

UNIT I HUMAN VALUES

Morals, values and Ethics

The Story of a Carpenter

An elderly carpenter was ready to retire. He told his employer-contractor of his plans to leave the house- building business and live a more leisurely life with his wife enjoying his extended family. He would miss his paycheck, but he needed to retire. They could get by. The contractor was sorry to see his good worker go and asked if he could build just one more house as a personal favor. The carpenter said yes, but in time it was easy to see that his heart was not in his work. He resorted to shoddy workmanship and used inferior materials. It was an unfortunate way to end his career. When the carpenter finished his work and the builder came to inspect the house, the contractor handed over the house key to the carpenter. "This is your house," he said, "it is my parting gift to you." What a shock! What a Shame! If only he had known he was building his own house, he would have done it all so differently. Now he had to live in the home he built none too well.

(Modified from LIVING WITH HONOUR by SHIV KH ERA)

Do we find ourselves in similar situations as the carpenter?

Moving through our work hours fast paced, driven to "get the job done", without much thought to moral values.

How do we regain our focus as individuals and organizations?

This is the challenge for the employee and the employer.

Ethics are fundamental standards of conduct by which we work as a professional.

VALUES

- ☐ Values are individual in nature.
- ☐ Values are comprised of personal concepts of responsibility, entitlement and respect.
- ☐ Values are shaped by personal experience, may change over the span of a lifetime and may be influenced by lessons learned.
- ☐ Values may vary according to an individual's cultural, ethnic and/or faith-based background.

"Never change your core values."

In spite of all the change around you, decide upon what you will never change: your core values.

Take your time to decide what they are but once you do, do not compromise on them for any reason.

Integrity is one such value.

MORALS

- ☐ Morals are guiding principles that every citizen should hold.
- ☐ Morals are foundational concepts defined on both an individual and societal level.
- ☐ At the most basic level, morals are the knowledge of the difference between right and wrong.
- ☐

PERSONAL ETHICS

☐ Simply put, all individuals are morally autonomous beings with the power and right to choose their values, but it does not follow that all choices and all value systems have an equal claim to be called ethical.

☐ Actions and beliefs inconsistent with the Six Pillars of Character - trustworthiness, respect, responsibility, fairness, caring and citizenship - are simply not ethical.

PERSONAL ETHICS - everyday examples

- Software piracy
- Expense account padding
- Copying of homework or tests
- Income taxes
- "Borrowing" nuts and bolts, office supplies from employer
- Copying of Videos or CD's
- Plagiarism
- Using the copy machine at work

RELIGION AND ETHICS

- The “Golden Rule” is a basic tenet in almost all religions: Christian, Hindu, Jewish, Confucian, Buddhist, Muslim.
- “Do unto others as you would have others do unto you.”
- “Treat others as you would like them to treat you” (Christian).
- “Hurt not others with that which pains you” (Buddhist)
- “What is hateful to yourself do not do to your fellow men” (Judaism)
- “No man is a true believer unless he desires for his brother that which he desires for himself” (Islam)

MORALITY AND ETHICS

- Concerns the goodness of voluntary human conduct that affects the self or other living things
- Morality (Latin *mores*) usually refers to any aspect of human action
- Ethics (Greek *ethos*) commonly refers only to professional behavior
- Ethics consist of the application of fundamental moral principles and reflect our dedication to fair treatment of each other, and of society as a whole.
- An individual’s own values can result in acceptance or rejection of society’s ethical standards because even thoughtfully developed ethical rules can conflict with individual values.

ASPECTS OF ETHICS

There are two aspects to ethics:

- ☐ The first involves the ability to discern right from wrong, good from evil and propriety from impropriety.
- ☐ The second involves the commitment to do what is right, good and proper. Ethics entails action.

An ALGEBRA course will teach you ALGEBRA. A HISTORY course will teach you HISTORY.
A MANAGEMENT course will teach you principles of MANAGEMENT.

But, Will an *ETHICS* course teach you to be *ETHICAL*?

Think !

1.0 OBJECTIVES (WHY ENGINEERING ETHICS?)

The objectives of this course on ‘Professional Ethics and Human Values’ are: (a) to understand the moral values that ought to guide the Engineering profession, (b) resolve the moral issues in the profession, and (c) justify the moral judgment concerning the profession. It is intended to develop a set of beliefs, attitudes, and habits that engineers should display concerning morality.

The prime objective is to increase one’s ability to deal effectively with moral complexity in engineering practice.

Alternatively, the objectives of the study on Professional Ethics may be listed as:

- (A) Improvement of the cognitive skills (skills of the intellect in thinking clearly)
 1. Moral awareness (proficiency in recognizing moral problems in engineering)
 2. Cogent moral reasoning (comprehending, assessing different views)
 3. Moral coherence (forming consistent viewpoints based on facts)
 4. Moral imagination (searching beyond obvious the alternative responses to issues and being receptive to creative solutions)
 5. Moral communication, to express and support one’s views to others.
- (B) To *act* in morally desirable ways, towards moral commitment and responsible conduct
 6. Moral reasonableness i.e., willing and able to be morally responsible.
 7. Respect for persons, which means showing concern for the well-being of others, besides oneself.
 8. Tolerance of diversity i.e., respect for ethnic and religious differences, and acceptance of reasonable differences in moral perspectives.
 9. Moral hope i.e., believe in using rational dialogue for resolving moral conflicts.
 10. Integrity, which means moral integrity, and integrating one’s professional life and personal convictions.

1.1 MORALS

Morals are the welfare principles enunciated by the wise people, based on their experience and wisdom. They were edited, changed or modified or evolved to suit the geography of the region, rulers (dynasty), and in accordance with development of knowledge in science and technology and with time.

Morality is concerned with principles and practices of morals such as: (a) What ought or ought not to be done in a given situation? (b) What is right or wrong about the handling of a situation? and (c) What is good or bad about the people, policies, and ideals involved?

Morality is different from Ethics in the following ways:

<i>Morality</i>	<i>Ethics</i>
1. More general and prescriptive based on customs and traditions.	1. Specific and descriptive. It is a critical reflection on morals.
2. More concerned with the results of wrong action, when done.	2. More concerned with the results of a right action, when not done.
3. Thrust is on judgment and punishment, in the name of God or by laws.	3. Thrust is on influence, education, training through codes, guidelines, and correction.
4. In case of conflict between the two, morality is given top priority, because the damage is more. It is more common and basic.	4. Less serious, hence second priority only. Less common. But relevant today, because of complex interactions in the modern society.
5. Example: Character flaw, corruption, extortion, and crime.	5. Example: Notions or beliefs about manners, tastes, customs, and towards laws.

As against morals and ethics, laws are norms, formally approved by state, power or national or international political bodies. Breaking the norms is called *crime*, and invite specific punishment.

1.2 VALUES

1.2.1 Definition

Humans have the unique ability to define their identity, choose their values and establish their beliefs. All three of these directly influence a person's behavior. People have gone to great lengths to demonstrate the validity of their beliefs, including war and sacrificing their own life! Conversely, people are not motivated to support or validate the beliefs of another, when those beliefs are contrary to their own.

People will act congruent with their personal values or what they deem to be important.

A value is defined as a principle that promotes well-being or prevents harm. Another definition is: *Values are our guidelines for our success—our paradigm about what is acceptable.* Personal values are defined as: *“Emotional beliefs in principles regarded as particularly favorable or important for the individual.”* Our values associate emotions to our experiences and guide our choices, decisions and actions.

A person's observations on its environment are filtered through his values to determine whether or not he should expend energy to do something about his experiences. A person who values gold and sees a large bag of gold (a positive value) in his path as he walks, will be motivated to reach down and pick it up. A person who values his life and knows about venomous snakes will retreat from the sound of a rattlesnake (a negative value) from nearby, when he is walking in the desert. Said in another way,

“Values are the scales we use to weigh our choices for our actions, whether to move towards or away from something.”

Not all values have the same weight or priority. Some are more important than others and must be satisfied before others can be addressed. **Dr. Abraham Maslow** illustrated this with his hierarchy of human needs. Survival has a higher priority than security, which has a higher priority than social acceptance. Self-esteem can only be addressed to the degree that social acceptance is fulfilled. Similarly, self-actualization can only be pursued to the degree that self-esteem has been satisfied.

A person's beliefs, values and identity are usually acquired unconsciously based on his personal experience or observations of others' experiences as to what produces desirable or undesirable results in the environment. A baby's learning *to walk and talk* is a clear example of identifying with human adults, valuing the act of being able to have the mobility and communication ability of an adult and the belief, based on unconscious observation, that humans can do walk and do talk with each other.

