Utilitarianism is one of the best known and most influential moral theories. Utilitarianism holds that those actions are good that serve to maximize human well-being. The emphasis in utilitarianism is not on maximizing the well-being of the individual, but rather on maximizing the well-being of society as a whole, and as such it is somewhat of a collectivist approach. It determines right from wrong by focusing on outcomes. It is the only moral framework that can be used to justify military force or war. It is the most common approach to everyone.

Utilitarianism tries to balance the needs of society with the needs of the individual, with an emphasis on what will provide the most benefit to the most people. But it has many problems also. Sometimes what is best for everyone may be bad for a particular individual or a group of individuals.

Utilitarian’s believe that the purpose of morality is to make life better by increasing the amount of good things (such as pleasure and happiness) in the world and decreasing the amount of bad things (such as pain and unhappiness).

1. Ethics and morality. Comparison.

Answer: Ethics and morals relate to “right” and “wrong” conduct. While they are sometimes used interchangeably, they are different: ethics refer to rules provided by an external source, e.g., codes of conduct in workplaces or principles in religions. Morals refer to an individual’s own principles regarding right and wrong.

**Comparison chart**

| Ethics versus Morals comparison chart | | |
| --- | --- | --- |
|  | **Ethics** | **Morals** |
| **What are they?** | The rules of conduct recognized in respect to a particular class of human actions or a particular group or culture. | Principles or habits with respect to right or wrong conduct. While morals also prescribe dos and don'ts, morality is ultimately a personal compass of right and wrong. |
| **Where do they come from?** | Social system - External | Individual - Internal |
| **Why we do it?** | Because society says it is the right thing to do. | Because we believe in something being right or wrong. |
| **Flexibility** | Ethics are dependent on others for definition. They tend to be consistent within a certain context, but can vary between contexts. | Usually consistent, although can change if an individual’s beliefs change. |
| **The "Gray"** | A person strictly following Ethical Principles may not have any Morals at all. Likewise, one could violate Ethical Principles within a given system of rules in order to maintain Moral integrity. | A Moral Person although perhaps bound by a higher covenant, may choose to follow a code of ethics as it would apply to a system. "Make it fit" |
| **Origin** | Greek word "ethos" meaning "character" | Latin word "mos" meaning "custom" |
| **Acceptability** | Ethics are governed by professional and legal guidelines within a particular time and place | Morality transcends cultural norms |

2. Lenski’s society. Industrial society.

Answer: Our social world consists of thousands of human societies. For the sake of comparison and analysis, it is necessary for us to classify them on some basis.

The work of Gerhard Lenski helps us understand the great differences among societies that have existed throughout human history. Lenski uses the term sociocultural evolution to mean changes that occur as a society gains new technology. Inventing or adopting new technology sends ripples of change throughout a society. The more technology a society has, the faster it changes.

**5 types of societies based on technology**

1. Hunting and Gathering Societies
2. Horticultural Pastoral Societies
3. Agrarian Societies
4. Industrial Societies
5. Postindustrial Societies

**Industrial Societies:**

Industrial era began, the major source of energy had been the muscles of humans and the animals they tended. Around the year 1750, people turned to water power and then steam boilers to operate mills and factories filled with larger and larger machines.

By 1900, railroads crossed the land, steamships traveled the seas, and steel-framed skyscrapers reached far higher than any of the old cathedrals that symbolized the agrarian age.

**Industrial Societies is associated with industrial revolution and industrialism:**

* Industrialization drew people away from home to factories situated near energy sources (such as coal fields) that powered their machinery. The result was a weakening of close working relationships, strong family ties, and many of the traditional values, beliefs, and customs that guide agrarian life.
* The new industrial societies changed more in one century than the earlier agrarian societies had changed over the course of the previous thousand years.
* Although at first new technology only benefits the elite few, industrial technology is so productive that over time just about everyone’s income rises so that people live longer and more comfortable lives.
* Even social inequality decreases slightly.

