GS ARTICLES

JANUARY 2021

EDEN IAS

MAJOR INSTITUTES FOR DEVELOPMENT OF SCIENCE AND TECHNOLOGY IN INDIA

Science and Technology have always been an integral part of Indian culture. India is one of the top-ranking countries in the field of basic research. Indian Science has come to be regarded as one of the most powerful instruments of growth and development, especially in the emerging scenario and competitive economy. The Indian Renaissance, which coincided with our independence struggle, at the dawn of 1900s, witnessed great strides made by Indian scientists.

This innate ability to perform creatively in science came to be backed with an institutional setup and strong state support after the country's independence in 1947. Since then, the Government of India has spared no effort to establish a modern S&T infrastructure in the country. The Department of Science and Technology plays a pivotal role in promotion of science and technology in the country.

Science and Technology are important drivers of economic growth and development in the contemporary world. It helps the country to achieve sustained and rapid growth. NITI Aayog plays a catalytic role in promoting Science & Technology in the country in association with the central scientific departments/agencies. It is the nodal Vertical for examination and appraisal of the ST programmes of the following major agencies/Departments, viz.

- 1. Department of Science and Technology (DST)
- 2. Department of Biotechnology (DBT)
- 3. Department of Scientific and Industrial Research (DSIR) including the Council of Scientific and Industrial Research (CSIR)
- 4. Department of Space (DOS)
- 5. Ministry of Electronics and Information Technology (MeitY)
- 6. Department of Telecommunications (DoT)
- 7. Department of Posts (DoP)

The Ministry Of Science and Technology

The Ministry of Science and Technology is the Indian government ministry charged with formulation and administration of the rules and regulations and laws relating to science and technology in India.

Department of Science & Technology (DST)

Department of Science & Technology (DST) was established in May 1971, with the objective of promoting new areas of Science & Technology and to play the role of a nodal department for organizing, coordinating and promoting S&T activities in the country. The Department has major responsibilities for specific projects and programmes as listed below:

- Formulation of policies relating to Science and Technology.
- Matters relating to the Scientific Advisory Committee of the Cabinet (SACC).
- Promotion of new areas of Science and Technology with special emphasis on emerging areas.
- Research and Development through its research institutions or laboratories for development of indigenous technologies concerning bio-fuel production, processing, standardization and applications, in co-ordination with the concerned Ministry or Department;
- Research and Development activities to promote utilization of by-products to development value added chemicals.
- Coordination and integration of areas of Science & Technology having crosssectoral linkages in which a number of institutions and departments have interest and capabilities.
- Undertaking or financially sponsoring scientific and technological surveys, research design and development, where necessary.
- Support and Grants-in-aid to Scientific Research Institutions, Scientific Associations and Bodies.

The Department of Biotechnology (DBT)

The Department of Biotechnology (DBT) is an Indian government department that works under the Ministry of Science and Technology. It is responsible for administrating development and commercialization in the field of modern biology and biotechnology in India. It was set up in 1986.

About DBT

- The Department of Biotechnology is the nodal agency supporting research and its applications in the Life Sciences and promotes & accelerates the pace of development and large scale use of biotechnology in the country.
- The department has made significant achievements in the growth and application of biotechnology in the broad areas of agriculture, health care, animal sciences, environment, and industry.
- The department has ensured that through several R&D projects, demonstrations and creation of infrastructural facilities a clear visible impact of this field has been seen.

Functions of DBT

- Promoting large scale use of Biotechnology
- Supporting R&D and manufacturing in Biology
- Responsibility for Autonomous Institutions
- Promoting University and Industry Interaction
- Identifying and Set up Centres of Excellence for R&D
- Integrated Programme for Human Resource Development
- Serving as Nodal Point for specific International Collaborations
- Establishment of Infrastructure Facilities to support R&D and production
- Evolving Bio Safety Guidelines, manufacture and application of cell based vaccines
- Serving as nodal point for the collection and dissemination of information relating to biotechnology.

Council of Scientific and Industrial Research (CSIR)

Council of Scientific and Industrial Research (CSIR) is the largest research and development (R&D) organisation in India. It has been established in 1942 and head quarters are located in New Delhi. CSIR has a pan-India presence and has a dynamic network of 38 national laboratories, 39 outreach centres, 3 Innovation Complexes and 5 units.