Physiologists have identified the parts of the human brain that are involved in producing behavior in accordance with beliefs and values. All information collected by human senses is passed through a net-like group of cells, known as the Reticular Activating System (RAS), located near the top of the brain stem. The RAS compares the data received with accepted values, positive and negative (threats), and beliefs stored in memory and determines whether or not immediate action is required. The results of the RAS's comparison are communicated to the 'amygdala' near the mid-brain.

The 'amygdala' produces neuro-chemicals that cause emotions consistent with the nature of and proportional to the match between environment and values and beliefs. The neuro-chemicals initiate the chemical processes needed for the action to be taken. If the emotions produced are strong enough, the perceived information is blocked from

reaching the logical, rational and conscious executive center of the brain, the pre-frontal lobes. In which case, the resulting behavior will be automatic, not necessarily logical or rational, and completely in accordance with the person's strongest held beliefs, values and/or identity.

By positive affirmations, one can modify or create new beliefs about a person's identity and/or what is important to him (values). Verbal repetition of statements intended to become new beliefs, and values will result in these being stored for use by the RAS for comparison with the environment being experienced. This is the mechanism how the beliefs or values are modified.

1.2.2 Types of Values²

The five core human values are: (1) Right conduct, (2) Peace, (3) Truth, (4) Love, and (5) Nonviolence.

1. Values related to RIGHT CONDUCT are:

(a) SELF-HELP SKILLS: Care of possessions, diet, hygiene, modesty, posture, self reliance, and tidy appearance

(b) SOCIAL SKILLS: Good behavior, good manners, good relationships, helpfulness, No wastage, and good environment, and

(c) ETHICAL SKILLS: Code of conduct, courage, dependability, duty, efficiency, ingenuity, initiative, perseverance, punctuality, resourcefulness, respect for all, and responsibility

2. Values related to PEACE are: Attention, calmness, concentration, contentment, dignity, discipline, equality, equanimity, faithfulness, focus, gratitude, happiness, harmony, humility, inner silence, optimism, patience, reflection, satisfaction, self-acceptance, self-confidence, self-control, self-discipline, self-esteem, self-respect, sense control, tolerance, and understanding

3. Values related to TRUTH are: Accuracy, curiosity, discernment, fairness, fearlessness, honesty, integrity (unity of thought, word, and deed), intuition, justice, optimism, purity, quest for knowledge, reason, self-analysis, sincerity, spirit of enquiry, synthesis, trust, truthfulness, and determination.

4. Values related to LOVE are: Acceptance, affection, care, compassion, consideration, dedication, devotion, empathy, forbearance, forgiveness, friendship, generosity, gentleness, humanness, interdependence, kindness, patience, patriotism, reverence, sacrifice, selflessness, service, sharing, sympathy, thoughtfulness, tolerance and trust

5. Values related to NON-VIOLENCE are:

(a) PSYCHOLOGICAL: Benevolence, compassion, concern for others, consideration, forbearance, forgiveness, manners, happiness, loyalty, morality, and universal love

(b) SOCIAL: Appreciation of other cultures and religions, brotherhood, care of environment, citizenship, equality, harmlessness, national awareness, perseverance, respect for property, and social justice.

PERSEVERANCE is defined as persistence, determination, resolution, tenacity, dedication, commitment, constancy, steadfastness, stamina, endurance and indefatigability. To persevere is described as to continue, carry on, stick at it (in formal), keep going, persist, plug away, (informal), remain, stand firm, stand fast, hold on and hang on. Perseverance builds character.

ACCURACY means freedom from mistake or error; conformity to truth or to a standard or model and exactness. Accuracy is defined as correctness, exactness, authenticity, truth, veracity, closeness to truth (true value) and carefulness. The value of accuracy embraces a large area and has many implications. Engineers are encouraged to demonstrate accuracy in their behavior through the medium of praise and other incentives. Accuracy includes telling the truth, not exaggerating, and taking care over one's work.

DISCERNMENT means discrimination, perception, penetration, and insight. Discernment means the power to see what is not obvious to the average mind. It stresses accuracy, especially in reading character or motives. Discrimination stresses the power to distinguish or select what is true or genuinely excellent. Perception implies quick and often sympathetic discernment, as of shades of feelings. Penetration implies a searching mind that goes beyond what is obvious or superficial.

Insight suggests depth of discernment.

Definitions of other terms are given in the appropriate pages of this book.

1.2.3 Evolution of Human Values

The human values evolve because of the following factors:

1. The impact of norms of the society on the fulfillment of the individual's needs or desires.
2. Developed or modified by one's own awareness, choice, and judgment in fulfilling the needs.
3. By the teachings and practice of Preceptors (Gurus) or Saviors or religious leaders.
4. Fostered or modified by social leaders, rulers of kingdom, and by law (government).

1.3 ETHICS

Ethics is the word that refers to morals, values, and beliefs of the individuals, family or the society. The word has several meanings. Basically it is an activity and process of inquiry. Secondly, it is different from non-moral problems, when dealing with issues and controversies. Thirdly, ethics refers to a particular set of beliefs, attitudes, and habits of individuals or family or groups concerned with morals. Fourth, it is used to mean 'morally correct'.

The study on ethics helps to know the people's beliefs, values, and morals, learn the good and bad of them, and practice them to maximize their well-being and happiness. It involves the inquiry on the existing situations, form judgments and resolve the issues. In addition, ethics tells us how to live, to respond to issues, through the duties, rights, responsibilities, and obligations. In religion, similar principles are included, but the reasoning on procedures is limited. The principles and practices of religions have varied from time to time (history), region (geography, climatic conditions), religion, society, language, caste and creed. But ethics has grown to a large extent beyond the barriers listed above. In ethics, the focus is to study and apply the principles and practices, universally.

Integrity

1.4 INTEGRITY

Integrity is defined as the unity of thought, word and deed (honesty) and open mindedness. It includes the capacity to communicate the factual information so that others can make well-informed decisions. It yields the person's 'peace of mind', and hence adds strength and consistency in character, decisions, and actions. This paves way to one's success. It is one of the self-direction virtues. It enthuse people not only to execute a job well but to achieve excellence in performance. It helps them to own the responsibility and earn self-respect and recognition by doing the job.

Moral integrity is defined as a virtue, which reflects a consistency of one's attitudes, emotions, and conduct in relation to justified moral values. Further discussion on this is available in Chapter 2.

Work ethic

1.5 WORK ETHICS¹

Industry and Society are the two systems which interact with each other and are interdependent.

Society requires industry/business system which provides manufacturing, distribution and consumption activities. It needs investment (capital input), labor (input), supply (raw materials), production (industries, business organizations), marketing and distribution (transport), and consumption (public, customer). A lot of transactions (and interactions) between these sub-systems involving people are needed for the welfare of the society. It is here, the work ethics plays an essential role.

Work ethics is defined as *a set of attitudes concerned with the value of work, which forms the motivational orientation*. The 'work ethics' is aimed at ensuring the economy (get job, create wealth, earn salary), productivity (wealth, profit), safety (in workplace), health and hygiene (working conditions), privacy (raise family), security (permanence against contractual, pension, and retirement benefits), cultural and social development (leisure, hobby, and happiness), welfare (social work), environment (anti-pollution activities), and offer opportunities for all, according to their abilities, but without discrimination.

Many complex social problems exist in the industrial/business scenario, because:

1. The people desire to be recognized as individuals and treated with dignity, as living human beings. Work is intrinsically valuable so far as it is enjoyable or meaningful in allowing personal expression and self-fulfillment. Meaningful work is worth doing for the sense of personal identity and the self-esteem it holds.
2. Economic independence: Work is the major instrumental good in life. It is the main source of providing the income needed to avoid economic dependence on others, for obtaining desired materials and services, and for achieving status and recognition from others.
3. Pay as well as the pace of work should be in commensurate with the expertise required, acquired, and utilized in the persons. Exploitation and bargained pay should be discouraged.
4. Privacy (personal freedom) of the employee, including women, is to be protected. At the same time, confidentiality of the employer is also to be protected. Mutual trust and loyalty both ways play major roles in this aspect.
5. Security during job and upon retirement: This concept is being accepted only in government jobs, public limited companies, and corporate organizations. The western thought has influenced the Indian private industries and multinationals in a paradigm shift from 'lifelong employment' to policies such as 'merit only', 'hire and fire', 'pay and use' etc. This situation has no doubt created tension in the Indian scene.
6. Recognition to non-work activities, such as leisure, paid holiday on the day of visit of a dignitary, social service, and other developmental activities. The workers in prosperous countries are less willing to consider 'work' as their prime interest in life. They claim that such service activities give them *peace of mind* and *happiness*. However, such a trend is likely to decline the work ethics.
7. Hard work and productivity are very essential for the success of an industry. The quality of work life deserves to be improved. Hard labor, undignified jobs (human-drawn *rikshaw*, people carrying night soil), and hazardous jobs are to be made less straining, dignified, and safer. Automation and CNC systems to a large extent have been successful in lessening the human burden. Still, many a hard work can not be replaced by 'virtual work', in the near future.
8. Employee alienation: Absence of or inadequate 'recognition and reward system' and 'grievance redressal system', lack of transparency in policy implementation, factions in trade unions etc. lead to ethical problems, affecting the work ethics. Participative management, quality circles, job rotation, and flexible working hours are some of the measures to counter this situation.