**Features:**

* Vast technology and rapid change
* Larger societies with huge populations
* Large scale division of labor
* Losing importance of family and kinship
* Religion losing its hold over people
* Increasing importance of science and education
* Increasing importance of the role of the state
* Widening gap between the rich and the poor
* Spread of heterogeneous culture

4. Causes of Bhopal tragedy. Link this incident to Ethical theories (Utilitarianism and duty ethics theory)

Answer: The Bhopal disaster, also referred to as the Bhopal gas tragedy, was a [gas leak](https://en.wikipedia.org/wiki/Gas_leak) incident on the night of 2–3 December 1984 at the [Union Carbide India Limited](https://en.wikipedia.org/wiki/Union_Carbide_India_Limited) (UCIL) [pesticide](https://en.wikipedia.org/wiki/Pesticide) plant in [Bhopal](https://en.wikipedia.org/wiki/Bhopal), Madhya Pradesh, India. It is considered among [the world's worst](https://en.wikipedia.org/wiki/List_of_accidents_and_disasters_by_death_toll#Industrial_disasters) [industrial disasters](https://en.wikipedia.org/wiki/List_of_industrial_disasters). Over 500,000 people were exposed to [methyl isocyanate (MIC)](https://en.wikipedia.org/wiki/Methyl_isocyanate) gas. The highly toxic substance made its way into and around the small towns located near the plant.

**How happened?**

* Accidentally opened a pressure-relief valve on a tank used to store methyl isocyanate (MIC) at a Union Carbide plant in Bhopal, India.
* When the valve opened,

MIC was released from the tank 🡪 The tank contained 10,000 gallons of MIC, a highly toxic chemical 🡪 the leak caused a cloud of toxic gas formed over the area surrounding the plant.

* The leak was attributed to the accidental pouring of water into the tank.
* Then water reacts very vigorously with MIC, causing heating of the liquid.
* In Bhopal, the mixing of water with MIC increased the temperature of the liquid in the tank to an estimated 400°F.
* The high temperature caused the MIC to vaporize, leading to a build-up of high pressure within the tank.
* When the internal pressure became high enough, a pressure-relief valve popped open, leaking MIC vapors into the air.
* Unfortunately, this neighborhood was very densely populated area. Caused a big loss.

**Why happened?**

* The water had probably been introduced into the tank accidentally.
* A utility station on the site contained two pipes side by side. One pipe carried nitrogen, which was used to pressurize the tank to allow the liquid MIC to be removed. The other pipe contained water.
* It appears that instead of connecting the nitrogen pipe, someone accidentally connected the water pipe to the MIC tank. ( irresponsible act indeed)
* The accident was precipitated when an estimated 240 gallons of water were injected into the MIC storage tank.

5. Globalization. Five arguments related to globalization.

Answer: Globalization is the word used to describe the growing interdependence of the world’s economies, cultures, and populations, brought about by cross-border trade in goods and services, technology, and flows of investment, people, and information.

**Objectives of Globalization**

* Making the world a truly inter-related global village.
* Make rules and procedures to take all decisions for securing globalization.
* Secure the benefits of free trade
* Create open access to markets and equal participation.
* Cultural Transformation

**Features of Globalization**

1. Liberalization: Freedom of entrepreneur for industry and trade.

2. Freedom: Each Nation grants (MFN) status to keep trade away from hard regime.

3. Globalization of economic activity: Governed by domestic and world market (FDI)

4. Liberalization of export-import system:

5. Privatization: Keeping state free from the ownership of means of production and distribution.

6. Increased collaboration among entrepreneurs:

7. Economic reforms: Free flow of global investment, democratization of cultures

**Five arguments related to globalization:**

1. **intensiﬁed exploitation:** EPZs

beneﬁts to capital may be

low wages,

low rates of taxation,

and weak environmental regulation

**(ii) An increase in social inequality:** global inequalities are the product of the expansion of the market without redistributive mechanisms, the marginalization of some regions and peoples from capital ﬂows, the hegemony of ﬁnance which enriches the very few at the expense of the many

**(iii) Globalization and political inequality:** the World Trade Organization supporters argue that an increase in global governance is a progressive development as it means that weaker countries are not subject to the law of the jungle, and can get their voice heard.

