ASSIGNMENT

(Tutor Marked Assignment)

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Max. Marks: 100

Write detailed accounts on the following. 10 × 10

1. Tradition and social function of Science.
2. The method of Science.
3. Formation of solar system.
4. Evidences of human evolution.
5. Management of forest and water resources.
6. Challenges for the agriculture sector in India.
7. Ancient and modern outlooks for the prevention of disease.
8. Media for open and distance mode of education.
9. Ways of technology transfer.
10. 'How scientific development is influenced by social needs and perceptions'.

Answers

SECTION I

1. Tradition and social function of Science.

Ans.: We have in the practice of science the prototype for all human action. The task which the scientists have undertaken — the understanding and control of nature and of man himself — is merely the conscious expression of the task of human society. The methods by which this task is attempted, however imperfectly they are realized, are the methods by which humanity is most likely to secure its own future. In its.endeavour, science is communism. In science men have learned consciously to subordinate themselves to a common purpose without losing the individuality of their achievements. Each one knows that his work depends on that of his predecessors and colleagues and that it can only reach its fruition through the work of his successors. In science men collaborate not because they are forced to by superior authority or because they blindly follow some chosen leader, but because they realize that only in this willing collaboration can each man find his goal. Not orders, but advice, determine action. Each man knows that only by advice, honestly and disinterestedly given, can his work succeed, because such advice expresses as near as may be the inexorable logic of the material world, stubborn fact. Facts cannot be forced to our desires, and freedom comes by admitting this necessity and not by pretending to ignore it. These things have been learned painfully and incompletely in the pursuit of science. Only in the wider tasks of humanity will their full use be found.

To see the function of science as a whole, it is necessary to look at it against the widest possible background of history. Our attention to immediate historical events has, up till very recently, blinded us to the understanding of its major transformations. Mankind is, after all, a relatively late emergence on the scene of terrestrial evolution, and the earth itself is a late by product of cosmic forces. Up till now human life has only undergone three major changes: the foundation of society and of civilization both of which occurred before the dawn of recorded history, and that scientific transformation of society which is now taking place and for which we have as yet no name.

The first revolution was the foundation of society by which man became different from the animals and found, through the new habit of transmission of experience from generation to generation, a means of advance altogether faster and more sure than the haphazard evolutionary struggle. The second revolution was the discovery of civilization, based on agriculture, and bringing with it a manifold development of specialized techniques, but above all, the social forms of the city and trade. Through these mankind as a whole was removed from parasitic dependence on nature and a certain section of mankind liberated altogether from the task of food production. The discovery of civilization was a local event. It had acquired nearly all its essential features by the sixth millennium B.C. but only at its centre, somewhere between Mesopotamia and India. We cannot trace in the succeeding thousands of years right up to the Renaissance and the beginning of our own times, any substantial change in the quality of civilization. The whole of this period of recorded history marks only relatively small cultural and technical changes, and these for the most part of a cyclic character. Civilization after civilization rises and decays, but each one, though different, is not essentially in advance of the one before. The real perceptible advance is only in area. Every breakdown of the civilization internally and through barbarian invasions meant in the long run, after a period of confusion, the spread of that civilization to the barbarians. By the end of the period all the easily cultivated lands of the old world were civilized.

2. The method of Science.

Ans.: Science is a systematic and logical approach to discovering how things in the universe work. It is also the body of knowledge accumulated through the discoveries about all the things in the universe.

The word "science" is derived from the Latin word scientia, which is knowledge based on demonstrable and reproducible data, according to the Merriam Webster Dictionary. True to this definition, science aims for measurable results through testing and analysis. Science is based on fact, not opinion or preferences. The process of science is designed to challenge ideas through research. One important aspect of the scientific process is that it is focuses only on the natural world, according to the University of California. Anything that is considered supernatural does not fit into the definition of science.

The steps of the scientific method go something like this:

- Make an observation or observations.
- Ask questions about the observations and gather information.