9. A different view of work ethics: Work is considered as a necessary evil. It is a thing one must do in order to avoid worse evils, such as dependency and poverty. That is a major source of anxiety and unhappiness.

10. As per the Protestant Work Ethics, the financial success is a sign that is favored by God. It means making maximal profit is a duty mandated by God. It is to be obtained rationally, diligently, and without compromising with other values such as spending time with one's family and not exploiting or harming others¹

To work (job), is not for monetary considerations only. Human beings believe that it is good to work. Work is good for the body and mind. It promotes self-respect, self-esteem, good for the family, and obligation to the society and allow the world to prosper. Work lays a moral and meaningful foundation for life. That is why, work ethics affirms that, the work *per se* is worthy, admirable and valuable at personal and social levels. It improves the quality of life and makes life purposeful, successful, and happy.

By work ethics, duties to the self, family, society, and nation are fulfilled. Rights of the individuals are respected and nourished. Values and virtues are cultivated and enjoyed by all human beings. Further, the quality of life is improved and the environment protected. On the other hand, unemployment and under-employment lead to frustration, social tensions, and occasional militancy. For a developing economy and society, like ours, we need to *promote work ethics*, at all levels, to flourish as developed nation.

Service learning

1.6 SERVICE LEARNING

Service learning refers to learning the service policies, procedures, norms, and conditions, other than 'the technical trade practices'. The service learning includes the characteristics of the work, basic requirements, security of the job, and awareness of the procedures, while taking decisions and actions. It helps the individuals to interact ethically with colleagues, to effectively coordinate with other departments, to interact cordially with suppliers as well as the customers, and to maintain all these friendly interactions.

Alternatively, the service learning may be defined as the *non-paid activity*, in which service is provided on voluntary basis to the public (have-nots in the community), non-profitable institutions, and charitable organizations. It is the service during learning. This includes training or study on real life problems and their possible solutions, during the formal learning, i.e., courses of study. In the industrial scenario, adoption, study, and development of public health or welfare or safety system of a village or school is an example of service learning by the employees. The engineering student analyzing and executing a socially-relevant project is another example of service learning.

The service learning is a methodology falling under the category of experiential education³. It is one of the forms of experiential learning and community service opportunities. It is distinguished in the following ways:

1. *Connection to curriculum*: Integrating the learning into a service project is a key to successful service learning. Academic ties should be clear and built upon existing disciplinary skills.
2. *Learner's voice*: Beyond being actively engaged in the project, trainees have the opportunity to select, design, implement, and evaluate their service activity.
3. *Reflection*: Structured opportunities are created to think, talk, and write about the service experience. The balance of reflection and action allows the trainee to be constantly aware of the impact of their *work*.
4. *Partners in the community*: Partnership with community agencies are used to identify genuine needs, provide mentorship, and contribute input such as labor and expertise towards completing the project.

Civic virtue

1.7 VIRTUES

Virtues are *positive* and *preferred* values. Virtues are desirable attitudes or character traits, motives and emotions that enable us to be successful and to act in ways that develop our highest potential. They energize and enable us to pursue the ideals that we have adopted. Honesty, courage, compassion, generosity, fidelity, integrity, fairness, transparency, self-control, and prudence are all examples of virtues.

Virtues are tendencies which include, solving problems through peaceful and constructive means and follow the path of the golden mean between the extremes of 'excess and deficiency'. They are like habits, once acquired, they become characteristics of a person. Moreover, a person who has developed virtues will naturally act in ways consistent with moral principles. The virtuous person is the ethical person.

1.7.1 Civic Virtues

Civic virtues are the moral duties and rights, as a citizen of the village or the country or an integral part of the society and environment. An individual may exhibit civic virtues by voting, volunteering, and organizing welfare groups and meetings.

The duties are:

1. To pay taxes to the local government and state, in time.
2. To keep the surroundings clean and green.
3. Not to pollute the water, land, and air by following hygiene and proper garbage disposal. For example, not to burn wood, tyres, plastic materials, spit in the open, even not to smoke in the open, and not to cause nuisance to the public, are some of the civic (duties) virtues.

4. To follow the road safety rules.

On the other hand, the rights are:

1. To vote the local or state government.
2. To contest in the elections to the local or state government.
3. To seek a public welfare facility such as a school, hospital or a community hall or transport or communication facility, for the residents.
4. To establish a green and safe environment, pollution free, corruption free, and to follow ethical principles. People are said to have the right to breathe in fresh air, by not allowing smoking in public.
5. People have inalienable right to accept or reject a project in their area. One has the right to seek legal remedy, in this respect, through public interest petition.

George Washington⁴ embodied the civic virtues as indispensable for a self-governing administration. These virtues are divided into four categories:

1. Civic Knowledge

Citizens must understand what the Constitution says about how the government is working, and what the government is supposed to do and what not to do. We must understand the basis of our responsibilities as citizens, besides duties and rights. We must be able to recognize when the government or another citizen infringes upon our rights. It implies that the government requires the participation of the enlightened citizens, to serve and survive.

2. Self-Restraint

For citizens to live in a free society with limited government each citizen must be able to control or restrain himself; otherwise, we would need a police state—that is, a dictatorial government to maintain safety and order. He advocated for morality and declared that happiness is achieved and sustained through virtues and morals. He advocated and demonstrated self-restraint several times in his private and public life, and naturally he was a great leader.

3. Self-Assertion

Self-assertion means that citizens must be proud of their rights, and have the courage to stand up in public and defend their rights. Sometimes, a government may usurp the very rights that it was created to protect. In such cases, it is the right of the people to alter or abolish that government (e.g., voting rights, rights call back).

4. Self-Reliance

Citizens who cannot provide for themselves will need a large government to take care of them. Once citizens become dependent on government for their basic needs, the people are no longer in a position to demand that government act within the confines of the Constitution. Self-reliant citizens are free citizens in the sense that they are not dependent on others for their basic needs. They do not need a large provider-government, which has the potential to become an oppressive government, to meet those needs. Only a strong self-reliant citizenry will be able to enjoy fully the blessings of liberty. These civic virtues, applicable to local, state, and central governments, nourish freedom and civil liberty at the root of democracy.

Respect for others

1.8 RESPECT FOR OTHERS

This is a basic requirement for nurturing friendship, team work, and for the synergy it promotes and sustains. The principles enunciated in this regard are:

1. Recognize and accept the existence of other persons as human beings, because they have a right to live, just as you have.
2. Respect others' ideas (decisions), words, and labor (actions). One need not accept or approve or award them, but shall listen to them first. One can correct or warn, if they commit mistakes. Some people may wait and watch as fun, if one falls, claiming that they know others' mistakes before and know that they will fall! Appreciate colleagues and subordinates on their positive actions. Criticize constructively and encourage them. They are bound to improve their performance, by learning properly and by putting more efforts.
3. Show 'goodwill' on others. Love others. Allow others to grow. Basically, the goodwill reflects on the originator and multiplies itself on everybody. This will facilitate collinearity, focus, coherence, and strength to achieve the goals.

Living peacefully

1.9 LIVING PEACEFULLY

To live peacefully, one should start install peace within (self). Charity begins at home. Then one can spread peace to family, organisation where one works, and then to the world, including the environment. Only who are at peace can spread peace. You can not gift an article which you do not possess. The essence of oriental philosophy is that one should not *fight* for peace. It is oxymoron. War or peace can be won only by peace, and *not by wars* !