- CSIR is funded by the Ministry of Science and Technology and it operates as an autonomous body through the Societies Registration Act, 1860.
- CSIR covers a wide spectrum of streams – from radio and space physics, oceanography, geophysics, chemicals, drugs, genomics, biotechnology and nanotechnology to mining, aeronautics, instrumentation, environmental engineering and information technology.
- It provides significant technological intervention in many areas with regard to societal efforts which include the environment, health, drinking water, food, housing, energy, farm and non-farm sectors.

Objectives

- The objectives of the Council are scientific and industrial/applied research of national importance.
- Promotion, guidance and coordination of scientific and industrial research in India including the institution and the financing of specific researchers.
- Establishment and assistance to special institutions or departments of existing institutions for the scientific study of problems affecting particular industries and trade.
- Establishment and award of research studentships and fellowships.
- Utilization of the results of the research conducted under the auspices of the Council towards the development of industries in the country.
- Payment of a share of royalties arising out of the development of the results of research to those who are considered as having contributed towards the pursuit of such research.
- Establishment, maintenance and management of laboratories, workshops, institutes and organisations to further scientific and industrial research.
- Collection and dissemination of information in regard not only to research but to industrial matters generally.
- Publication of scientific papers and a journal of industrial research and development.

Vision & Strategy 2022

• Vision: Pursue science which strives for global impact, the technology that enables innovation-driven industry and nurtures trans-disciplinary leadership thereby catalyzing inclusive economic development for the people of India.

Awards

• Shanti Swarup Bhatnagar (SSB) Prize for Science and Technology is named after the founder Director of the CSIR, the late Dr Shanti Swarup Bhatnagar. It was instituted in 1957 as the most coveted and revered prize in the field of science and technology in the country.

Science and Engineering Research Board (SERB)

It is a statutory body under the Department of Science and Technology, Ministry of Science and Technology established by an Act of the Parliament of India in 2009 (SERB ACT 2008). It is chaired by the Secretary to the Government of India in the Department of Science and Technology and has other senior government officials and eminent scientists as members.

Objective

• It was set up for promoting basic research in science and engineering and to provide financial assistance to scientists, academic institutions, Research and Development laboratories, industrial concerns and other agencies for such research.

Vision

• To position science and technology as the fulcrum for social and economic change by supporting relevant, competitive and quality scientific research and development.

Mission

• As the premier national research funding agency, raise the quality and footprint of Indian science and engineering to the highest global levels in an accelerated mode, through calibrated support for research and development.

Awards

• The JC Bose fellowship is awarded to active scientists in recognition for their outstanding performance. The fellowship is scientist-specific and very selective. Ramanujan Fellowship is meant for brilliant Indian scientists and engineers from outside India to take up scientific research positions in India, those Indian scientists/engineers who want to return to India from abroad. The fellowship is scientist -specific and very selective.

Department of Atomic Energy (DAE)

The Department of Atomic Energy (DAE) was established in 1954. However The Atomic Energy Bill was passed by the Parliament in 1948. Subsequent to that, the Atomic Energy Commission was set up with the first chairman being Homi Bhabha. The apex body of the DAE is the Atomic Energy Commission (AEC).

- The DAE is headquartered in Mumbai. This department is directly under the Prime Minister of the country.
- This department has 6 research institutions, 5 public sector companies, 3 industrial organisations, 3 service organisations and 3 universities under it. The DAE also supports many other research institutes of eminence in India.
- The Bhabha Atomic Research Centre (BARC) located in Mumbai is under the DAE.
- The universities under it are Homi Bhabha National Institute, Mumbai; Tata Institute of Fundamental Research, Hyderabad & Mumbai.

Objectives of the DAE:

- Generating electricity from nuclear energy through the use of the naturally available uranium and thorium in India
- Building research reactors and implementing the radioisotopes produced in reactors for application in the fields of agriculture, industry and medicine
- Developing advanced technology in domains like lasers, accelerators, information technology and biotechnology
- Developing materials including strategic and non-nuclear ones like titanium
- Playing a role in national security

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Department of Space(DOS)

The Department of Space is an Indian government department responsible for administration of the Indian space program. It manages several agencies and institutes related to space exploration and space technologies. The Secretariat of DOS and ISRO Headquarters are located at Antariksh Bhavan in Bangalore.

