History of science and Technology:
Unit: II
Sir William Jones:

He(1746–1794) was an English philologist, Orientalise, and jurist. While serving as a judge of the high court at Calcutta, he became a student of ancient India and founded the Asiatic Society of Bengal. He is best known for his famous proposition that many languages sprang from a common source.

He came to **India** in September, 1783. He was a linguist meaning that he knew and studied different languages. It was because of his interest in languages that **he** started spending time in **studying** Sanskrit and Ancient Hindu texts. By the end of his life, he had learned **28 languages**, including Chinese, often by teaching himself. After several years in translating and scholarship, he turned, for financial reasons, to the study of law and was called to the bar in 1774. Meanwhile, he did not give up Orientalise.

He studied at Harrow and University College, Oxford (1764–68), and learned Latin, Greek, Hebrew, Arabic, and Persian. By the end of his life, he had learned 28 languages, including Chinese, often by teaching himself. After several years in translating and scholarship, he turned, for financial reasons, to the study of law and was called to the bar in 1774. Meanwhile, he did not give up Orientalise. His *Grammar of the Persian Language* (1771) was authoritative in the field for a long time. His *Moallakât* (1782), a translation of seven famous pre-Islamic Arabic odes, introduced these poems to the British public.

Jones's letters, edited by Garland Cannon, were published in two volumes in 1970. Cannon was also the author of a biography published in 1964.He is often credited with establishing the Indo- European family of languages and founding comparative linguistics. On January 15, 1934, the Asiatic Society of Bengal, which was founded under the name of the "Asiatick Society", on January 15, 1784, by **Sir William Jones**, will reach the age of a hundred and fifty years

ii) **Zoological Survey:**

It was founded on 1 July 1916 by Government of India Ministry of Environment, Forest and Climate Change, as premier Indian organisation in **zoological** research and studies to promote the **survey**, exploration and research of the fauna in the country. Dr **Kailash Chandra** Director : Zoological Survey of India

The principal function of **GSI** relate to creation and updation of national geoscientific data and mineral resource assessment, air-borne and marine **surveys** and conducting multifarious geo- technical, geo-environmental and natural hazards studies, glaciology, seismotectonics, etc.

The **genesis o**f Zoological Survey of India was in 1875 with the opening of the Indian Museum. The new museum on its inception comprised only three sections: the Zoological, the Archaeological and the Geological; the zoological collections of the Asiatic Society of Bengal were formally handed over to the Board of Trustees of the Indian Museum in 1875. Zoological Section of the Museum during the period from 1875 to 1916 expanded, growing to the greatest collection of natural history in Asia. By the care and activity of the Curators of the Asiatic society of Bengal and the Superintendents of the Indian Museum, viz. **John McClelland Edward Blyth John Anderson, James Wood-Mason** Alfred William Alcock and **Thomas Nelson Annandale** and his colleagues, the museum was richly endowed with a magnificent collection of animals of the larger **vertebrate** groups..

The Zoological Gallery at the Asiatic society Museum under the care and charge of Nathaniel Wallich served the impetus for the formation of the Zoological Survey of India, born as an independent organization on 1 July 1916. The excerpt from the 'Constitution of the Zoological Survey of India', released by the Government of India, Department of Education, Resolution no. 19-Museum, dated **Shimla,** 20 June 1916, states: "In March 1913, the Chairman of the Trustees of the Indian Museum forwarded a representation from the Superintendent of the Zoological and Anthropological Section of the Museum regarding the recognition of the Zoological Section as Zoological Survey. The Government of India, who had under consideration the desirability of establishing on a sound basis a Zoological Survey of India, informed the Trustees of the Museum that they would be prepared to consider a scheme for such a survey on lines somewhat similar to the existing **Botanical Survey of India** and asked to furnish with the necessary details.

Primary objectives

- Exploring, Surveying, Inventorying and Monitoring of faunal diversity in various states, selected ecosystems and protected areas of India.
- Taxonomic studies of the faunal components collected.
- Status survey of Threatened and Endemic species.
- Preparation of Red Data Book, Fauna of India and Fauna of States.
- Bio-ecological studies on important communities/species.
- Preparation of database for the recorded species of the country.
- Maintenance and Development of National Zoological Collections.
- Training, Capacity Building and Human Resource Development.
- Faunal Identification, Advisory services and Library Services.
- Publication of results including Fauna of India, Fauna of States and Fauna of Conservation Areas.

Secondary objectives

- GIS and Remote Sensing studies on recorded animal diversity as well as on threatened species.
- Chromosomal Mapping and DNA Barcoding.
- Environmental Impact Studies.
- Maintenance of Musea at Headquarters and Regional Centres.
- Development of ENVIS and CITES Centers.
- Research Fellowship, Associateship and Emeritus Scientists Programme.
- Collaborative research programmes on Biodiversity with other Organizations in India and abroad.