One should adopt the following means to live peacefully, in the world: **Nurture**

1. Order in one's life (self-regulation, discipline, and duty).

2. Pure thoughts in one's soul (loving others, blessing others, friendly, and not criticizing or hurting others by thought, word or deed).
3. Creativity in one's head (useful and constructive).
4. Beauty in one's heart (love, service, happiness, and peace). **Get**
5. Good health/body (physical strength for service). **Act**
6. Help the needy with head, heart, and hands (charity). Service to the poor is considered holier than the service to God.
7. Not hurting and torturing others either physically, verbally, or mentally.

The following are the factors that promote living, with internal and external peace:

1. Conducive environment (safe, ventilated, illuminated and comfortable).
2. Secured job and motivated with 'recognition and reward'.
3. Absence of threat or tension by pressure due to limitations of money or time.
4. Absence of unnecessary interference or disturbance, except as guidelines.
5. Healthy labor relations and family situations.
6. Service to the needy (physically and mentally-challenged) with love and sympathy.

Caring

1.10 CARING

Caring is feeling for others. It is a process which exhibits the interest in, and support for, the welfare of others with fairness, impartiality and justice in all activities, among the employees, in the context of professional ethics. It includes showing respect to the feelings of others, and also respecting and preserving the interests of all others concerned. Caring is reflected in activities such as friendship, membership in social clubs and professional societies, and through various transactions in the family, fraternity, community, country and in international councils.

In the present day context, caring for the environment (including the *fauna and flora*) has become a necessity for our very survival. If we do not care for the environment, the environment will scare us.

Sharing

1.11 SHARING

Primarily, caring influences 'sharing'. Sharing is a process that describes the transfer of knowledge (teaching, learning, and information), experience (training), commodities (material possession) and facilities with others. The transfer should be genuine, legal, positive, voluntary, and without any expectation in return. However, the proprietary information it should not be shared with outsiders. Through this process of sharing, experience, expertise, wisdom and other benefits reach more people faster. Sharing is voluntary and it cannot be driven by force, but motivated successfully through ethical principles. In short, sharing is 'charity'

For the humanity, 'sharing' is a *culture*. The 'happiness and wealth' are multiplied and the 'crimes and sufferings' are reduced, by sharing. It paves the way for peace and obviates militancy. Philosophically, the sharing maximizes the happiness for all the human beings. In terms of psychology, the fear, divide, and distrust between the 'haves' and 'have-nots' disappear. Sharing not only paves the way to prosperity, early and easily, and sustains it. Economically speaking, benefits are maximized as there is no wastage or loss, and everybody gets one's needs fulfilled and satisfied. Commercially speaking, the profit is maximized. Technologically, the productivity and utilization are maximized by sharing.

In the industrial arena, code-sharing in airlines for bookings on air travels and the common Effluent Treatment Plant constructed for small-scale industries in the industrial estates, are some of the examples of sharing. The co-operative societies for producers as well as consumers are typical examples of sharing of the goods, profit and other social benefits.

Here is an anecdote that illustrates the benefits of sharing, for the young minds!

The shouting...the screaming...the fighting. That was the breaking point for me as I poured out my woes to my mother. "How can I get them to *share* as well as we did as kids?", I pleaded.

Laughter was her reply. "Well, thanks a lot, mom," I said. "I'm sorry," she chuckled, "but you didn't always share." She went on to explain about the "Box of Misbehaved Toys." Every time we fought over a toy, she would quietly take that and put it into the box.

Yes, I did remember that box. I also remember it wasn't always fair since one person may have caused all the commotion. But my mother was consistent. No matter what the reason for the struggle was, the toy disappeared into the box for one week. No questions asked, and no chance of parole. My siblings and I soon learned that sharing a toy was better than losing it. Often, one person would decide to just wait for a time when no one else was playing with the toy, rather than fight and lose it. It was not a perfect system, but I tried it anyway

That box was a shock to my kids and it was close to full, within a few days....As the weeks progressed, I noticed the box was emptier and the arguing was less. Today, I heard quiet music to my ears as my son said to his sister, "That's OK, you can play with it."

This story illustrates the worthy joy of sharing as compared to the pain of losing.

Honesty

1.12 HONESTY

Honesty is a virtue, and it is exhibited in two aspects namely, (a) Truthfulness and (b) Trustworthiness.

Truthfulness is to face the responsibilities upon telling truth. One should keep one's word or promise. By admitting one's mistake committed (one needs courage to do that!), it is easy to fix them. Reliable engineering judgment, maintenance of truth, defending the truth, and communicating the truth, only when it does 'good' to others, are some of the reflections of truthfulness. But trustworthiness is maintaining integrity and taking responsibility for personal performance. People abide by law and live by mutual trust. They play the right way to win, according to the laws or rules (legally and morally). They build trust through reliability and authenticity. They admit their own mistakes and confront unethical actions in others and take tough and principled stand, even if unpopular.

Honesty is mirrored in many ways. The common reflections are:

- (a) Beliefs (intellectual honesty).
- (b) Communication (writing and speech).
- (c) Decisions (ideas, discretion).
- (d) Actions (means, timing, place, and the goals).
- and (e) Intended and unintended results achieved.

As against this, some of the actions of an engineer that leads to dishonesty are:

1. *Lying*: Honesty implies avoidance of lying. An engineer may communicate wrong or distorted test results intentionally or otherwise. It is giving *wrong* information to the *right* people.
2. *Deliberate deception*: An engineer may judge or decide on matters one is not familiar or with insufficient data or proof, to impress upon the customers or employers. This is a self-deceit.
3. *Withholding the information*: It means hiding the facts during communication to one's superior or subordinate, intentionally or otherwise.
4. *Not seeking the truth*: Some engineers accept the information or data, without applying their mind and seeking the truth.
5. *Not maintaining confidentiality*: It is giving *right* information to *wrong* people. The engineers should keep information of their customers/clients or of their employers confidential and should not discuss them with others.
6. Giving professional judgment under the influence of extraneous factors such as personal benefits and prejudice. The laws, experience, social welfare, and even conscience are given a go-bye by such actions. Certainly this is a higher-order crime.

Courage

1.13 COURAGE

Courage is the tendency to accept and face risks and difficult tasks in rational ways. Self-confidence is the basic requirement to nurture courage.

Courage is classified into three types, based on the types of risks, namely

- (a) Physical courage,
- (b) Social courage, and
- (c) Intellectual courage. In physical courage, the thrust is on the adequacy of the physical strength, including the muscle power and armaments. People with high adrenalin, may be prepared to face challenges for the mere 'thrill' or driven by a decision to 'excel'. The social courage involves the decisions and actions to change the order, based on the conviction for or against certain social behaviors. This requires leadership abilities, including empathy and sacrifice, to mobilize and motivate the followers, for the social cause. The intellectual courage is inculcated in people through acquired knowledge, experience, games, tactics, education, and training. In professional ethics, courage is applicable to the employers, employees, public, and the press.

Look before you leap. One should perform Strengths, Weakness, Opportunities, and Threat (SWOT) analysis. Calculate (estimate) the risks, compare with one's strengths, and anticipate the end results, while taking decisions and before getting into action. Learning from the past helps. Past experience (one's own or borrowed!) and wisdom gained from self-study or others will prepare one to plan and act with self-confidence, succeed in achieving the desired ethical goals through ethical means. Opportunities and threat existing and likely to exist in future are also to be studied and measures to be planned. This anticipatory management will help any one to face the future with courage.

Facing the criticism, owning responsibility, and accepting the mistakes or errors when committed and exposed are the expressions of courage. In fact, this sets their mind to be vigilant against the past mistakes, and creative in finding the alternate means to achieve the desired objectives. Prof. Sathish Dhawan, Chief of ISRO, was reported to have exhibited his courage and owned responsibility, when the previous space mission failed, but credited Prof. A.P.J. Abdul Kalam (now our revered President), when the subsequent mission succeeded.

The courageous people own and have shown the following characteristics, in their professions:

- (a) Perseverance (sustained hard work),
- (b) Experimentation (preparedness to face the challenges, that is, unexpected or unintended results),
- (c) Involvement (attitude, clear and firm resolve to act), and

- (d) Commitment (willing to get into action and to reach the desired goals by any alternative but ethical means).

Valuing time

1.14 VALUING TIME

Time is rare resource. Once it is spent, it is lost for ever. It can not be either stored or recovered. Hence, time is the most perishable and most valuable resource too. This resource is continuously spent, whether any decision or action is taken or not.