Many poorer countries complained that the most important decisions were taken behind their backs

1. **Cultural homogenization:** Western cultural imperialism has undermined local cultures and led to a process of homogenization
2. **intensiﬁes environmental destruction:** Developed countries had developed without strong environmental considerations, but developing countries were now being disallowed from following a similar process of development

If it is more proﬁtable to cut down all the trees and build something else, or lease or sell the land to say, an Aluminium smelting company, than the owner may well do so

6. Technology transfer and appropriate technology.

Answer: Technology transfer is the process of moving technology to a novel setting and implementing it there. Technology includes both hardware (machines and installations) and technique (technical, organizational, and managerial skills and procedures). A novel setting is any situation containing at least one new variable relevant to the success or failure of a given technology. The setting may be within a country where the technology is already used elsewhere, or a foreign country, which is our present interest. A variety of agents may conduct the transfer of technology: governments, universities, private volunteer organizations (such as Engineers Without Borders), consulting firms, and multinational corporations.

In most instances, the transfer of technology from a familiar to a new environment is a complex process. The technology being transferred may be one that originally evolved over a period of time and is now being introduced as a ready-made, completely new entity into a different setting. Discerning how the new setting differs from familiar contexts requires the imaginative and cautious vision of “cross-cultural social experimenters.”

The expression appropriate technology is widely used, but with a variety of meanings. We use it in a generic sense to refer to identification, transfer, and implementation of the most suitable technology for a new set of conditions. Typically the conditions include social factors that go beyond routine economic and technical engineering constraints. Identifying them requires attention to an array of human values and needs that may influence how a technology affects the novel situation. Thus, in the words of Peter Heller, “appropriateness may be scrutinized in terms of scale, technical and managerial skills, materials/energy (assured availability of supply at reasonable cost), physical environment (temperature, humidity, atmosphere, salinity, water availability, etc.), capital opportunity costs (to be commensurate with benefits), but especially human values (acceptability of the end-product by the intended users in light of their institutions, traditions, beliefs, taboos, and what they consider the good life).

Examples include the introduction of agricultural machines and long-distance telephones. A country with many poor farmers can make better immediate use of small, single- or two-wheeled tractors that can serve as motorized ploughs, to pull wagons or to drive pumps, than it can of huge diesel tractors that require collectivized or agribusiness-style farming. Conversely, the same country can benefit more from the latest in wireless communication technology to spread its telephone service to more people and over long distances than it can from old-fashioned transmission by wire.

Appropriate technology also implies that the technology should contribute to and not detract from sustainable development of the host country by providing for careful stewardship of its natural resources and not degrading the environment beyond its carrying capacity. Nor should technology be used to replace large numbers of individually tended small fields by large plantations to grow crops for export, leaving most of the erstwhile farmers jobless and without a source of home grown food.

The word appropriate is vague until we answer the questions, appropriate to what, and in what way? Answering those questions immediately invokes values about human needs and environmental protection, as well as facts about situations, making it obvious that appropriate is a value-laden term. In this broader sense, the appropriate technology might sometimes be small-, intermediate-, or large-scale technology. Appropriate technology is a generic concept that applies to all attempts to emphasize wider social factors when transferring technologies. As such, it reinforces and amplifies our view of engineering as social experimentation.

7. What is telework? Explain the advantages and disadvantages of teleworking for both the employees and organizations.

Answer: Telework (also known as telecommuting) is a work arrangement in which an employee works away from the office—at home, at a client’s office, in a hotel—literally, anywhere. In telework, an employee uses various forms of electronic communication, including texting, email, audio and videoconferencing, and online chat.

The goal of telework is to allow employees to be effective and productive from wherever they are.

Advantages for employees:

* People with disabilities who otherwise find public transportation and office accommodations a barrier to work may now be able to join the workforce.
* Teleworkers avoid long, stressful commutes and gain time for additional work or personal activities.
* Teleworkers have an opportunity to experience an improved work/family balance.

Disadvantages of teleworking for employees:

* Some employees are unable to be productive workers away from the office.
* Teleworkers may suffer from isolation and may not really feel “part of the team.”
* Teleworkers must guard against working too many hours per day because work is always there.
* Workers who are out of sight also tend to be out of mind. The contributions of teleworkers may not be fully recognized and credited.