- Form a hypothesis — a tentative description of what's been observed, and make predictions based on that hypothesis.
- Test the hypothesis and predictions in an experiment that can be reproduced.
- Analyze the data and draw conclusions; accept or reject the hypothesis or modify the hypothesis if necessary.
- Reproduce the experiment until there are no discrepancies between observations and theory. "Replication of methods and results is my favorite step in the scientific method," Moshe Pritsker, a former post doctoral researcher at Harvard Medical School and CEO of JoVE, told Live Science. "The reproducibility of published experiments is the foundation of science. No reproducibility – no science."

Some key underpinnings to the scientific method:

- The hypothesis must be testable and falsifiable, according to North Carolina State University. Falsifiable means that there must be a possible negative answer to the hypothesis.
- Research must involve deductive reasoning and inductive reasoning. Deductive reasoning is the process of using true premises to reach a logical true conclusion while inductive reasoning takes the opposite approach.
- An experiment should include a dependent variable (which does not change) and an independent variable (which does change).
- An experiment should include an experimental group and a control group. The control group is what the experimental group is compared against.

3. Formation of solar system.

Ans.: Our solar system consists of one star (the Sun), eight planets and all their moons, three dwarf planets, and several thousand small solar system objects—asteroids, comets, trans Neptunian objects, and other small bodies. The Sun's age was calculated in 1989 to be 4.5 billion years old, less than the 4.7 billion years previously believed. It was formed from a cloud of hydrogen mixed with small amounts of other substances that had been produced in the bodies of other stars before the Sun was born. This was the parent cloud of the solar system. The dense, hot gas at the center of the cloud gave rise to the Sun; the outer regions of the cloud—cooler and less dense—gave birth to the planets.

The Solar System has evolved considerably since its initial formation. Many moons have formed from circling discs of gas and dust around their parent planets, while other moons are thought to have formed independently and later been captured by their planets. Still others, such as Earth's Moon, may be the result of giant collisions. Collisions between bodies have occurred continually up to the present day and have been central to the evolution of the Solar System. The positions of the planets often shifted due to gravitational interactions. This planetary migration is now thought to have been responsible for much of the Solar System's early evolution.

In roughly 5 billion years, the Sun will cool and expand outward to many times its current diameter (becoming a red giant), before casting off its outer layers as a planetary nebula and leaving behind a stellar remnant known as a white dwarf. In the far distant future, the gravity of passing stars will gradually reduce the Sun's retinue of planets. Some planets will be destroyed, others ejected into interstellar space. Ultimately, over the course of tens of billions of years, it is likely that the Sun will be left with none of the original bodies in orbit around it.

Ideas concerning the origin and fate of the world date from the earliest known writings; however, for almost all of that time, there was no attempt to link such theories to the existence of a "Solar System", simply because it was not generally thought that the Solar System, in the sense we now understand it, existed. The first step toward a theory of Solar System formation and evolution was the general acceptance of heliocentrism, which placed the Sun at the centre of the system and the Earth in orbit around it. This concept had developed for millennia (Aristarchus of Samos had suggested it as early as 250 BC), but was not widely accepted until the end of the 17th century. The first recorded use of the term "Solar System" dates from 1704.

The current standard theory for Solar System formation, the nebular hypothesis, has fallen into and out of favour since its formulation by Emanuel Swedenborg, Immanuel Kant, and Pierre Simon Laplace in the 18th century. The most significant criticism of the hypothesis was its apparent inability to explain the Sun's relative lack of angular momentum when compared to the planets. However, since the early 1980s studies of young stars have shown them to be surrounded by cool discs of dust and gas, exactly as the nebular hypothesis predicts, which has led to its re acceptance.

Understanding of how the Sun is expected to continue to evolve required an understanding of the source of its power. Arthur Stanley Eddington's confirmation of Albert Einstein's theory of relativity led to his realisation that the Sun's energy comes from nuclear fusion reactions in its core, fusing hydrogen into helium. In 1935, Eddington went further and suggested that other elements also might form within stars. Fred Hoyle elaborated on this premise by arguing that evolved stars called red giants created many elements heavier than hydrogen and helium in their cores. When a red giant finally casts off its outer layers, these elements would then be recycled to form other star systems.