Background

• The space activities in the country were initiated With the setting up of Indian National Committee for Space Research (INCOSPAR) in 1962,. In the same year, the work on Thumba Equatorial Rocket Launching Station (TERLS) near Thiruvananthapuram was also started. Indian Space Research Organisation (ISRO) was established in August 1969. The Government of India constituted the Space Commission and established the Department of Space (DOS) in June 1972 and brought ISRO under DOS in September 1972.

Objective:

The Department of Space (DOS) has the primary objective of promoting development and application of space science and technology to assist in all-round development of the nation. Towards this, DOS has evolved the following programmes:

- 1. Launch Vehicle programme having indigenous capability for launching spacecrafts.
- 2. INSAT Programme for telecommunications, broadcasting, meteorology, development of education etc.
- 3. Remote Sensing Programme for application of satellite imagery for various developmental purposes.
- 4. Research and Development in Space Sciences and Technology for serving the end of applying them for national development.

Indian Space Research Organization (ISRO)

ISRO or Indian Space Research Organisation is India's space agency founded in 1969 to help develop an indigenous Indian space program. The head quarters of ISRO are located in Bengaluru. It is one of the 6 largest space agencies in the world today.

- ISRO maintains one of the biggest fleets of remote sensing (IRS) and communication (INSAT) satellites catering to the needs of the nation through a network of centres, offices, and research institutes in different parts of the country.
- ISRO functions in the following areas: broadcasting, weather forecasting, disaster management, geographic information systems, navigation, cartography (maps), and telemedicine, distance education satellites, etc.
- ISRO has many facilities each dedicated to a specialised field of study in space. A few of them are as follows:
 - 1. Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram
 - 2. Liquid Propulsion Systems Centre (LPSC), Thiruvananthapuram
 - 3. Satish Dhawan Space Centre (SDSC-SHAR), Sriharikota
 - 4. Space Applications Centre (SAC), Ahmadabad
 - 5. National Remote Sensing Centre (NRSC), Hyderabad

ISRO Vision & Objectives

- Vision: ISRO's vision is stated as "Harness space technology for national development while pursuing space science research and planetary exploration."
- ISRO Mission
- 1. Design and development of launch vehicles and related technologies for providing access to space.
- 2. Design and development of satellites and related technologies for earth observation, communication, navigation, meteorology and space science.
- 3. Indian National Satellite (INSAT) programme for meeting telecommunication, television broadcasting and developmental applications.
- 4. Indian Remote Sensing Satellite (IRS) programme for management of natural resources and monitoring of environment using space-based imagery.
- 5. Space-based Applications for Societal development.
- 6. Research and Development in space science and planetary exploration.

DISASTER – HAZARD AND VULNERABILITY

Syllabus Section: Disaster Management/ GS Paper III

What is a disaster?

A disaster is a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources. Though often caused by nature, disasters can have human origins.

(VULNERABILITY+ HAZARD) / CAPACITY = DISASTER

The combination of hazards, vulnerability and inability to reduce the potential negative consequences of risk results in disaster.

What is Hazard?

A hazard is a process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.

Hazards may be natural, anthropogenic or socionatural in origin.

The classification schemes for hazards vary across different research institutions and governments, but these can be divided into (UNSIDR, 2017):

Biological hazards

- They are of organic origin or conveyed by biological vectors, including pathogenic microorganisms, toxins and bioactive substances.
- Examples are bacteria, viruses or parasites, as well as venomous wildlife and insects, poisonous plants and mosquitoes carrying disease-causing agents.

Environmental hazards

- It includes chemical, natural and biological hazards.
- They can be created by environmental degradation or physical or chemical pollution in the air, water and soil.
- However, many of the processes and phenomena that fall into this category may be termed drivers of hazard and risk rather than hazards in themselves, such as soil degradation, deforestation, loss of biodiversity, salinization and sea-level rise.

