas the knowledge of writing zero after figures was discovered by the sage named 'Grutsamad'. The ancient Indian mathematicians gave the names of the numbers formed by placing up to 53 zeros after 1 (one). Archaeologists found out that the measuring and weighing instruments of Harappa' and 'Mohenjodaro' used decimal system.

"Medhatithi', the great mathematician, gave the concept of this decimal system. Bhaskaracharya wrote books 'Lilawati Ganit' and "By Ganit' in 1150 AD. He discovered signs of addition (+) and subtraction (-). Brahmagupta gave the knowledge about the types of equations in Mathematics. Baudhayana gave another version of Pythagoras theorem. Around 800 BC., 'Aapstambha' wrote a book called 'Shulba Sutra'. In this book, he gave the method to accurately calculate dimensions for constructing altars needed for sacrifice. These sacrificial pits were also called 'yagyavedis' and were used for Vedic yagyas. His book also contains analysis of several principles.

Aryabhatta is known as the 'father of Mathematics'. He wrote a book called 'Hryabhattiyam'. In this book, he gave an approximate value of x(Pi) as '3.14 or say 22/7', He also suggested that rc(pi) is the consant which works as a multiplier in the equation of circumference and diameter of circle. He also gave information about Ashtang method of multiplication, addition, subtraction, square-root, cube-root, etc.

Aryabhatta also wrote books like 'Dash Gitika' and 'Aryabhattiyam'. In his book 'Aryasiddhanta', he had described the main principles of astronomy. He also found the solution of various fundamentals of arithmetic and geometry. Apart from this, many scholars have contributed various aspects of mathematics in their works and books. Two of these scholars were Katyayan and Bhaskaracharya.

Question 2.
Write a short note on : Astronomy of ancient India.
Answer:
Many works i.e. 'grantha' related to astronomy have been written in India. Ancient universities of India did systematic and deep study of astronomy. Indian scholars studied planets and their movements, constellations and other celestial objects in several mathematical calculations. Based on these calculations they made remarkable progress in the fields of astronomy. They also used to make several predictions by studying the movement of planets. Aryabhatta made a remarkable contribution in field of astronomy. As a result, when India launched its first satellite, named 'Aryabhatta'. He declared that the earth rotates on its own axis. He proved that the basic reason for lunar eclipse is the shadow of the earth.

Question 3.
Write contribution of India in the field of astrology.
Answer:
Ancient universities of India did systematic and deep study of astrology. Indian scholars studied planets and their movements, constellations and other celestial objects in several mathematical calculations. Based on these calculations they made remarkable progress in the field of astrology. They also used to make several predictions by studying the movement of planets. One of the greatest astrologers and astonomers Varahmihir divided astrology into three sections namely Tantra', 'Hora' and 'Samhita'. He wrote a book called 'Brihat Samhita'. This book gives information about effects of planets on man's future, his

characteristics, various classes of animals, the auspicious time of marriage, digging ponds and wells and making gardens.

Question 4.
Which information is included in Vastushastra?
Answer:
Vastushastra means the science of architecture. It gives guidelines for constructing things on the principles of Vastu. In the ancient times Vastushasta gave information for constructing houses, temples, palaces, horse stables, forts, store-house of ammunition and also town planning. Vastushastra provides information for selecting a location, shapes, structure, planning of things, planning of temples and Bhramsthan (planning room), planning dining-room bedroom, etc.

III. Answer the following in short.

Question 1.
What is meant by science and technology?
Answer:
Science means 'systematic knowledge' and technology means 'the practical utility of systematic knowledge'. Although 'Science' and Technology' are two different words, they are linked to each other.