4. Evidences of human evolution.

Ans.: Scientists have discovered a wealth of evidence concerning human evolution, and this evidence comes in many forms. Thousands of human fossils enable researchers and students to study the changes that occurred in brain and body size, locomotion, diet, and other aspects regarding the way of life of early human species over the past 6 million years. Millions of stone tools, figurines and paintings, footprints, and other traces of human behavior in the prehistoric record tell about where and how early humans lived and when certain technological innovations were invented. Study of human genetics show how closely related we are to other primates – in fact, how connected we are with all other organisms – and can indicate the prehistoric migrations of our species, Homo sapiens, all over the world. Advances in the dating of fossils and artifacts help determine the age of those remains, which contributes to the big picture of when different milestones in becoming human evolved.

Human evolution is the lengthy process of change by which people originated from apelike ancestors. Scientific evidence shows that the physical and behavioral traits shared by all people originated from apelike ancestors and evolved over a period of approximately six million years.

One of the earliest defining human traits, bipedalism the ability to walk on two legs evolved over 4 million years ago. Other important human characteristics such as a large and complex brain, the ability to make and use tools, and the capacity for language developed more recently. Many advanced traits including complex symbolic expression, art, and elaborate cultural diversity emerged mainly during the past 100,000 years.

Humans are primates. Physical and genetic similarities show that the modern human species, Homo sapiens, has a very close relationship to another group of primate species, the apes. Humans and the great apes (large apes) of Africa chimpanzees (including bonobos, or so called “pygmy chimpanzees”) and gorillas share a common ancestor that lived between 8 and 6 million years ago. Humans first evolved in Africa, and much of human evolution occurred on that continent. The fossils of early humans who lived between 6 and 2 million years ago come entirely from Africa.

Most scientists currently recognize some 15 to 20 different species of early humans. Scientists do not all agree, however, about how these species are related or which ones simply died out. Many early human species certainly the majority of them – left no living descendants. Scientists also debate over how to identify and classify particular species of early humans, and about what factors influenced the evolution and extinction of each species.

Early humans first migrated out of Africa into Asia probably between 2 million and 1.8 million years ago. They entered Europe somewhat later, between 1.5 million and 1 million years. Species of modern humans populated many parts of the world much later. For instance, people first came to Australia probably within the past 60,000 years and to the Americas within the past 30,000 years or so. The beginnings of agriculture and the rise of the first civilizations occurred within the past 12,000 years.

Paleoanthropology: Paleoanthropology is the scientific study of human evolution. Paleoanthropology is a subfield of anthropology, the study of human culture, society, and biology. The field involves an understanding of the similarities and differences between humans and other species in their genes, body form, physiology, and behavior. Paleoanthropologists search for the roots of human physical traits and behavior. They seek to discover how evolution has shaped the potentials, tendencies, and limitations of all people. For many people, paleoanthropology is an exciting scientific field because it investigates the origin, over millions of years, of the universal and defining traits of our species. However, some people find the concept of human evolution troubling because it can seem not to fit with religious and other traditional beliefs about how people, other living things, and the world came to be. Nevertheless, many people have come to reconcile their beliefs with the scientific evidence.

Early human fossils and archeological remains offer the most important clues about this ancient past. These remains include bones, tools and any other evidence (such as footprints, evidence of hearths, or butchery marks on animal bones) left by earlier people. Usually, the remains were buried and preserved naturally. They are then found either on the surface (exposed by rain, rivers, and wind erosion) or by digging in the ground. By studying fossilized bones, scientists learn about the physical appearance of earlier humans and how it changed. Bone size, shape, and markings left by muscles tell us how those predecessors moved around, held tools, and how the size of their brains changed over a long time. Archeological evidence refers to the things earlier people made and the places where scientists find them. By studying this type of evidence, archeologists can understand how early humans made and used tools and lived in their environments.

The process of evolution involves a series of natural changes that cause species (populations of different organisms) to arise, adapt to the environment, and become extinct. All species or organisms have originated through the process of biological evolution. In animals that reproduce sexually, including humans, the term species refers to a group whose adult members regularly interbreed, resulting in fertile offspring that is, offspring themselves capable of reproducing. Scientists classify each species with a unique, two part scientific name. In this system, modern humans are classified as Homo sapiens.