The history of great reformers and innovators have stressed the importance of time and valuing time. The proverbs, 'Time and tide wait for nobody' and 'Procrastination is the thief of time' amply illustrate this point.

An anecdote to highlight the 'value of time' is as follows: To realize the value of one year, ask the student who has failed in the examinations; To realize the value of one month, ask the mother who has delivered a premature baby; to realize the value of one week, ask the editor of weekly; to realize the value of one day, ask the daily-wage laborer; to realize now the value of one hour, ask the lovers longing to meet; to realize the value of one minute, ask a person who has missed the train; to realize the value of one second, ask the person who has survived an accident; to realize the value one milli second, ask the person who has won the bronze medal in Olympics; to realize the value of one micro second, ask the NASA team of scientists; to realize the value of one nano-second, ask a Hardware engineer!; If you have still not realized the value of time, wait; are you an Engineer?

Cooperation

1.15 COOPERATION

It is a team-spirit present with every individual engaged in engineering. Co-operation is activity between two persons or sectors that aims at integration of operations (synergy), while not sacrificing the autonomy of either party. Further, working together ensures, coherence, i.e., blending of different skills required, towards common goals.

Willingness to understand others, think and act together and putting this into practice, is cooperation. Cooperation promotes collinearity, coherence (blend), co-ordination (activities linked in sequence or priority) and the synergy (maximizing the output, by reinforcement). The whole is more than the sum of the individuals. It helps in minimizing the input resources (including time) and maximizes the outputs, which include quantity, quality, effectiveness, and efficiency.

According to professional ethics, cooperation should exist or be developed, and maintained, at several levels; between the employers and employees, between the superiors and subordinates, among the colleagues, between the producers and the suppliers (spare parts), and between the organisation and its customers.

The codes of ethics of various professional societies insist on appropriate cooperation to nourish the industry. The absence of cooperation leads to lack of communication, misinformation, void in communication, and undue delay between supply, production, marketing, and consumption. This is likely to demoralize and frustrate the employees, leading to collapse of the industry over time and an economic loss to the society.

The impediments to successful cooperation are:

1. Clash of ego of individuals.
2. Lack of leadership and motivation.
3. Conflicts of interests, based on region, religion, language, and caste.
4. Ignorance and lack of interest. By careful planning, motivation, leadership, fostering and rewarding team work, professionalism and humanism beyond the 'divides', training on appreciation to different cultures, mutual understanding 'cooperation' can be developed and also sustained.

Commitment

1.16 COMMITMENT

Commitment means *alignment to goals and adherence to ethical principles during the activities*. First of all, one must believe in one's action performed and the expected end results (confidence). It means one should have the conviction without an iota of doubt that one will succeed. Holding sustained interest and firmness, in whatever ethical means one follows, with the fervent attitude and hope that one will achieve the goals, is commitment. It is the driving force to realize success.

This is a basic requirement for any profession. For example, a design engineer shall exhibit a sense of commitment, to make his product or project designed a beneficial contribution to the society. Only when the teacher (Guru) is committed to his job, the students will succeed in life and contribute 'good' to the society. The commitment of top management will naturally lead to committed employees, whatever may be their position or emoluments. This is bound to add wealth to oneself, one's employer, society, and the nation at large.

Empathy

1.17 EMPATHY

Empathy is social radar. Sensing what others feel about, without their open talk, is the essence of empathy. Empathy begins with showing concern, and then obtaining and understanding the feelings of others, from others' point of view. It is also defined as the ability to put one's self into the psychological frame or reference or point of view of another,

to know what the other person feels. It includes the imaginative projection into other's feelings and understanding of other's background such as parentage, physical and mental state, economic situation, and association. This is an essential ingredient for good human relations and transactions.

To practice 'Empathy', a leader must have or develop in him, the following characteristics⁵

1. *Understanding others*: It means sensing others feelings and perspectives, and taking active interest in their welfare.
2. *Service orientation*: It is anticipation, recognition and meeting the needs of the clients or customers.
3. *Developing others*: This means identification of their needs and bolstering their abilities. In developing others, the one should inculcate in him the 'listening skill' first.

Communication = 22% reading and writing + 23% speaking + 55% listening

One should get the feed back, acknowledge the strength and accomplishments, and then coach the individual, by informing about what was wrong, and giving correct feedback and positive expectation of the subject's abilities and the resulting performance.

4. *Leveraging diversity* (opportunities through diverse people): This leads to enhanced organizational learning, flexibility, and profitability.

5. *Political awareness*: It is the ability to read political and social currents in an organization.

The benefits of empathy include:

1. Good customer relations (in sales and service, in partnering).
2. *Harmonious* labor relations (in manufacturing).
3. *Good* vendor-producer relationship (in partnering.) Through the above three, we can maximize the output and profit, as well as minimizing the loss. While dealing with customer complaints, empathy is very effective in realising the unbiased views of others and in admitting one's own limitations and failures. According to Peter Drucker, purpose of the business is not to *make a sale*, but to *make and keep a customer*. Empathy assists one in developing courage leading to success!

Self-confidence

1.18 SELF-CONFIDENCE

Certainty in one's own capabilities, values, and goals, is self-confidence. These people are usually positive thinking, flexible and willing to change. They respect others so much as they respect themselves.

Self-confidence is positive attitude, wherein the individual has some positive and realistic view of himself, with respect to the situations in which one gets involved. The people with self-confidence exhibit courage to get into action and unshakable faith in their abilities, whatever may be their positions. They are not influenced by threats or challenges and are prepared to face them and the natural or unexpected consequences.

The self-confidence in a person develops a sense of partnership, respect, and accountability, and this helps the organization to obtain maximum ideas, efforts, and guidelines from its employees. The people with self-confidence have the following characteristics:

1. A self-assured standing,
2. Willing to listen to learn from others and adopt (flexibility),
3. Frank to speak the truth, and
4. respect others' efforts and give due credit.

On the contrary, some leaders expose others when failure occurs, and own the credit when success comes.

The factors that shape self-confidence in a person are:

1. Heredity (attitudes of parents) and family environment (elders),
2. Friendship (influence of friends/colleagues),
3. Influence of superiors/role models, and
4. Training in the organization (e.g., training by Technical Evangelists at Infosys Technologies). The following methodologies are effective in developing self-confidence in a person:
 1. Encouraging SWOT analysis. By evaluating their strength and weakness, they can anticipate and be prepared to face the results.
 2. Training to evaluate risks and face them (self-acceptance).
 3. Self-talk. It is conditioning the mind for preparing the self to act, without any doubt on his capabilities. This make one accepts himself while still striving for improvement.
 4. Study and group discussion, on the history of leaders and innovators (e.g., Sam Walton of Wal-Mart, USA).

Character

1.19 CHALLENGES IN THE WORK PLACE

The biggest workplace challenge is said to be the employee's work ethics: showing up to work every day (interest in work and attendance), showing up to work on time (punctuality), taking pride in the quality of their work, commitment to the job, and getting along with others. This situation demands inculcation of good character in the workplace by employees.

1.19.1 Character

It is a characteristic property that defines the behavior of an individual. It is the pattern of virtues (morally-desirable features). Character includes attributes that determine a person's moral and ethical actions and responses. It is also the ground on which morals and values blossom.

People are divided into several categories, according to common tendencies such as ruthless, aggressiveness, and ambition, constricting selfishness, stinginess, or cheerfulness, generosity and goodwill. Individuals vary not only in the type of their character but also in the degree. Those whose lives are determined and directed by the prevailing habits, fashions, beliefs, attitudes, opinions and values of the society in which they live have at best a developed *social* as opposed to an *individual* character.

The character is exhibited through conduct. Character is determined by the expectations of society. Many act and live within its norms, refusing to fall below the required social minimum, failing to rise above the maximum expected of a normal member of the group. On one extreme are those that do not even conform to the minimum standards, and fail to acquire the socially-required behaviors, attitudes and values. These individuals have an unformed social character. At the other extreme are those whose beliefs, attitudes and values are determined internally by the strength of their own convictions. These are individuals with developed minds and formed characters of their own.

Individuals do not live or act in a vacuum. They exist and act in a human social environment of other people that constantly act on them and react to their actions. They also live in a natural environment of physical objects and material forces such as the winds and rains. And those with occult and spiritual traditions recognize that there is also a subtle environment of other planes of existence, both higher planes of spiritual influence and lower planes of negative forces in universal nature seeking to act on the lives. All of the social, material and the occult planes constitute the field of human activity. Each of them functions according to its own laws or principles. Each of them has its own characteristic modes of action and influence on human life.