Geological or geophysical hazards

- It originates from internal earth processes.
- Examples are earthquakes, volcanic activity and emissions, and related geophysical processes such as mass movements, landslides, rockslides, surface collapses and debris or mud flows.
- Hydro meteorological factors are important contributors to some of these processes.
- Tsunamis are difficult to categorize: although they are triggered by undersea earthquakes and other geological events, they essentially become an oceanic process that is manifested as a coastal water-related hazard.

Hydro meteorological hazards

- They are of atmospheric, hydrological or oceanographic origin.
- Examples are tropical cyclones (also known as typhoons and hurricanes); floods, including flash floods; drought; heat waves and cold spells; and coastal storm surges. Hydro meteorological conditions may also be a factor in other hazards such as landslides, wild land fires, locust plagues, epidemics and in the transport and dispersal of toxic substances and volcanic eruption material.

Technological hazards

- It originates from technological or industrial conditions, dangerous procedures, infrastructure failures or specific human activities.
- Examples include industrial pollution, nuclear radiation, toxic wastes, dam failures, transport accidents, factory explosions, fires and chemical spills. Technological hazards also may arise directly as a result of the impacts of a natural hazard event

Difference between Hazard and Disaster:

Hazard	Disaster
Hazard is an event that has potential for causing	Disaster is an event that occurs
property/environment.	disrupts the normal course of life in affected
	area.
Hazards can lead to disasters.	A disaster is the result of a hazard but at the
	same time is also a hazardous event.
Hazards come with warnings.	Ignoring warnings can lead to disaster.
Hazards may be inevitable.	Disasters can be prevented.
Hazard occurs at less populated area.	Disaster occurs at overpopulated area.

Vulnerability

- Vulnerability is the inability to resist a hazard or to respond when a disaster has occurred. For instance, people who live on plains are more vulnerable to floods than people who live higher up.
- Vulnerability depends on several factors such as people's age and state of health, local environmental and sanitary conditions, as well as on the quality and state of local buildings and their location with respect to any hazards.
- Families with low incomes often live-in high-risk areas around cities, because they can't afford to live in safer (and more expensive) places, this is what we call economic vulnerability
- Similarly, a wooden house is sometimes less likely to collapse in an earthquake, but it may be more vulnerable in the event of a fire or a hurricane. This is what we call physical vulnerability.
- Risk
- Risk (or more specifically, disaster risk) is the potential disaster losses (in terms of lives, health status, livelihoods, assets and services) which could occur to a particular community or a society over some specified future time period.
- It considers the probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environmentally damaged) resulting from interactions between natural or human induced hazards and vulnerable conditions.
- Risk = Probability of Hazard x Degree of Vulnerability.

FEATURES OF PARLIAMENTARY SYSTEM AND PRESIDENTIAL SYSTEM

Syllabus Section: Polity and constitution/ GS Paper II

Features of Parliamentary System of Government

The Constitution of India provides for a parliamentary form of government, both at the Centre and in the states. Articles 74 and 75 of Indian constitution deals with the parliamentary system at the Centre and Articles 163 and 164 in the states. The features or principles of parliamentary government in India are as follows:

- 1. Nominal and Real Executives: The President is the nominal executive (de jure executive or titular executive) while the Prime Minister is the real executive (de facto executive). Thus, the President is head of the State, while the Prime Minister is head of the government. Article 74 provides for a council of ministers headed by the Prime Minister to aid and advise the President in the exercise of his functions. The advice so tendered is binding on the President.
- **2. Majority Party Rule:** The political party which secures majority seats in the Lok Sabha forms the government.
- **3. Collective Responsibility:** The ministers are collectively responsible to the Parliament in general and to the Lok Sabha in particular (Article 75). They act as a team, and swim and sink together.