Regional centers:

- North Eastern Regional Centre (NERC), Shillong, Meghalaya (Estd. 1959).
- Western Regional Centre (WRC), Pune, Maharashtra (Estd. 1959).
- Central Zone Regional Centre (CZRC), Jabalpur, Madhya Pradesh (Estd. 1960).
- Desert Regional Centre (DRC), Jodhpur, Rajasthan (Estd. 1960).
- Northern Regional Centre (NRC), Dehra Dun, Uttarakhand (Estd. 1960).
- Southern Regional Centre (SRC), Chennai, Tamil Nadu (Estd. 1961).
- Gangetic Plains Regional Centre (GPRC), Patna, Bihar (Estd. 1965).
- High Altitude Regional Centre (HARC), Solan, Himachal Pradesh (Estd. 1968).
- Marine Biology Regional Centre (MBRC), Madras, Tamil Nadu (Estd. 1973).
- Andaman and Nicobar Regional Centre (ANRC), Port Blair (Estd. 1977).
- Freshwater Biology Regional Centre (FBRC), Hyderabad, Andhra Pradesh (Estd. 1979).

ii) Geological survey of India:

Geological surveying employs techniques from the traditional walk-over **survey**, studying outcrops and landforms, to intrusive methods, such as hand augering and machine-driven boreholes, to the use of geophysical techniques and remote sensing methods, such as aerial photography and satellite imagery.

The principal function of **GSI** relate to creation and updation of national geoscientific data and mineral resource assessment, air-borne and marine **surveys** and conducting multifarious geo- technical, geo-environmental and natural hazards studies, glaciology, seismotectonics, etc. **Kolkata** city is the head office of Geological Survey of India.

John McClelland first used the term Geological Survey of India. **Thomas Oldham** established Geological Survey of India? 1851 **Thomas Oldham** arrived in Calcutta on 4th March and took charge of office on 5th March, 1851, which marks the establishment of the Geological Survey of India.

GSI has six Regional offices at Lucknow, Jaipur, Nagpur, Hyderabad, Shillong and **Kolkata** and offices in almost all States of the country. The Geological Survey of India is an attached office to the Ministry of Mines There are seven **types of land** surveying and provide recommended tools for each: ALTA/ACSM, Boundary, Construction, Location, Site Planning, Subdivision, Topographic. 4 March 1851geological survey of India was founded.

Geological survey of India:

1821 First Geological Map of parts of India was of Hyderabad region by Dr H. W. Voysey

1851 Thomas Oldham arrived in Calcutta on 4th March and took charge of office on 5th March, 1851, which marks the establishment of the Geological Survey of India.

1854-55 H. B. Medlicott establishes three fold subdivision of the Vindhyans

1857 H. B. Medlicott surveys Himalayan Ranges between Ravi and Ganges and lays down the foundation of Himalayan Geology.

1858-60 Geological map of the Ranigunj coal fields by W. L. Wilson published. This is the first geological map of 1" = 1 Mile published by the Geological Survey of India

1877 Geological Gallery in the new Indian Museum was thrown open to public on January 1

1892 Geology Classes started in Presidency College, Calcutta with T. H. Holland as the first part time professor of Geology.

1911 Revised Geological Map of India in 1"= 32 Mile scale was published under H. H. Hayden

1846 D. H. Williams of British Geological Survey appointed geologic advisor to the East India Company for the purpose of carrying out geological survey of three coal bearing districts.

some of the major memoirs published in the period 1921-35

- C. S. Fox's memoir on the Gondwana system and the lower Gondwana coalfields of India
- E. R. Gee: Geology and coal reserves of Ranigunj Coalfields
- J. B. Auden's Vindhyan Sedimentaion in the Son Valley
- H. C. Jones Iron Ore deposits of Bihar and Orissa.
- L. L. Fermor's Mineral Resources of Central Provinces of Bihar and Orissa.
- D. N. Wadia's Geology of Poonch State (Kashmir) and Syntaxis of the Northwest Himalaya

3) a)Engineer research:

It is critical to an organization's productivity and competitiveness. From wireless communications to robotics, biomedical **engineering** and sustainable energy, it helps fill gaps in knowledge and develop new products while improving organizational efficiency and growth.

Engineering is the application of science and math to solve problems. **Engineers** figure out how things work and find practical uses for scientific discoveries. ... A good **engineer** is a person who makes a design that works with as few original ideas as possible .

It seeks improvements in theory and practice in fields such as (for example) high-speed computation, **bioengineering, earthquake prediction** power systems, **nanotechnology** and construction.

research important in engineering:

Engineer research is critical to an organization's productivity and competitiveness. From wireless communications to robotics, biomedical **engineering** and sustainable energy, it helps fill gaps in knowledge and develop new products while improving organizational efficiency and growth.