Character is the expression of the personality of a human being, and that it reveals itself in one's conduct. In this sense every human has a character. At the same time only human beings, not animals have character: it implies rationality. But in addition to this usage, the term is also employed in a narrower sense, as when we speak of a person "of character". In this connotation, character implies certain unity of qualities with a recognizable degree of *constancy* in mode of action. Psychology analyzes the elements of character to trace the laws of its growth, to distinguish the chief agencies which contribute to the formation of different types of character, and to classify them. Many psychologists world over, during the last 40 years have given a large quantity of acute observations on the topic of character. Still these contributions do not constitute a science.

1.19.2 The Four Temperaments⁵

The original endowment or native element in character with which the individual starts life is practically identical with what the Ancients recognized as *temperament*. From the times of Hippocrates, they distinguished four main types of temperaments: the Sanguine, the Choleric, the Phlegmatic, and the Melancholic. The modern speculation accepts the same classification, but under other names. These different types of temperaments are accounted for differences in physiological conditions of the tissues of the body, by diverse rates of activities in the processes of nutrition and waste, in the changes of nerve-energy, or in circulation, and by differences of tonicity in the nerves. Irrespective of the physiological explanation, the four-fold classification seems to be fair. Moreover, though scientists are still far from agreeing upon the precise elements in the organism on which temperament depends, the fact that different forms of temperaments have an organic basis such as *hormones* seems certain. Although our original temperament is given to us independently of our will by heredity, we play an important part in moulding our character, and we thus become responsible for certain ethical qualities in it.

Character has been defined as "*natural temperament completely fashioned by the will*". It is, in fact, a resultant of our acquired habits with our original disposition. The regular use of the intellect, the controlled activity of the imagination, the practice of judgment and reflection, all contribute to the formation and refinement of habits of mind. The frequent indulgence in particular forms of emotion, such as anger, envy, sympathy, melancholy, fear, and the like, fosters tendencies towards these sentiments which give a subconscious bent to a large part of man's behavior. But finally, the exercise of the will plays the predominant role in moulding the type of character. The manner and degree in which currents of thought and waves of emotion are initiated, guided, and controlled by the will, or allowed to follow the course of spontaneous impulse, has more effect in determining the resultant type of character than the quality of the thoughts or emotions themselves.

The life of the animal is entirely ruled by instinct from within, and by accidental circumstances from without. It is therefore incapable of acquiring a character. A human, through reasoning and the growth of reflection, by the exercise of choice against the impulse, gradually develops self-control; and it is by the exercise of this power that moral character is formed and reformed. Character is in fact the outcome of a series of volitions, and it is for this reason we are responsible for our characters, as we are for the individual habits which go to constitute them.

1.19.3 Types of Character

From the four fundamental temperaments, various classifications of character have been adopted by different psychologists. The intellectual, the emotional, and the volitional or energetic are the chief types with A. Bain. M.

Pérez, based on the phenomenon of movement, distinguishes characters as lively, slow, ardent, and well-balanced. M. Ribot, with more subjective division and excluding indefinite types as 'characterless', recognizes the forms as:

- (a) the sensitive (humble, contemplative and emotional,
- (b) the active (great and the mediocre), and (c) the apathetic (purely apathetic or dull), and (d) the intelligent.

1.19.4 Ethics and Character

Whilst psychology investigates the growth of different types of character, ethics considers the relative value of such types and the virtues which constitute them. The problem of the true moral ideal is a question of the relative value of different types of character. The effect on the person's character of a particular form of conduct is a universally accepted as a test of its moral quality. Different systems of ethics emphasize different virtues in constituting the ideal moral character. With the utilitarian, who places the ethical end in the maximum happiness for the whole community, *benevolence* will form the primary element in the ideal character. For the stoic, fortitude and *self-control* are the chief excellences.

In all conceptions of ideal character, firmness of will, fortitude, constancy in adhering to principle or in pursuit of a noble aim are held important. A man of character is frequently equivalent to being capable of adhering to a fixed purpose. Another essential is the virtue of justice, the recognition of the rights, duties, and claims of others. The richer the culture of the mind, the larger the intellectual horizon, the broader the sympathies, the more will the character approximate to the ideal of human perfection.

1.19.5 Education and Character

The aim of education is not only the cultivation of the intellect but also the formation of moral character. Increased intelligence or physical skill may as easily be employed to the detriment or benefit of the community, if not accompanied by improved will. It is the function of ethics to determine the ideals of human character. The theory and science of education are to study the processes by which that end may be attained.

1.19.6 Building Character in the Workplace

Managers have to influence and employ creative means of stressing the importance of good character in the workplace, in the following ways^{6,7}:

1. **Employee Hiring, Training, and Promotion Activities**

- (a) Institute and adopt an organization policy statement to positive character in the workplace. For example, commitment to civility pledges. This may be communicated through printing on the back of the business cards of the employees.
- (b) Prominently and explicitly include character considerations in recruiting procedures, during interviews and in the hiring deliberations.
- (c) Emphasize the importance of character and adherence to the 'six pillars' of character in orientation, initial job training, and during in-service training. The six pillars of character are the ethical values, such as: trustworthiness, respect, responsibility, fairness, caring and citizenship. Respect means showing high regard for self, others, authority, property and country. It includes showing appreciation for cultural diversity by valuing all people as human beings. Responsibility is
 - (i) being accountable for one's actions,
 - (ii) being dependable in carrying out obligations and duties,
 - (iii) being reliable and consistent in word and action, and
 - (iv) being committed to community development. Integrity or fairness means showing the inner strength and courage to be truthful, trustworthy, fair and honest in all things. It includes acting justly and honorably. Caring means being kind, considerate, courteous, helpful, friendly and generous to others, and being compassionate by treating others as you would like to be treated. Citizenship means accepting and adopting civic rights and duties as a citizen of the country.
- (d) Include evaluation of fundamental character values such as honesty, promise keeping, accountability, fairness, and caring, in appraisals/reviews.
- (e) Institute recognition and reward system for the employees who exemplify the positive character. for example, awards and medals.
- (f) Think of your employees, especially the younger ones, as people whose personal and work values will be influenced by what you expect of them and how you treat them.
- (g) Think of your employees as present or future mentors, coaches, and volunteers.

2. **Internal Communication**

Use internal communication channels to create a friendly environment that praises positive role modeling at the workplace and in the community by encouraging voluntarism, and mentoring, e.g., through

- (a) Internal newsletters,
- (b) Workplace posters in canteens and recreation rooms, (c) Mailers, and
- (d) Electronic mails.

3. **External Communication**

In relations with customers, vendors and others, consciously communicate affirming messages about character and ethics, such as

- (a) Advertise and market honoring consensual values (the six pillars),

- (b) Assure that none of your products and services undermines character building,
- (c) Include positive messages about voluntarism and celebrate, and
- (d) 'Character counts' week in advertising, billings and other mailers.

4. Financial and Human Resources

- (a) Support local and national 'character' projects and the activities of the members by encouraging staff members to get involved. Offer incentives such as paying employees for the time they contribute at a local youth-service organization.
- (b) Sponsor 'character' movement through financial support.

5. Community Outreach

- (a) Use public outreach structures to encourage mentoring and other character-building programs. (b) Encourage educational and youth organizations to become active in character building.
- (b) Use corporate influence to encourage business groups (chambers of commerce, conference boards, and Rotary clubs) and other companies to support 'character' building.

Spirituality

1.20 SPIRITUALITY

Spirituality is a way of living that emphasizes the constant awareness and recognition of the spiritual dimension (mind and its development) of nature and people, with a dynamic balance between the material development and the spiritual development. This is said to be the great virtue of Indian philosophy and for Indians. Sometimes, spirituality includes the faith or belief in supernatural power/ God, regarding the worldly events. It functions as a fertilizer for the soil 'character' to blossom into values and morals.

Spirituality includes creativity, communication, recognition of the individual as human being (as opposed to a life-less machine), respect to others, acceptance (stop finding faults with colleagues and accept them the way they are), vision (looking beyond the obvious and not believing anyone blindly), and partnership (not being too authoritative, and always sharing responsibility with others, for better returns).

Spirituality is motivation as it encourages the colleagues to perform better. Remember, lack of motivation leads to isolation. Spirituality is also energy: Be energetic and flexible to adapt to challenging and changing situations. Spirituality is flexibility as well. One should not be too dominating. Make space for everyone and learn to recognize and accept people the way they are. Variety is the order of the day. But one can influence their mind to think and act together. Spirituality is also fun. Working is okay, but you also need to have fun in office to keep yourself charged up. Tolerance and empathy are the reflections of spirituality. Blue and saffron colors are said to be associated with spirituality.