Evolution occurs when there is change in the genetic material the chemical molecule, DNA which is inherited from the parents, and especially in the proportions of different genes in a population. Genes represent the segments of DNA that provide the chemical code for producing proteins. Information contained in the DNA can change by a process known as mutation. The way particular genes are expressed – that is, how they influence the body or behavior of an organism can also change. Genes affect how the body and behavior of an organism develop during its life, and this is why genetically inherited characteristics can influence the likelihood of an organism’s survival and reproduction.

Evolution does not change any single individual. Instead, it changes the inherited means of growth and development that typify a population (a group of individuals of the same species living in a particular habitat). Parents pass adaptive genetic changes to their offspring, and ultimately these changes become common throughout a population. As a result, the offspring inherit those genetic characteristics that enhance their chances of survival and ability to give birth, which may work well until the environment changes. Over time, genetic change can alter a species' overall way of life, such as what it eats, how it grows, and where it can live. Human evolution took place as new genetic variations in early ancestor populations favored new abilities to adapt to environmental change and so altered the human way of life.

5. Management of forest and water resources.

Ans.: The recurrence of extreme weather events, climate change and the need for adaptation strategies are focusing national and international attention on water, water related ecosystems and watersheds. In addition, growing problems of water scarcity, environmental degradation, food insecurity and poor livelihood conditions and human health all require urgent policy and management measures, pointing attention to interrelationships between forest and water.

A number of forest related cooperation mechanisms such as regional criteria and indicators processes to monitor sustainable forest management, and the global legally binding environmental conventions on biological diversity, desertification and climate change, have been considering water and watershed issues. At the same time, the growing number of water related initiatives worldwide, such as the International Network of Basin Organizations (INBO, see www.inbo news.org) or the World Water Council (WWC, see www.worldwatercouncil.org), are progressively taking into account the role of trees, forests, riparian ecosystems and their management in achieving targets of fresh water quality, quantity, timing and hazard prevention. The Global Water Partnership, as another example among many, has developed a compendium of good practices that identifies field examples of forests providing benefits to water resources and to balanced management of watersheds.

In many countries, forest and water policies, legislation and administration have long been shaping forest rehabilitation programmes; this has been the case in European countries such as France, Italy and Switzerland since the eighteenth century. Only in the past few decades, however, has the emphasis on theory and practice of hydrology been replaced by a more comprehensive approach embracing environmental issues, land use and watersheds. More recent efforts have sought further to integrate varied sectors and the participation of stakeholders within a wider approach to environmental protection with a solid basis in forest science.

The International Expert Meeting on Forests and Water in Shiga, Japan, held in November 2002 in the framework of the Third World Water Forum in Kyoto, Japan, can be considered a major step towards improved understanding and effective implementation of policies, planning and management initiatives worldwide related to forests and water. Convened jointly by FAO, the International Tropical Timber Organization (ITTO), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Forestry Agency of Japan, the expert meeting focused on new challenges and perspectives concerning forest and water interactions, such as the need for better understanding of the hydrological and environmental services provided by forest ecosystems, more effective management tools integrating forest and water resources, and clearer national strategies and policies to guide stakeholders in the field (Forestry Agency of Japan, 2002). The meeting also raised questions on the role and services of forests in the global freshwater crisis which threatens livelihoods – including health and food security – and biodiversity conservation.

The need for cross sectoral approaches and practices in forestry is widely recognized, and the implementation of national integrated water resources management and water efficiency plans was requested at the World Summit for Sustainable Development in 2002 (WSSD, 2003). Institutions and individuals should take concrete steps to integrate water considerations and water resources management into the many sectors affecting and influencing it, including forestry. The main recommendation of the Shiga meeting on this point was that policies and institutional arrangements should be defined to facilitate collaboration among decision makers and between the decision makers and resource users.