4 types of engineers:

In broad terms, engineering can be divided into four main categories – **chemical**, civil, electrical and mechanical engineering

Major contributors to engineering research around the world include governments, private business,[1] and academia.

The results of engineering research can emerge in journal articles, at academic conferences, and in the form of new products on the marMuch engineering research in the **United States of America** takes place under the aegis of the **Department of Defense**.

Military-related research into science and technology has led to "**dual-use**"applications, with the adaptation of weaponry, communications and other defense systems to civilian use. Programmable **digital computers** and the **Internet** which connects them, the **GPS** satellite network, **fiber-optic cable radar and lasers provide examples**

b) Medical research:

The term "health **research**," sometimes also called "**medical research**" or "**clinical research**," refers to **research** that is done to learn more about human health. Health **research** also aims to find better ways to prevent and treat disease.
Definition: Medical research involves research in a wide range of fields, such as biology, chemistry, pharmacology and toxicology with the goal of developing new medicines or **medical** procedures or improving the application of those already available.
Important of Medical Research:
The **Importance** of Health **Research**. Like privacy, health **research** has high value to society. It can provide **important** information about disease trends and risk factors, outcomes of treatment or public health interventions, functional abilities, patterns of care, and health care costs and use.

US federal funding trends pays for medical research

The **National Institutes of Health** (NIH) is the agency that is responsible for management of the lion's share of federal funding of biomedical research. It funds over 280 areas directly related to health.

The top 10 countries for scientific research in 2018

1. **United States of America**. **The United States** is the most prolific publisher of high-quality science in the world, but **China** is closing the gap with astonishing rapidity. ...
2. **China**. ...
3. Germany. ...
4. United Kingdom. ...
5. Japan. ...
6. France. ...
7. Canada. ...
8. Switzerland.

Three of the most influential and common **purposes of research** are exploration, description and explanation. Exploration involves familiarizing a researcher with a topic. Exploration satisfies the researcher's curiosity and desire for improved understanding.

c)**Agricultural research**:It can be broadly defined as any research activity aimed at improving productivity and quality of crops by their genetic improvement, better plant protection, irrigation, storage methods, **farm** mechanization, efficient marketing, and a better management of resources.

1) **Importance of agriculture research:** In agriculture, scientists actively seek to discover procedures that will increase livestock and crop yields, improve farmland pro- ductivity, reduce loss due to disease and insects, develop more efficient equipment, and increase overall food quality.

2) Types of agricultural research:
Agricultural research has passed through four broad paradigms . These paradigms are (i) **agricultural research**; (ii) **agricultural research** and development; (iii) **agricultural research** for development; and (iv) **agricultural research** for sustainability.

3) branches of agriculture

- Livestock production.
- Crop production.
- **agricultural** economics.
- **agricultural** engineering.

4) benefits of agriculture:
Higher crop productivity. Decreased use of water, fertilizer, and pesticides, which in turn keeps food prices down. Reduced impact on natural ecosystems. Agricultural research and development encompasses an extremely broad range of activities and potential innovations. ... First, higher yield seeds allow production of larger quantities of **agricultural** output at a lower cost, bolstering the income of farmers. Farming creates **opportunities** to lift people out of poverty in developing nations. Over 60 percent of the world's working poor works in agriculture. Farming creates more jobs, beginning with farmers, and continuing with farm equipment makers, food processing plants, transportation, infrastructure and manufacturing.
5) Major Agricultural Problems of India:

- Small and fragmented land-holdings: ...
- Seeds: ...
- Manures, Fertilizers and Biocides: ...
- Irrigation: ...

- Lack of mechanisation: ...
- **Soil erosion**: ...
- Agricultural Marketing: ...
- Inadequate storage facilities:

6) **The main problems of Indian agriculture:**

Rural- Urban Divide. **India's** most of the **farming** is done in rural parts of the country. ...

- Lack of Investment in **Agriculture**. ...
- Lack of Effective Policies. ...
- Negligence of Natural resources. ...
- Impact of Demonetization. ...
- Excessive Interventions on Prices. ...
- Irrigation Facilities. ...
- Sluggish Fertilizer Industry.