Question 2.
Write about the contribution of Nagarjuna in the field of chemistry.
Answer:
Acharya Nagarjuna, a learned Buddhist of Nalanda University, is known as the pioneer of Chemistry. He suggested that people should use allopathic medicines also along with herbal medicines. It is believed that it was Achaiya Nagarjuna who first introduced the use of mercury ash as a medicine. He wrote books namely, 'Rasa-ratnakar i.e. juice ratnakar' and 'Arogya-manjari'. In his book Rasa- ratnakar, he mentioned about the main juice i.e. 'maha rasa', 'uprasa' and 10 types of poisons, various types of salts and ash to minerals that are found in chemistry. Nagarjuna was the head of Nalanda University where he had set-up school of chemistry and fumance for study and research purpose.

Question 3.
Write a note on discoveries made by Aryabhatta in mathematics.
Answer:
Aryabhatta is known as the 'father of Mathematics'. He discovered 'zero' (0). He wrote a book called 'Aiyabhattiyam'. In this book, he gave an approximate value of x(Pi) as '3.14'. He also suggested that it(pi) is the constant which works as a multiplier in the equation of circumference and diameter of circle. He also gave information about Ashtang method of multiplication, addition, subtraction, square-root, cube-root, etc. Aryabhatta also wrote books like 'Dash Gitika' and 'Aryabhattiyam'. In his book 'Aiyasiddhanta', he had described the main principles of astronomy. He also found the solution of various fundamentals of arithmetic and geometry.

Contribution in astrology and astronomy:
Aryabhatta made a remarkable contribution in the field of astronomy. As a result, when India launched its first satellite, named 'Aryabhatta'. He declared that the earth rotates on its own axis. He proved that the basic reason for lunar eclipse is the shadow of the earth. The Indian scholar used to call this shadow as 'Ajarbhar'.

Question 4.
Into how many sections is astrology divided?
Answer:
Varahmihir who was one of the greatest astrologers and astronomers of India, divided astrology into 3 sections namely Tantra'. 'Hora' and 'Samhita'.

Question 5.
Name the pioneers of Vastushastra.
Answer:
Brahma, Narad, Brahaspati, Bhrugu, Vashishtha, Vishwakarma, Varahmihir, etc. are considered pioneers of Vastushastra in India.

IV. Choose the correct option and answer the following questions.
Question 1.
Which sculpture has international significance from the art point of view?
(a) Buddha
(b) Nataraja
(c) Bodh Gaya
(d) Rama – the archer
Answer:
(b) Nataraja

Question 2.
Which is not correct statement from the following:
(a) Nagarjuna is considered as an 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.
Answer:
(c) Chemistry is not a science of experiment

Question 3.
Maharshi Charak: Charak Samhita,
Maharshi Sushruta:
(a) Sushruta Samhita
(b) Charak Shastra
(c) Vagbhatta Samhita

(d) Sushruta Shastra
Answer:
(a) Sushruta Samhita

Question 4.
In the doss of a school, various students discuss about mathematics. Which one is true among them?
Shreyas: Bhaskaracharya has written books named Lilawati Ganit and Bij Ganit.
Yash: Boddhayan discovered decimal system.
Mansi: Aryabhatta is acknowledged as the father of Mathematics. Hard : India discovered zero (0).
(a) Yash
(b) Hard
(c) Shreya
(d) Shreya, Mansi, Hard
Answer:
(d) Shreya, Mansi, Hard

Question 5.
Book written by Bhrambhravya Panchal is _____ .
(a) Chikitsasangraha
(b) Prajananshastra
(c) Kamasutra
(d) Yantra Sarvaswa
Answer:
(b) Prajananshastra

Question 6.
In ancient India, who wrote 'Brahma- siddhanta' which declares the law of gravitation?
(a) Vatsayayan
(b) Grutsamad
(c) Brahmagupta
(d) Maharashi Patanjali
Answer:
(a) Vatsayayan

Question 7.
Which science from the following suggests about the principle of direction while constructing temples, palaces, ashwashala, forts etc. ?
(a) Mathematics
(b) Chemistry
(c) Science of medicine
(d) Vastushastra

Answer:
(b) Chemistry