Advantages of teleworking for organizations:

* As more employees telework, there is less need for office and parking space; this can lead to lower costs.
* Telework allows for the continuity of business operations in the event of a local or national disaster and supports national pandemic preparedness planning.
* There may be an actual gain in worker productivity.

Disadvantages of teleworking for organizations:

* Allowing teleworkers to access organizational data and systems from remote sites creates potential security issues.
* Managers may have a harder time monitoring the quality and quantity of the work performed by teleworkers, wondering, for instance, if they really “put in a full day.”
* There are additional costs associated with providing equipment, services, and support for people who work away from the office.
* Telework increases the potential for lost or stolen equipment.

8. Digital divide. Mobile phone VS Digital divide.

Answer: The Digital Divide is a social issue referring to the differing amount of information between those who have access to the Internet, specially broadband access and those who do not have access. The term became popular among concerned parties, such as scholars, policy makers and advocacy groups.

The digital divide exists from country to country and even within countries—among age groups, economic classes, and people who live in cities versus those in rural areas. For example, in India, while 20 percent of urban Indians are connected to the Internet, only 3 percent of rural Indians are connected.

Indicators of living standard:

* Average number of calories consumed per person per day
* Availability of clean drinking water
* Average life expectancy
* Literacy rate
* Availability of basic freedoms
* Number of people per doctor
* Infant mortality rate
* Crime rate
* Rate of home ownership
* Availability of educational opportunities
* Another indicator of standard of living is the availability of information and communications technology.

**Mobile Phone: The Tool to Bridge the Digital Divide**

One of the most promising directions to bridge the Digital Divide is to provide eServices on mobile phones. Some industry observers identify the increasing use of mobile phones as an important first step in bridging the digital divide in many countries.

Mobile phones have several advantages over personal computers, including the following:

* Mobile phones come in a wide range of capabilities and costs, but are cheaper than personal computers.
* Mobile phones come with an extended battery life (much longer than any personal computer battery), which makes the cell phone more reliable in regions where access to electricity is inadequate or nonexistent.
* Mobile phones provide the means to communicate with friends, family, coworkers, and indeed most of the world's population instantly.
* Mobile phones fit easily into our pocket or bag. They don't weigh much. There are inexpensive models available for those with a limited budget.
* Many people don't even own a camera nowadays, because their phone has all the image and video capturing capability that they require.
* As long we have our mobile phone, there is no reason to get bored. There are a multitude of games to download and play, we can read an online article, or get involved with social media to pass time.
* Mobile phones are great devices for organization and their calendars are an excellent way to manage a busy schedule.
* Mobile phones are an excellent way to organize your finances. You can check your account balances, transfer money, and pay bills, all with just a few clicks.
* Mobile phones enable work on the move in almost any location.
* Our mobile phone is like having the world's biggest reference library on hand everywhere we go. We can search for just about anything in any situation as long as we have a connection.

By considering all of these, we can said that Mobile phone is the tool to Bridge the Digital Divide.

9. ‘Computer as a tool of unethical behavior’ Explain. Therac 25 case.

Computers are used as the means for unethical behavior. Many of these uses are merely extensions to computers of other types of unethical acts. For example, computers can be used to more efficiently steal money from a bank. A more traditional bank-robbery method is to put on a mask, hand a note to a bank teller, show your gun, and walk away with some cash. Computers can be used to make bank robbery easier to perform and harder to trace. Using a computer, a criminal can also make it difficult for the theft to be detected and traced.

Generally the amounts taken in a computer crime far exceed those taken in an armed robbery. The difference between these two types of robbery is that the use of the computer makes the crime impersonal. The criminal never comes face to face with the victim.

Similar computer ethics issues arise with regard to privacy. It is widely held that certain information is private and cannot be divulged without consent. Computers make privacy more difficult to protect, since large amounts of data on individuals and corporations are centrally stored on computers where an increasing number of individuals can access it.

Invasions of privacy can be harmful to an individual in two ways. First, the leaking of private information can lead to an individual’s being harassed or blackmailed. In its simplest form, this harassment may come in the form of repeated phone calls from telemarketers who have obtained information about an individual’s spending habits. The harassment might also come in the form of subtle teasing or bothering from a coworker who has gained personal knowledge of the individual. Second, personal information can also be considered personal property. As such, any unauthorized use of this information is theft. This same principle applies to proprietary information of a corporation.