One example of a policy instrument that integrates forestry and water is the “social accounting” established by the forest administration of the Autonomous Province of Trento, Italy (2006). This tool aims to establish the value of the social, economic and environmental benefits of the watershed management fieldwork implemented annually in terms of water quality, quantity control, sustainability and monitoring. The accounting covers 5 600 km of torrents and rivers over a land area of 6 400 km2, a forest area of 3 500 km2 (55 percent of the land area), the work of 333 employees and over €34 million budget in 2005.

6. Challenges for the agriculture sector in India.

Ans.: Agriculture, the backbone of Indian economy, contributes to the overall economic growth of the country and determines the standard of life for more than 50% of the Indian population.

Agriculture contributes only about 14% to the overall GDP but its impact is felt in the manufacturing sector as well as the services sector as the rural population has become a significant consumer of goods and services in the last couple of decades.

Nearly 80% of the 140 million farming families hold less than 2 acres of land. Large land holdings enable the farmer to implement modern agricultural techniques and boost productivity. Small land holdings restrict the farmer to use traditional methods of farming and limit productivity.

As land holdings are small, more people invariably work on the farms in the rural areas and coupled with the obsolete technology, farm incomes come down.

Irrigation problems: Most of the farming in India is monsoon dependent – if monsoons are good, the entire economy (and not just the agricultural sector) is upbeat and when the monsoon fails, everyone everywhere takes a hit to some extent. The problem here is of proper management of water or the lack of it.

Irrigation which consumes more than 80% of the total water use in the country needs a proper overhaul if the country has to improve agricultural output and boost the overall economy.

Seed problems: Most of the farmers – especially the poor and marginal ones – are dependent on seeds sold in the market. Moreover, the HYV seeds as well as the GM seeds which promise higher yields force the farmers to buy seeds for every crop. With spurious seeds hitting the market, the farmers' woes have exceeded all limits. Sometimes seeds do not give the stated/claimed yields and farmers run into economic troubles.

In many cases of GM and HYV seeds, farmers are forced to use high amounts of fertilisers and pesticides, provide large amounts of water (irrigation) and abide to all the other farming requirements that the companies mandate to get the proper yields.

A proper regulation/legislation to hold seed companies accountable for false claims is the need of the hour as companies use legal loopholes to push the blame on to the farmers in the case of failed crops.

Sustainability problems: Indian agricultural productivity is very less compared to world standards due to use of obsolete farming technology. Coupled with this, lack of understanding of the need for sustainability in the poor farming community has made things worse.

Water usage is also unplanned with some arid areas misusing the irrigation facilities provided by planting water intensive crops. In areas where irrigation in the form of rivers and canals is not sufficiently available, ground water resources are heavily exploited.

Sustainability in agriculture is of utmost importance as many problems faced by farmers are related to this. Excess fertiliser usage not only makes the plants dependent on artificial fertilisers but also erodes the land quality, polluted ground water and in case of a surface runoff, pollutes the nearby water bodies.

Similarly, planting crops which require more water like rice on the basis of irrigation facilities extended to areas which are water deficient uses up more water than required. Besides, the excessive evaporation cause salts to accumulate on the fields making them lose their fertility quickly.

Lack of proper understanding of the need to grow crops sustainably will push farmers into a vicious circle – of debts, heavy use of fertilisers, water mismanagement, low productivity and thus more debts for the next cycle.

Over dependence on traditional crops like rice and wheat: Every crop requires certain climatic conditions to give the best yields. Though rice and wheat are produced in a large area in India, certain areas can readily switch to other crops to get better productivity. India is importing cooking oil from abroad though we have the necessary conditions to grow more oilseeds here.

Heavy dependence on traditional rice and wheat points to the lack of a proper national plan on agriculture. Excess stocks in a few crops lead to problems in the selling of the produce, storage and shortage of other essential farm output.

Moreover, if the farm output is skewed towards crops like rice, irrigation and ground water facilities are misused by farmers, which leads to a host of other problems.

Supply channel bottlenecks and lack of market understanding: Supply channel bottlenecks and lack of a proper marketing channel are serious problems for a farmer who is already burdened with a host of troubles. These are issues which need to be tackled at the regional, state and national levels.