- **4. Political Homogeneity:** Usually members of the council of ministers belong to the same political party, and hence they share the same political ideology. In case of coalition government, the ministers are bound by consensus.
- 5. **Double Membership:** The ministers are members of both the legislature and the executive. This means that a person cannot be a minister without being a member of the Parliament.
- 6. Leadership of the Prime Minister: The Prime Minister plays the leadership role in this system of government. He is the leader of the council of ministers, leader of the Parliament and leader of the party in power.
- 7. Dissolution of the Lower House: The lower house of the Parliament (Lok Sabha) can be dissolved by the President on recommendation of the Prime Minister.
- 8. Secrecy: The ministers operate on the principle of secrecy of procedure and cannot divulge information about their proceedings, policies and decisions. They take the oath of secrecy before entering their office. The oath of secrecy to the ministers is administered by the President

Features of Presidential Government

Unlike the Indian Constitution, the American Constitution provides for the presidential form of government. The features of the American presidential system of government are as follows:

- (a) The American President is both the head of the State and the head of government. As the head of State, he occupies a ceremonial position. As the head of government, he leads the executive organ of government.
- (b) The President is elected by an electoral college for a fixed tenure of four years. He cannot be removed by the Congress except by impeachment for a grave unconstitutional act.
- (c) The President governs with the help of a cabinet or a smaller body called 'Kitchen Cabinet'. It is only an advisory body and consists of non-elected departmental secretaries. They are selected and appointed by him, are responsible only to him, and can be removed by him any time.

- (d) The President and his secretaries are not responsible to the Congress for their acts. They neither possess membership in the Congress nor attend its sessions.
- (e) The President cannot dissolve the House of Representatives—the lower house of the Congress.
- (f) The doctrine of separation of powers is the basis of the American presidential system. The legislative, executive and judicial powers of the government are separated and vested in the three independent organs of the government.

DHARASHIV CAVES

Syllabus section: Art and culture

Why in News?

DharaShiv caves were in news recently when Maharashtra CM referred to Osmanabad as Dharashiv (named after 6th century caves).

About:

- Osmanabad is named after the last ruler of Hyderabad, Mir Osman Ali Khan, while Dharashiv is derived from the name for the sixth-century caves near the city.
- Dharashiv caves are the nexus of 7 caves in Balaghat mountains in Maharashtra.
- These have been declared as Protected area by Government of Maharashtra.
- They are believed to be built around 5th-7th century.
- There have been debates over caves whether they are Buddhist or Jain creations.
- It is believed that these caves were originally Buddhist, but later some caves were converted to Jain caves.

CLASSIFICATION OF TAXES

tax is a mandatory financial charge or some other type of levy imposed upon a taxpayer by a governmental organization in order to fund various public expenditures. A failure to pay, along with evasion of or resistance to taxation, is punishable by law. However, the government can exclude certain individuals, groups or institutions from the burden of taxation by law. Further, there exists no quid pro quo between payment of taxes and provision of public goods and services. Certain vulnerable sections benefit from government expenditure irrespective of their contribution to the tax revenues. Taxes can be broadly classified into three types

- Direct and Indirect Taxes
- Specific and Ad-Valorem Taxes
- Progressive, Regressive and Proportional Taxes

Direct and Indirect Taxes

Direct Taxes, as the name suggests, are taxes that are directly paid to the government by the taxpayer. It is a tax applied on individuals and organizations directly by the government e.g. income tax, corporation tax, wealth tax, etc. Indirect tax the burden of taxation falls on the same person over whom the tax is imposed i.e. the burden cannot be shifted. Direct taxes are generally taxes on income and property.

An indirect tax is a tax levied by the Government on goods and services and not on the income, profit or revenue of an individual or institution and its burden can be shifted. In other words, the indirect tax is imposed over someone but its burden falls on someone else. Customs Duty, Service Tax, Goods and Services Tax (GST) are examples of indirect taxes. The Government often increases the tax rate when there is monetary inflation which in turn reduces the demand for goods and services and as a result of descending demand, the inflation is bound to condense.

Specific and Ad-Valorem Taxes

Specific tax is a tax imposed on some specific attribute of the good or service irrespective of its value. Like taxes on quantity, weight, length, size, etc are examples of specific taxes. Ad-valorem taxes are taxes imposed on the value (generally taken as money value) of the good or service. The most common ad valorem taxes are property taxes levied on real estate. However, ad valorem taxes may also extend to a number of tax applications, such as import duty taxes on goods from abroad.