How do computers increase the problems with privacy protection? This phenomenon is most easily seen by looking at the old system of record keeping. For example, medical records of individuals were at one time kept only on paper and generally resided with the individual’s physician and in hospitals where a patient had been treated. Gaining access to these records by researchers, insurance companies, or other healthcare providers was a somewhat laborious process involving searching through storage for the appropriate fi les, copying them, and sending them through the mail.

Ethical issues also arise when computers are used for “hacking.” Hacking comes in many forms: gaining unauthorized access to a database, implanting false information in a database or altering existing information, and disseminating viruses over the Internet.

These activities are by no means limited to highly trained computer specialists. Many hackers are bored teenagers seeking a challenge. In extreme cases, hackers have accessed secret military information, which has obvious implications for national security.

The issuance of computer viruses is also unethical. These viruses frequently destroy data stored on computers. In extreme cases, this act could lead to deaths when hospital records or equipment are compromised, to financial ruin for individuals whose records are wiped out, or even to the loss of millions of dollars for corporations, individuals, and taxpayers, as completed work must be redone after being destroyed by a virus.

Copyright infringement is also a concern in computer ethics. Computers and the Internet have made it easy to share music, movies, software, and other copyrighted materials. The protection of copyright has become increasingly difficult as court cases related to music sharing websites such as Napster and other copycat websites have illustrated. If creators can no longer profit from their work—if their work is freely distributed without their consent—then the incentive to create will diminish, and this type of creative activity that enriches everyone’s lives will diminish as well.

###### Accidental Overdoses in Medical Radiation Therapy Systems

**The Therac-25**

The Therac-25 was a radiation therapy machine produced by Atomic Energy of Canada Ltd. (AECL) The Therac-25 was not the first radiation therapy machine produced by this partnership; similar machines, the Therac-6 and Therac-20, had been in use for a number of years. From the start, the Therac-25 was designed to be controlled by software and did not incorporate the level of hardware safety devices found on the early machines.

The accidents involving the Therac-25 date back to the months between June 1985 and January 1987, comprising at least six known events of improper dosing of patients. At the time of this accident, the Therac-25 had been in operation at this center for two years and had been used to treat over 500 patients.

As the treatment was started, the machine shut down, giving the operator an error code labeled “Malfunction 54.” The meaning of this code was not identified in the manual that came with the machine. The machine also showed a “Treatment Pause” and an under dose, indicating that only about 3% of the requested dose had been delivered. Thinking that the treatment was incomplete, the operator told the machine to proceed, but it immediately shut down again.

Because the video monitor was not working, the operator was unable to see the patient and didn’t know that after the first dose, the patient had experienced what he described as an electric shock in his back. Knowing that something was wrong, he was attempting to get up when the second dose was delivered with the same painful effect.

It was later estimated that the patient had received a total dose of between 16,500 and 25,000 rads, far higher than the 180 rads he was supposed to receive. As a result of this malfunction, the patient developed symptoms of severe radiation poisoning and eventually died of complications related to the accident. The other six accidents were similar in nature, with similar consequences.

The proximate cause of these accidents was a “bug” in the software. Compounding the problem, there were no hardware interlocks available to shut the beam off when excessive doses were detected. The earlier versions of the Therac machines had this type of hardware safety system, but the Therac-25 relied on software to provide this protection.

In the wake of these accidents, investigations took place into the reasons for the malfunction of the machine. Two major areas of concern were identified:

* **Systems engineering**: In this complicated system, there was an almost exclusive reliance on the software to work correctly and ensure the safe operation of the machine. The lack of hardware safety systems was cited as one of the main problems with the Therac-25.
* **Software engineering**:Many software engineering errors were made during the development of the Therac-25, including inadequate documentation and testing of the software modules and the software.

10. Types of perpetrators.

Answer: Each type of perpetrator has different objectives and access to varying resources, and each is willing to accept different levels of risk to accomplish his or her objective.

**Hackers and Crackers**

Hackers test the limitations of information systems out of intellectual curiosity—to see whether they can gain access and how far they can go. They have at least a basic understanding of information systems and security features, and much of their motivation comes from a desire to learn even more.