Creativity in spirituality means conscious efforts to see things differently, to break out of habits and outdated beliefs to find new ways of thinking, doing and being. Suppression of creativity leads to violence. People are naturally creative. When they are forced to crush their creativity, its energy turns to destructive release and actions. Creativity includes the use of color, humor and freedom to enhance productivity. Creativity is fun. When people enjoy what they do, it is involvement. They work much harder.

1.20.1 Spirituality in the Workplace

Building spirituality in the workplace: Spirituality is promoted in the workplace by adhering to the following activities:

1. Verbally respect the individuals as humans and recognize their values in all decisions and actions.
2. Get to know the people with whom you work and know what is important to them. Know their goals, desires, and dreams too.
3. State your personal ethics and your beliefs clearly.
4. Support causes outside the business.
5. Encourage leaders to use value-based discretion in making decisions.
6. Demonstrate your own self-knowledge and spirituality in all your actions.
7. Do unto others as you would have them do unto you.

1.20.2 Spirituality for Corporate Excellence⁸

The spiritual traits to be developed for excellence in corporate activities are listed as follows:

1. *Self-awareness* — Realization of self-potential. A human has immense capability but it needs to be developed.
2. *Alertness in observation and quickness in decision making*, i.e., spontaneity which includes quick reflexes, no delay but also no hasty decisions.
3. *Being visionary and value based* — This includes an attitude towards future of the organization and the society, with clear objectives.
4. *Holism* — Whole system or comprehensive views and interconnected with different aspects. Holistic thinking, which means the welfare of the self, family, organization and the society including all other living beings and environment.
5. *Compassion* — Sympathy, empathy and concern for others. These are essential for not only building the team but also for its effective functioning.

6. *Respect for diversity* — It means search for unity in diversity i.e., respect others and their views.
7. *Moral Autonomy* — It means action based on rational and moral judgment. One need not follow the crowd or majority i.e., band-wagon effect.
8. *Creative thinking and constant reasoning* — Think if we can do something new and if we can improve further?
9. *Ability to analyze and synthesize* — Refrain from doing something only traditional.
10. *Positive views of adversity* — Make adversities one's source of power—a typical Karma yogi's outlook! Every threat is converted into opportunity.
11. *Humility* — The attitude to accept criticism (it requires courage!) and willing to correct. It includes modesty and acknowledging the work of colleagues.
12. *Sense of vocation* — Treat the duty as a service to society, besides your organization.

Introduction to Yoga and meditation for professional excellence and stress management.

Stress is a critical phenomenon. It is a very subjective experience. It is based widely upon the background experiences, temperament and environmental conditions. Stress is a part of life and is generated by constantly changing situations that a person must face. A certain level of stress becomes unavoidable. Due to its complex nature stress has been studied for many years by researchers in psychology, sociology, medicine and even in management. Certain stress is necessary for the growth of individual and even a part of stress can lead to the serious ailment causes. The challenge is an important ingredient for healthy and productive work. Challenge can be referred as the bit of stress good for survival and growth and results to be positive. But when the challenge moves in fast pace with high impact and sharp pressure, lead towards negative impact of stress. Thus workplace stress is the generally focused area of stress. This stress increases pressure and worsening the condition of the individual leading to harmful problems which may be of physical, mental, emotional, behavioural in nature and even create imbalance in lifestyle. Managing the stress is needed to cope with the exceeding level of challenges. Stress management is the concept that can be adapted to reduce the level of stress. It focuses on keeping the stress levels from exceeding the level where it energizes and improves the productivity of individuals. The paper focuses on the level of stress being found among individuals at workplace in Indian context, with understanding the problems faced due to stress on the basis of gender, and also to study employees' perception towards stress, and to suggest measures to both management and employees to deal with stress. The finding of the paper reveals that more or less stress is being experienced by the individuals at workplace. Excessive workload and organisational conflict are the major causes of workplace stress. Lifestyle imbalance is the common result of stress among both the genders. It also finds that the management can play a vital role by providing training, recreational activities, meditation and yoga classes to the employees for managing stress at work.

UNIT II - ENGINEERING ETHICS

“Technology can have no legitimacy unless it inflicts no harm”-Adm.H.G. Rickover, father of the US nuclear navy.

- What does Adm. Rickover mean by this?
- Should engineers avoid technology that has the potential for inflicting harm on a society or its members?

- Engineers have an ethical and social responsibility to themselves, their clients and society.
- Practically (although there is much debate about this), engineering ethics is about balancing cost, schedule, and risk.

ENGINEERING ETHICS is:

- the study of moral issues and decisions confronting individuals and organizations involved in engineering and
- the study of related questions about moral ideals, character, policies and

relationships of people and organizations involved in technological activity.

TRAINING IN PREVENTIVE ETHICS

- Stimulating the moral imagination
- Recognizing ethical issues
- Eliciting a sense of responsibility
- Tolerating disagreement and ambiguity

IMPEDIMENTS TO RESPONSIBILITY

- Self-interest.
- Fear.
- Self-deception.
- Ignorance.
- Egocentric tendencies.
- Microscopic vision.
- Groupthink.

QUESTIONABLE ENGINEERING PRACTICES

- Trimming – “smoothing of irregularities to make data look extremely accurate and precise”
- Cooking – “retaining only those results that fit the theory and discarding others”.
- Forging – “inventing some or all of the research data...”
- Plagiarism – misappropriating intellectual property.
- Conflicts of interest (such as accepting gifts.)
 - actual
 - potential
 - apparent

CLEARLY WRONG ENGINEERING PRACTICES

- Lying
- Deliberate deception
- Withholding information
- Failure to seek out the truth
- Revealing confidential or proprietary information
- Allowing one's judgment to be corrupted.
- Failing to adequately promote the dissemination of information

SENSES OF EXPRESSION OF ENGG. ET HICS

- ☐ Ethics is an activity and area of inquiry. It is the activity of understanding moral values, resolving moral issues and the area of study resulting from that activity.
- ☐ When we speak of ethical problems, issues and controversies, we mean to distinguish them from non-moral problems.
- ☐ Ethics is used to refer to the particular set of beliefs, attitudes and habits that a person or group displays concerning moralities.
- ☐ Ethics and its grammatical variants can be used as synonyms for „morally correct“.

VARIETIES or APPROACHES OF MORAL ISSUES

MICRO-ETHICS emphasizes typically everyday problems that can take on significant proportions in an engineer's life or entire engineering office.

MACRO-ETHICS addresses societal problems that are often shunted aside and are not addressed until they unexpectedly resurface on a regional or national scale.

MORAL PROBLEMS IN ENGINEERING

(SOME EXAMPLES)

- 4.1. An inspector discovered faulty construction equipment and applied a violation tag, preventing its use. The supervisor, a construction manager viewed the case as a minor abrasion of the safety regulations and ordered the removal of the tag to speed up the project. When the inspector objected to this, he was threatened with disciplinary action.
- 4.2. An electric utility company applied for a permit to operate a nuclear power plant. The licensing agency was interested in knowing what emergency measures had been established for human's safety in case of reactor malfunctioning. The utility engineers described the alarm system and arrangements with local hospitals for treatment. They did not emphasize that this measures applied to plant personnel only and that they had no plans for the surrounding population. When enquired about

their omission, they said it was not their responsibility.

4.3. A chemical plant dumped wastes in a landfill. Hazardous substances found their way into the underground water table. The plant's engineers were aware of the situation but did not change the method of disposal because their competitors did it the same cheap way, and no law explicitly forbade the practice.

4.4. Electronics Company ABC geared up for production of its own version of a popular new item. The product was not yet ready for sale, but even so, pictures and impressive specifications appeared in advertisements. Prospective customers were led to believe that it was available off the shelf and were drawn away from competing lines.

TYPES OF INQUIRIES

1. NORMATIVE INQUIRY

These are about „what ought to be“ and „what is good“. These questions identify and also justify the morally desirable norms or standards.

Some of the questions are:

- A. How far engineers are obligated to protect public safety in given situations?
- B. When should engineers start whistle blowing on dangerous practices of their employers?
- C. Whose values are primary in taking a moral decision, employee, public or govt?
- D. Why are engineers obligated to protect public safety?
- E. When is govt justified in interfering on such issues and why?