Lack of a proper marketing channel forces the farmers to distress sale, makes them victims in the hands of greedy middlemen and ultimately restricts their income.

An improper marketing and storage channel also leads to storage problems in the years where productivity is good, leads to poor agricultural exports due to problems in maintaining quality and in many cases leads to gross wastage of valuable food grains and other farm output.

Food wastage running into thousands of crores of rupees every year is nothing short of a crime in a country where more than 25% is below poverty line and where millions go hungry day after day.

7. Ancient and modern outlooks for the prevention of disease.

Ans.: As we move into the new millennium it is becoming increasingly clear that the biomedical sciences are entering the most exciting phase of their development. Paradoxically, medical practice is also passing through a phase of increasing uncertainty, in both industrial and developing countries. Industrial countries have not been able to solve the problem of the spiraling costs of health care resulting from technological development, public expectations, and—in particular—the rapidly increasing size of their elderly populations. The people of many developing countries are still living in dire poverty with dysfunctional health care systems and extremely limited access to basic medical care.

Against this complex background, this chapter examines the role of science and technology for disease control in the past and present and assesses the potential of the remarkable developments in the basic biomedical sciences for global health care.

From the earliest documentary evidence surviving from the ancient civilizations of Babylonia, China, Egypt, and India, it is clear that longevity, disease, and death are among humanity's oldest preoccupations. From ancient times to the Renaissance, knowledge of the living world changed little, the distinction between animate and inanimate objects was blurred, and speculations about living things were based on prevailing ideas about the nature of matter.

Advances in science and philosophy throughout the 16th and 17th centuries led to equally momentous changes in medical sciences. The elegant anatomical dissections of Andreas Vesalius swept away centuries of misconceptions about the relationship between structure and function of the human body; the work of Isaac Newton, Robert Boyle, and Robert Hooke disposed of the basic Aristotelian elements of earth, air, fire, and water; and Hooke, through his development of the microscope, showed a hitherto invisible world to explore. In 1628, William Harvey described the circulation of the blood, a discovery that, because it was based on careful experiments and measurement, signaled the beginnings of modern scientific medicine.

After steady progress during the 18th century, the biological and medical sciences began to advance at a remarkable rate during the 19th century, which saw the genuine beginnings of modern scientific medicine. Charles Darwin changed the whole course of biological thinking, and Gregor Mendel laid the ground for the new science of genetics, which was used later to describe how Darwinian evolution came about. Louis Pasteur and Robert Koch founded modern microbiology, and Claude Bernard and his followers enunciated the seminal principle of the constancy of the internal environment of the body, a notion that profoundly influenced the development of physiology and biochemistry. With the birth of cell theory, modern pathology was established. These advances in the biological sciences were accompanied by practical developments at the bedside, including the invention of the stethoscope and an instrument for measuring blood pressure, the first use of x rays, the development of anesthesia, and early attempts at the classification of psychiatric disease as well as a more humane approach to its management. The early development of the use of statistics for analyzing data obtained in medical practice also occurred in the 19th century, and the slow evolution of public health and preventive medicine began.

Significant advances in public health occurred on both sides of the Atlantic. After the cholera epidemics of the mid 19th century, public health boards were established in many European and American cities. The Public Health Act, passed in the United Kingdom in 1848, provided for the improvement of streets, construction of drains and sewers, collection of refuse, and procurement of clean domestic water supplies. Equally important, the first attempts were made to record basic health statistics. For example, the first recorded figures for the United States showed that life expectancy at birth for those who lived in Massachusetts in 1870 was 43 years; the number of deaths per 1,000 live births in the same population was 188. At the same time, because it was becoming increasingly clear that communicable diseases were greatly depleting the workforce required to generate the potential rewards of colonization, considerable efforts were channeled into controlling infectious diseases, particularly hookworm and malaria, in many countries under colonial domination.

However, until the 19th century, curative medical technology had little effect on the health of society, and many of the improvements over the centuries resulted from higher standards of living, improved nutrition, better hygiene, and other environmental modifications. The groundwork was laid for a dramatic change during the second half of the 20th century, although considerable controversy remains over how much we owe to the effect of scientific medicine and how much to continued improvements in our environment (Porter 1997).