Some hackers are smart and talented, but many are technically inept and are referred to as lamers or script kiddies by more skilled hackers. Surprisingly, hackers have a wealth of available resources to hone their skills—online chat groups, Web sites, downloadable hacker tools, and even hacker conventions (such as DEFCON, an annual gathering in Las Vegas).

**Malicious Insiders**

A major security concern for companies is the malicious insider—an ever-present and extremely dangerous adversary. Companies are exposed to a wide range of fraud risks, including diversion of company funds, theft of assets, fraud connected with bidding processes, invoice and payment fraud, computer fraud, and credit card fraud. Not surprisingly, fraud that occurs within an organization is usually due to weaknesses in its internal control procedures. Often, frauds involve some form of collusion, or cooperation, between an employee and an outsider. For example, an employee in Accounts Payable might engage in collusion with a company supplier. Each time the supplier submits an invoice, the Accounts Payable employee adds $1,000 to the amount approved for payment. The inflated payment is received by the supplier, and the two split the extra money.

Insiders are not necessarily employees; they can also be consultants and contractors. The risk tolerance of insiders depends on whether they are motivated by financial gain, revenge on their employers, or publicity.

Malicious insiders are extremely difficult to detect or stop because they are often authorized to access the very systems they abuse. Most computer security measures are designed to stop external attackers but are nearly powerless against insiders. Insiders know how the systems work and where the weak points are. Their knowledge of organizational structure and security procedures helps them avoid detection of their actions.

The Saudi Arabian Oil Company (Aramco) is the state-owned oil company of Saudi

Arabia. It owns approximately one-fifth of the world’s oil reserves and employs more than 55,000 workers in 77 countries. In 2012, the firm was a victim of a cyberattack that erased data on about 30,000 of its personal computers. Security experts believe that the attack was led by a company insider who had privileged access to Aramco’s network.

Organizations must also be concerned about negligent insiders, poorly trained and inadequately managed employees who mean well but have the potential to cause much damage by accident.

**Industrial Spies**

Industrial spies use illegal means to obtain trade secrets from competitors. In the United States, trade secrets are protected by the Economic Espionage Act of 1996, which makes it a federal crime to use a trade secret for one’s own benefit or another’s benefit. Trade secrets are most often stolen by insiders, such as disgruntled employees and ex-employees.

Competitive intelligence is legally obtained information gathered using sources available to the public. Information is gathered from financial reports, trade journals, public filings, and printed interviews with company officials. Industrial espionage involves using illegal means to obtain information that is not available to the public. An unethical firm may spend a few thousand dollars to hire an industrial spy to steal trade secrets that can be worth a thousand times that amount. Industrial espionage can involve the theft of new product designs, production data, marketing information, or new software source code. For example, a virus called “ACAD/Medre.A” was used to steal thousands of blueprints from companies based mainly in Peru and secretly email them to two Chinese firms.

**Cybercriminals**

Information technology provides a new and highly profitable venue for cybercriminals, who are attracted to the use of information technology for its ease in reaching millions of potential victims. Cybercriminals are motivated by the potential for monetary gain and hack into computers to steal, often by transferring money from one account to another to another—leaving a hopelessly complicated trail for law enforcement officers to follow.

Credit card companies are so concerned about making consumers feel safe while shopping online that many are marketing new and exclusive zero-liability programs, although the Fair Credit Billing Act limits consumer liability to only $50 of unauthorized charges.

Most companies are afraid to admit publicly that they have been hit by online fraud or hackers because they don’t want to hurt their reputations.

(A data breach is the unintended release of sensitive data or the access of sensitive data by unauthorized individuals.) It is likely that data of Visa card holders was also stolen. The total number of card holders that might be affected and the banks notified were not revealed.

To reduce the potential for online credit card fraud, most e-commerce Web sites use some form of encryption technology to protect information as it comes in from the consumer. For example, say that you have never been to a casino and your credit card information is being used at Caesar’s Palace at 2:00 a.m. The transaction-risk score would go up dramatically, so much so that the transaction might be declined.