Progressive, Regressive, and Proportional Taxes

A progressive tax is defined as a tax whose rate increases as the payer's income increases. That is, individuals who earn high incomes have a greater proportion of their incomes taken to pay the tax. A regressive tax, on the other hand, is one whose rate increases as the payer's income decreases. In other words under a regressive tax structure as the income increases the burden of taxes decreases.

A proportional tax system also referred to as a flat tax system, assesses the same tax rate on everyone regardless of income or wealth.

What is Economic Planning?

The fundamental purpose of economic life is the satisfaction of human wants which are basically unlimited. All the economic activities of any modern society are directed towards satisfying human needs with limited (scarce) resources.

The limitation of resources forces society to make choice and allocation. Economic resources are scarce in relation to the demands for their alternative uses. The primary economic problem is the allocation of scarce resources to satisfy human wants in a manner that brings maximum satisfaction.

Economic planning, writes B.C. Tandon, "means arrangement of resources which are scarce in relation to the needs for their alternative uses in such a way that the satisfaction yielded by them is maintained at an optimum level. It thus involves the element of choice between scarce means of achieving a predetermined end. It is a carefully thoughtout rational arrangement of economic resources". L. Robbins says: "To plan is to act with a purpose, to choose, and choice is the essence of economic activity".

Features of Economic Planning Economic planning has some essential features:

- There must be a centralised planning authority for preparing the plans and suggesting the means for their implementation.
- Before framing the plan, the planning authority should undertake an accurate survey of the available resources (both existing and potential) and the essential needs of the country.
- An economic plan must have some definite aims and objectives.
- The plan should lay down a series of targets on the different lines of production such as agricultural, industrial, etc.
- It should make a proper allocation of the proposed outlay into the different heads of development.

Necessity for Economic Planning

The factors, which emphasis the need for economic planning in India, are as follows:

- To attain steady economic development in a free market economy.
- To remove unemployment, poverty and inequalities among people.

- To provide infrastructural facilities such as banking, power, water, transport and communications.
- To allocate resources properly between present and future needs.
- To attain balanced regional development.

The objective of Economic Planning in India

• Economic Development:

The main objective of Indian planning is to achieve the goal of economic development, economic development is necessary for underdeveloped countries because they can solve the problems of general poverty, unemployment and backwardness through it.

Economic development is concerned with the increase in per capita income and causes behind this increase.

• Increase Employment:

Another objective of the plans is a better utilization of manpower resources and increasing employment opportunities. Measures have been taken to provide employment to millions of people during plans.

• Self-Sufficient:

It has been the objective of the plans that the country becomes self-sufficient regarding food grains and industrial raw material like iron and steel etc. Also, growth is to be self-sustained for which rates of saving and investment are to be raised. With the completion of the Third Plan, the Indian economy has reached the takeoff stage of development. The main objective of the Tenth Plan is to get rid of dependence on foreign aid by increasing export trade and developing internal resources.

Economic Stability:

Stability is as important as growth. It implies the absence of frequent end excessive occurrence of inflation and deflation. If the price level rises very high or falls very low, many types of structural imbalances are created in the economy.

Economic stability has been one of the objectives of every Five-year plan in India. Some rise in prices is inevitable as a result of economic development, but it should not be out of proportion. However, since the beginning of the second plan, the prices have been rising rather considerably.

• Comprehensive Development:

All-round development of the economy is another objective of the five-year plans. Development of all economic activities viz. agriculture, industry, transport, power etc. is sought to be simultaneously achieved. First Plan laid emphasis on the development of agriculture. The second plan gave priority to the development of heavy industries. In the Eighth Plan maximum stress was on the development of human resources.

• To Reduce Economic Inequalities:

Every Plan has aimed at reducing economic inequalities. Economic inequalities are indicative of exploitation and injustice in the country. It results in making the rich richer and the poor poorer. Several measures have been taken in the plans to achieve the objectives of economic equality especially by way of progressive taxation and reservation of jobs for the economically backward classes. The goal of the socialistic pattern of society was set in the second plan mainly to achieve this objective.

• Increase in Standard of Living:

The other objective of the plan is to increase the standard of living of the people. Standard of living depends on many factors such as per capita increase in income, price stability, equal distribution of income etc.