This balance between the potential of the basic biological sciences and simpler public health measures for affecting the health of our societies in both industrial and developing countries remains controversial and is one of the major issues to be faced by those who plan the development of health care services for the future.

Although rapid gains in life expectancy followed social change and public health measures, progress in the other medical sciences was slow during the first half of the 20th century, possibly because of the debilitating effect of two major world wars. The position changed dramatically after World War II, a time that many still believe was the period of major achievement in the biomedical sciences for improving the health of society. This section outlines some of these developments and the effect they have had on medical practice in both industrial and developing countries. More extensive treatments of this topic are available in several monographs

8. Media for open and distance mode of education.

Ans.: Distance education established its roots as a form of instruction at least 150 years ago as correspondence study. Distance learning was not new. Open universities that numerous governments set up following the pioneering example of the United Kingdom is testimony to this. Distance learning, in the 1960s and 1970s, was already widespread; it was called correspondence education however, university correspondence branches were more eager to plough money back into the campus than to help correspondence students complete their studies. To serve students better the open universities have created student support networks that rely on collaboration with other institutions for study centers and tutors.

With the advancements in telecommunications technologies, distance learning programs rapidly expanded so distance education is now defined as "the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance. The history of distance education in the Indian context is valuable in that is shows there was more than one historical path of distance education and that the evolution of distance education has not been that easy for we had many obstacles to clear, blocks to break and barriers to overcome. Many of the same problems facing implementation and acceptance of educational innovations today along with new problems such as teacher shortages, overcrowded and unsafe schools, and unequal access to educational technology join other perennial issues in education such as gender bias and the bilingual education have been faced by distance education throughout its history.

The Positive Side: India is more illiterate now than it was fifty or a hundred years ago. Preparing students today for tomorrow's workforce has a lot to do with teaching about how to use and evaluate knowledge.

The average Indian student of today is much better than that of yesterday. He is committed to the coursework, usually for the purpose of advancing in his career. For this reason, we can expect quality work and diligent participation from students of today especially in the distance learning context.

The distance education offers flexible learning through both online and print based materials. Distance education courses are designed to provide one of the study options to students and others who are unable to attend scheduled classes on campus or who want to experience distance learning as part of their program.

Distance education is inevitably linked to media and technology. The organizational pattern and operating practices of a distance education facility are generally based upon the same educational philosophy as conventional system. However the use of media is greater in Distance Learning.

Technologies and Media: One of the greatest strengths of Open Distance Learning is its ability to harness the latest technologies to reach the unreached Employing mass media technologies distance education institutions have bridged distance and made education more accessible. Various technologies and delivery media are available for distance education. Different media types are used to deliver information. Each medium and each technology has its own strengths and weaknesses. Many factors control these media technologies. How a medium is used is more important than what particular technologies are selected. The use of the medium is part of the design of the distance education program itself. Certain resources may provide a better framework and cater to the different perspectives of the distance education learner: That is, the sender and receiver do not communicate at the same time."

9. Ways of technology transfer.

Ans.: Technology transfer, also called transfer of technology (TOT), is the process of transferring (disseminating) technology from the places and ingroups of its origination to wider distribution among more people and places. It occurs along various axes: among universities, from universities to businesses, from large businesses to smaller ones, from governments to businesses, across borders, both formally and informally, and both openly and surreptitiously. Often it occurs by concerted effort to share skills, knowledge, technologies, methods of manufacturing, samples of manufacturing, and facilities among governments or universities and other institutions to ensure that scientific and technological developments are accessible to a wider range of users who can then further develop and exploit the technology into new products, processes, applications, materials, or services. It is closely related to (and may arguably be considered a subset of) knowledge transfer.

Horizontal transfer is the movement of technologies from one area to another. At present[when?] transfer of technology (TOT) is primarily horizontal. Vertical transfer occurs when technologies are moved from applied research centers to research and development departments.