**Hacktivists and Cyberterrorists**

Hacktivism, a combination of the words hacking and activism, is hacking to achieve a political or social goal. A cyberterrorist launches computer-based attacks against other computers or networks in an attempt to intimidate or coerce an organization in order to advance certain political or social objectives. Because of the Internet, cyberattacks can easily originate from foreign countries, making detection and retaliation much more difficult. Cyberterrorists seek to cause harm rather than gather information, and they use techniques that destroy or disrupt services. They are extremely dangerous, consider themselves to be at war, have a very high acceptance of risk, and seek maximum impact.

In late 2012, the hacktivist group Parastoo hacked into the International Atomic Energy Agency (IAEA) network and stole the email addresses of 167 experts working with the agency. The group then posted an online statement demanding that the experts petition the IAEA to investigate what it considered to be “beyond-harmful operations” at Israel’s Negev Nuclear Research Center. Parastoo threatened to expose the whereabouts of these experts, as well as other personal information, if they failed to act.

11. Population study. Demographic transition theory.

Answer: Demography means the statistical study of populations, especially human beings. It is a cousin of sociology that analyzes the size and composition of a population and studies how and why people move from place to place.

**Demographic Transition Theory:**

A more complex analysis of population change is demographic transition theory, a thesis that links population patterns to a society’s level of technological development.

It has four levels of technological development. They are:

1. Stage 1: Pre Industrial / Agrarian Societies
2. Stage 2: Early Industrial
3. Stage 3: Mature Industrial
4. Stage 4: Post Industrial

Demographic transition theory actually began as only a description of the demographic changes that had taken place over time in the advanced nations. It described the transition from high birth and death rates to low birth and death rates.

This theory also provides an explanation of how fertility and mortality rates impact the age distribution and growth rate of population.

**Preindustrial, agrarian Societies (Stage 1):**

Preindustrial, agrarian societies have high birth rates because of the economic value of children and the absence of birth control. Death rates are also high because of low living standards and limited medical technology. Deaths from outbreaks of disease cancel out births, so population rises and falls only slightly over time.

**Early Industrial Societies (Stage 2):**

The onset of industrialization, brings a demographic transition as death rates fall due to greater food supplies and scientific medicine. But birth rates remain high, resulting in rapid population growth.

**Mature Industrial Societies (Stage 3):**

A mature industrial economy, the birth rate drops due to various fertility factors such as contraception, increases in wages, an increase of the status and education of women. Fertility falls because most children survive to adulthood and because high living standards make raising children expensive. Smaller families, made possible by effective birth control, are also favored by women working outside the home. As birth rates follow death rates downward, population growth slows further. It is important to note that birth rate decline is caused also by a transition in values.

**Post Industrial Societies (Stage 4):**

Stage 4 corresponds to a postindustrial economy in which the demographic transition is complete. The birth rate keeps falling, partly because dual-income couples gradually become the norm and partly because the cost of raising children continues to increase.

12. Technology and the environmental deficit. “Technological power to make our lives better can also put the lives of future generations at risk.”- Explain.

Answer: Technological determinism is a reductionist theory that assumes that a society's technology determines the development of its social structure and cultural values. There is no doubt that in today’s time technology has made our lives quite easy and simultaneously efficient as well.

The Sociologists point to a simple formula referred as I = PAT, where environmental impact (I) reflects a society’s population (P), its level of affluence (A), and its level of technology (T).

So it can be said that technological power has a great impact on the environment of society. If we go through some deflecting scenarios we can easily understand the fact.

* Members of societies with simple technology such as the hunters and gatherers could hardly affect the environment because they were few in number, were poor, and have only simple technology. On the contrary, nature affects their lives as they follow the migration of game, watch the rhythm of the seasons, and suffer from natural catastrophes such as fires, floods, droughts, and storms.
* As we reached to the Societies at intermediate stages of technological development, the number of people being both larger and richer, have a somewhat greater capacity to affect the environment.
* If we see the environmental impact of horticulture, pastoralism and even agricultural societies is limited because people used to rely on muscle power for production of food and other goods.
* On the other side, the ability of human to control the natural environment increased dramatically when the Industrial Revolution started. As Muscle powers transforms to machine powers which burn fossil fuels to run the production. Thus we started to consume more natural resources (coal at first and then oil). Such machinery affects the environment in two ways: We consume more natural resources, and we release more pollutants into the atmosphere.
* It is not true that high-income societies use more energy but don’t provide anything. In fact they produce 100 times more goods than people in agrarian societies used to do. Higher living standards in turn increase the problem of solid waste (because people ultimately throw away most of what they produce) and pollution (industrial production generates smoke and other toxic substances).