7) **Disadvantages of modern agriculture:**

- Due to lack of practical knowledge, farmers cant handle the machines properly. Maintenance cost is very high. Over usage of machines may lead to environmental damage. It is efficient but it has side effects and **drawbacks**.
- are the five importance of agriculture?
- **Agriculture** as a concept has grown as well. A decade or two back, it was associated solely with the production of basic crops. Modern **agriculture** includes forestry, bee keeping, fruit cultivation, poultry, and even dairy **farming**

8)Biggest problems faced by farmers in India:

- Small and fragmented land-holdings: ...
- Seeds: ...
- Manures, Fertilizers and Biocides: ...
- Irrigation: ...
- Lack of mechanisation: ...
- **Soil erosion**: ...
- Agricultural Marketing: ...
- Scarcity of capita

9)Indian farmers are facing problems in agriculture:

The **farmers** are demanding waivers on **farm** loans and higher prices for their crops. For decades now, **farming** in **India** has been blighted by drought, small plot sizes, a depleting water table, declining productivity and lack of modernisation. ... Put simply, **farms** employ a lot of people but produce too little.

iv)Meteorological studies:

Meteorology: It is the study of the atmosphere, atmospheric phenomena, and atmospheric effects on our **weather**. The atmosphere is the gaseous layer of the physical environment that surrounds a planet. ... **Meteorologists** use scientific principles to observe, explain, and forecast our **weather**.

Luke Howard has been called "the father of meteorology" for his comprehensive recordings of weather in the London area from 1801 to 1841 and his writings, which transformed the science of meteorology.

Importance of Meteorology:
Meteorology is **important** because of the impact of air conditions on life. First of all weather forecasting has vital role in urban administration. ... **Meteorology** is **important** for farmers since crops need water to grow up. **Meteorology** is also **important** for both air and marine transportation.

Meteorology is the study of the Earth's atmosphere and the variations in temperature and moisture patterns that produce different weather conditions. Some of the major subjects of study are such phenomena as precipitation (rain and snow), thunderstorms, tornadoes, and hurricanes and typhoons.

The importance of meteorological events is felt in various ways. For example, a drought results in water shortages, crop damage, low river flow rates, and increased wildfire potential. In addition, these effects may lead to restricted river travel, saltwater infiltration in aquifers and coastal bays, stress on various plant and animal species, population shifts, economic hardship, and even political unrest. The critical impact of weather on human activity has led to the development of the uncertain science of weather forecasting.

Scope

The effort to understand the atmosphere and its processes draws on many fields of science and engineering. The study of atmospheric motions is called dynamic meteorology. It makes use of equations describing the behaviour of a compressible fluid (air) on a rotating sphere (the Earth). One important complication in this study is the fact that the water in the atmosphere changes back and forth between solid, liquid, and gas in a very complex fashion. These changes greatly modify the equations used in dynamic meteorology.

Physical meteorology, or atmospheric physics, deals with a number of specialized areas of study. For example, the study of clouds and of the various forms of hydrometeors involves investigations into the behavior of water in the atmosphere. The study of radiative transfer is concerned with the fundamental source of energy that drives atmospheric processes, namely solar radiation, and the ways in which radiant energy in general is employed and dissipated in the atmosphere. Other specialized disciplines deal with phenomena involving light (atmospheric optics) and sound (atmospheric acoustics).

Some branches of meteorology are defined in terms of the size of the phenomena being studied. For example, micrometeorology is mainly the study of the small-scale interactions between the lowest level of the atmosphere and the surfaces with which it comes into contact. Mesoscale meteorology deals with phenomena of intermediate size — thunderstorms and mountain winds, for example. Synoptic meteorology is concerned with larger processes such as high- and low-pressure systems and their fronts, and so on up to the study of overall atmospheric circulation for time scales of a few days. Weather forecasting, the predictive aspect of meteorology, derives from these disciplines.

Other branches of meteorology focus on phenomena in specific locations, such as equatorial areas, the tropics, maritime regions, coastal areas, the poles, and mountains. The upper atmosphere is also studied separately. Other disciplines concentrate on taking observations with particular technologies, including radio, radar, and artificial satellite. Computer technology is applied extensively, including numerical weather prediction, interactive data analysis, and display systems.

The chemical behavior of the atmosphere, studied in atmospheric chemistry, has rapidly gained in importance due to inadvertent changes caused by humans in the molecular composition of the atmosphere. Changes in ozone (and the ozone layer) and carbon dioxide concentrations, and increased levels of acid rain, have gone beyond the status of local problems to become regional or global issues.

Meteorological studies are carried out in conjunction with several environmentally related fields. These include aeronautics, agriculture, architecture, ballistics, ecology, energy production, forestry, hydrology, medicine, and oceanography. Many of these related fields simply need to determine the weather's effects at a particular time and place, but some — hydrology and oceanography, for example — also affect meterological events by modifying atmospheric conditions at the Earth's surface.

Contemporary Meteorology

The field of meteorology is increasingly becoming computerized and automated as scientists seek how best to use the flood of observations from a wide variety of traditional and new instruments. For example, rapid processing of Doppler radar data is crucial to maximize the warning time for tornadoes and other severe local weather phenomena. The preparation of observations for use in large numerical global forecast models, the "timestepping" of these models, and the processing of the resulting output are too laborious for any but the most powerful computers. Development of the World Wide Web has opened a whole new range of options for disseminating the resulting data and forecast information in ways that are still being explored.