One of the key roles of technology transfer departments is to bring new inventions closer to market. In many cases, this means helping university researchers develop go to market strategies for their research outputs and deliverables, then creating a startup, arranging licensing, or working with a venture fund.

With this said, I believe that promoting the sustainability of existing businesses, particularly those with an R&D focus, is also critical. Sharing university research outputs and deliverables can help companies in a number of different ways:

- Broaden horizons. Internal R&D groups tend to be limited to research with immediate, marketable applications. Partnering with university researchers gives companies access to blue skies research, the kind of open ended, far ranging research that most companies don't have the luxury of doing on their own. Access to this kind of research can expand existing business opportunities, or open the door for new ones.

- Technology trajectories. R&D groups are often focused on developing products on short term timelines. But working with university researchers can give insights into new products that may be market ready some 10 to 15 years in the future. This allows forward thinking companies to avoid technological stagnation. They can remain competitive while truly planning ahead for their next generation of products.

- Disruptive technologies. University researchers work in a curiosity driven environment. Not being bound by next year's product launch or next quarter's earnings report means researchers can take risks. They can uncover truly radical technologies with the potential to drive innovation and disrupt markets. And they can help companies sustain technology leadership far into the future.

10. 'How scientific development is influenced by social needs and perceptions'. Adjudicative tribunals resolve disputes between two perceptions'.

Ans.: Adjudicative tribunals are an integral part of health system governance, yet their real world impact remains largely unknown. Most assessments focus on internal accountability and use anecdotal methodologies; few, studies if any, empirically evaluate their external impact and use these data to test effectiveness, track performance, inform service improvements and ultimately strengthen health systems. Given that such assessments would yield important benefits and have been conducted successfully in similar settings (e.g. specialist courts), their absence is likely attributable to complexity in the health system, methodological difficulties and the legal environment within which tribunals operate. We suggest practical steps for potential evaluators to conduct empirical impact evaluations along with an evaluation matrix template featuring possible target outcomes and corresponding surrogate endpoints, performance indicators and empirical methodologies. Several system level strategies for supporting such assessments have also been suggested for academics, health system institutions, health planners and research funders. Action is necessary to ensure that policymakers do not continue operating without evidence but can rather pursue data driven strategies that are more likely to achieve their health system goals in a cost effective way.

Indigenous arbitrators share many of the characteristics of mediators. They tend to be prosperous male elders, often renowned for their speaking skills and sound judgement. In many cases they possess formal or informal leadership positions. Kpelle arbitrators, for example, commonly hold such influential roles as town chief or quarter elder (Gibbs 1967). In northern Somalia, the clan and sub clan sultans often serve as mediators and arbitrators. The sultans' process of arriving at a decision is often collaborative, allowing the disputants an active role in shaping a compromise. Indeed, to be heavy handed undermines a sultan's authority, as expressed in a Somali proverb: "Three things bring the down of Sultans; biased judgement (in the settlement of disputes), dryhandedness (meanness) and indecision" (Lewis 1961: 205).

Increasingly, people who hold formal arbitration positions require skills such as knowledge of the official language, literacy, book keeping, and the ability to navigate in wider administrative and legal settings. In some places, such as among pastoralists in Mali, tensions arise between customary leaders who lack such skills and younger men with such capabilities (Vedeld 1994). Access to political authorities at the regional and national level is also crucial. The members of the Tanzanian land tribunals, for example, are appointed by the central government, and one of its five members must be a lawyer (Moore 1986). Local politics still matter, too. The arbitration tribunal members in Tanzania are selected by the local branch of the ruling political party (Moore 1986). In Bangladesh communities, there is often considerable overlap between individuals holding "economic, social and juridical positions of power" at the village level.

Decision making in adjudication is vested in judges and administrators, who possess the authority to impose a settlement on disputants. It is sometimes depicted as the antithesis of negotiation. According to Gulliver (1979), adjudication is more likely to apply legal norms in a rigid manner, to offer all or nothing decisions, to be expensive, and to show little concern about the complexities of local relationships. There are many issues about the accessibility and appropriateness of adjudication for processing disputes in small communities, as will be discussed below.