In this way, when the technological power started to increases people are being recognized to the material benefits of industrial technology. But they didn’t found that it will affect the environment in the long run. Thus by taking the short term material affluence, it caused a long term effect on natural environment. The ecological balance has been interrupted. This all resulted into a serious risk on the health and living of the next generation as they will have to dwell into a place where every little things are adulterated and can cause serious harm to them gradually.

So we can said that “Technological power to make our lives better can also put the lives of future generations at risk.”

13. Why sustainable society is important and how can we establish sustainable society for us? Explain critically.

Answer: A sustainable society is one that ensures the health and vitality of human life and culture's and of nature's capital for present and future generations. Such a society acts to stop the activities that serve to destroy human life and culture and nature’s capital and to encourage those activities that serve to conserve what exists, restore what has been damaged, and prevent future harm.

**Importance of Sustainable Society:**

1. Sustainability itself can be defined by three core element which are:

* Environmental protection
* Social development
* Economic development

We can’t leave without these development.

1. We can see that the Earth’s population has reached record levels as birth rates remain high in some under developed nations and death rates have fallen just about everywhere. Reducing fertility will remain a pressing need throughout this century.
2. We need sustainability to ensure the basic rights of people including food, house, education, treatment and employments.
3. If the unsustainability remains we will run out fossil fuels one day for using excessively.
4. We will run out of lumber one day if the unsustainability remains.
5. As we are destroying the ecological balance unknowingly by the social imbalance, thousands of animal species will become extinct.
6. In fact, slowly the atmosphere is being damaged beyond repair.

So from now, we understood the importance of a sustainable society and we have to maintain the sustainability of our society.

**How can we establish sustainable society for us?**

Sustainable living depends on three strategies. They are:

* First, the world needs to bring population growth under control.
* A second strategy is to conserve finite resources. This means meeting our needs with a responsible eye toward the future by using resources efficiently, seeking alternative sources of energy, and in some cases, learning to live with less.
* A third strategy is to reduce waste. Whenever possible, simply using less is the best solution. Recycling programs, too, are part of the answer, and recycling can make everyone part of the solution to our environmental problems.

In order for a society to remain sustainable, it must be:

* Energetically Sustainable
* Resource Sustainable
* Environmentally Sustainable
* Socially Sustainable

By achieving all these things, we can make our society sustainable for us.

14. Difference between copyright and patents. Explain the process for being a patent holder.

|  | **Copyright** | **Patent** |
| --- | --- | --- |
| Intellectual Property Type | Artistic, literary or dramatic expressions such as songs, music, motion pictures, poetry, fiction and non-fiction writings, etc. | An invention which must be a manufactured product, an apparatus, chemical composition or a manufacturing process |
| Protection Requirements | A materialized form of artistic expression which exists as a tangible entity. Ideas cannot be copyrighted. | An invention which is innovative, previously undiscovered and has practical applications in any industry. |
| Duration of Rights | Copyright laws apply to the intellectual property for the duration of the artist’s life plus 70 years. | Patents are limited duration intellectual property rights which last a maximum of 20 years. |
| Rights Provided to Owner | Right to reproduce or copy the works, distribute or broadcast the works to the public, and lend or rent the work. | Right to use the invention and prevent others from using, recreating, importing or selling the patented invention. |

A person or company that holds a patent is called a patent holder.

**Process for being a patent holder:**

1. Preparing to submit patent applications:

**Step 1**: Assess your invention

**Step 2**: Monetization: Build on licence on both

**Step 3**: Prototyping and Manufacturing

**Step 4**: Business plan and Marketing

1. Submitting a patent application:

**Step 5**: Conduct a patent search

**Step 6**: Submit patent application

**Step 7**: Maintenance fees and patent terms