2. CONCEPTUAL INQUIRY:

These questions should lead to clarifications on concepts, principles and issues in ethics. Examples are:

- A) What is „SAFETY“ and how is it related to „RISK“
- B) „Protect the safety, health and welfare of public“-What does this statement mean?
- C) What is a bribe?
- D) What is a „profession“ and who are „professionals“?

3. FACTUAL (DESCRIPTIVE) INQUIRIES

These are inquiries used to uncover information using scientific techniques. These inquiries get to information about business realities, history of engineering profession, procedures used in assessment of risks and engineers psychology.

Why study *ENGINEERING ETHICS*

ENGINEERING ETHICS is a means managers, citizens and others to technological activities. to increase the ability of concerned engineers, responsibly confront moral issues raised by

MORAL DILEMMA

There are three types of complexities.

- ☐ **VAGUENESS:** This complexity arises due to the fact that it is not clear to individuals as to which moral considerations or principles apply to their situation.
- ☐ **CONFLICTING REASONS:** Even when it is perfectly clear as to which moral principle is applicable to one's situation, there could develop a situation where in two or more clearly applicable moral principles come into conflict.
- ☐ **DISAGREEMENT:** Individuals and groups may disagree how to interpret, apply and balance moral reasons in particular situations.

Steps in confronting MORAL DILEMMAS:

- i) Identify the relevant moral factors and reasons.
- ii) Gather all available facts that are pertinent to the moral factors involved.
- iii) Rank the moral considerations in the order of their importance as they apply to the situation.
- iv) Consider alternative course of action, tracing the full implications of each, as ways of solving dilemma.
- v) Talk with colleagues, seeking the suggestions and perspectives of the dilemma.
- vi) Arrive at a carefully reasoned judgment by weighing all the relevant moral factors and reasons in light of facts.

All the above steps are distinct, even though they are inter-related and can often be taken jointly

MORAL AUTONOMY

- This is viewed as the skill and habit of thinking rationally about ethical issues on the basis of moral concerns independently or by self-determination.
- Autonomous individuals think for themselves and do not assume that customs are always right.
- They seek to reason and live by general principles.
- Their motivation is to do what is morally reasonable for its own sake, maintaining integrity, self-respect, and respect for others.

“One who breaks an unjust law must do so openly, lovingly, and with a willingness to accept the penalty. I submit that an individual who breaks a law that conscience tells him is unjust and willingly accepts the penalty... is in reality expressing the highest respect for the law.” *Rev. Martin Luther King, Jr.* in Letter from a Birmingham Jail, 1963.

A person becomes morally autonomous by improving various practical skills listed below:

- i) Proficiency is recognizing moral problems and issues in engineering.
- ii) Skill in comprehending, clarifying and critically assessing arguments on opposing sides of moral issues.
- iii) The ability to form consistent and comprehensive viewpoints based upon consideration of relevant facts.
- iv) Awareness of alternate responses to issues and creative solutions for practical difficulties.
- v) Sensitivity to genuine difficulties and subtleties
- vi) Increased precision in the use of a common ethical language necessary to express and also defend one's views adequately.
- vii) Appreciation of possibilities of using rational dialogue in resolving moral conflicts and the need for tolerance of differences in perspective among orally reasonable people.
- viii) A sense of importance of integrating one's professional life and personal convictions i.e. maintaining one's moral integrity.

KOHLBERG'S THEORY**STAGES OF MORAL DEVELOPMENT**

- *Pre-conventional Level*

Whatever benefits oneself or avoids punishment. This is the level of development of all young children. -Avoid punishment & Gain Reward

- *Conventional Level*

Uncritical acceptance of one's family, group or society are accepted as final standard of morality. Most adults do not mature beyond this stage. -1. Gain Approval & Avoid Disapproval & 2. Duty & Guilt

- *Post-conventional Level*

Motivation to do what is morally reasonable for its own sake, rather than solely from ulterior motives, with also a desire to maintain their moral integrity, self-respect and the respect of other autonomous individuals. They are „Morally autonomous“ people. -1. Agreed upon rights & 2. Personal moral standards

GILLIGAN'S THEORY

- *Pre-conventional Level*

This is the same as Kohlberg's first level in that the person is preoccupied with self-centered reasoning, caring for the needs and desires of self.

- *Conventional*

Here the thinking is opposite in that, one is preoccupied with not hurting others and a willingness to sacrifice one's own interests in order to help or nurture others (or retain friendship).

- *Post-conventional Level*

Achieved through context-oriented reasoning, rather than by applying abstract rules ranked in a hierarchy of importance. Here the individual becomes able to strike a reasoned balance between caring about other people and pursuing one's own self-interest while exercising one's rights.

Differences between the TWO THEORIES

KOHLBERG	GILLIGAN
<i>I. Ethics of rules and rights</i>	<i>Ethics of care</i>
<i>II. Studies based on well educated, white male's only, tending male bias.</i>	<i>Studies included females and colored peoples</i>
<i>III. Application of abstract rules ranked in the order of importance</i>	<i>Application of context-oriented reasoning.</i>
<i>IV. Studies were hypothesized for both the genders even though the study was conducted mostly on males</i>	<i>Study was conducted on both genders and it was found, men based their reasoning on „justice“ and women based theirs on „care“</i>

HEINZ'S DILEMMA

The famous example used by Kohlberg was called “Heinz’s dilemma”. A woman living in Europe would die of cancer unless she was given an expensive drug. Her husband, Heinz, could not afford it. But the local pharmacist, who had invented the drug at only one tenth of the sale price refused to sell it to Heinz who could only raise half the required money from borrowings. Desperation drives Heinz to break into the pharmacy and steal the drug to save his wife.

When respondents were asked whether and why Heinz should or should not steal a drug to save his wife from a life-threatening illness. The responses of the individuals were compared with a prototypical response of individuals at particular stages of moral reasoning. Kohlberg noted that irrespective of the level of the individual the response could be same, but the reasoning could be different.

For example, if a child reasoning at a „pre conventional“ level might say that it is not right to steal because it is against law and someone might see you.

At a „conventional“ level, an individual might argue that it is not right to steal because it is against law and laws are necessary for society to function.

At a „post conventional“ level, one may argue that stealing is wrong because is against law and it is immoral.

CONSENSUS AND CONTROVERSY

CONTROVERSY:

- All individuals will not arrive at same verdict during their exercising their moral autonomy.
- Aristotle noted long ago that morality is not as precise and clear-cut as arithmetic.
- Aim of teaching engg ethics is not to get unanimous conformity of outlook by indoctrination, authoritarian and dogmatic teaching, hypnotism or any other technique but to improve promotion of tolerance in the exercise of moral autonomy.

CONSENSUS:

The conductor of a music orchestra has authority over the musicians and his authority is respected by them by consensus as otherwise the music performance will suffer. Hence the authority and autonomy are compatible.

On the other hand, tension arises between the needs for autonomy and the need for concerns about authority. The difference between the two should be discussed openly to resolve the issue to the common good.

PROFESSIONS AND PROFESSIONALISM

Engineers normally imagine that they are servants to organizations rather than a public guardian. Responsibility to the public is essential for a professional.

Who is a professional?

- Obviously a *member* of a profession.

What is a profession?

„JOB“ or „OCCUPATION“ that meets the following criteria from which a person *earns his living*.

- Knowledge – Exercise of skills, knowledge, judgment and discretion requiring extensive formal criteria.
- Organization - special bodies by members of the profession to set standard codes of ethics,
- Public good-The occupation serves some important public good indicated by a code of ethics.

Who is a professional engineer?

- Has a bachelor's degree in engineering from an accredited school?
- Performs engineering work
- Is a registered and licensed Professional Engineer
- Acts in a morally responsible way while practicing engineering

Differing views on Professionals

“Only consulting engineers who are basically independent and have freedom from coercion can be called as professionals.”
-Robert L.W hitelaw

“Professionals have to meet the expectations of clients and employers. Professional restraints are to be imposed by only laws and government regulations and not by personal conscience.” -Samuel Florman

“Engineers are professionals when they 1) attain standards of achievement in education, job performance or creativity in engineering and 2) accept the most basic moral responsibilities to the public as well as employers, clients, colleagues and subordinates.” -Mike Martin & Roland Schinzinger

MOTIVES FOR PROFESSIONALISM

- A desire for interesting and challenging work and the pleasure in the act of changing the world.
- The joy of creative efforts. Where a scientist's interest is in discovering new technology, engineers interest is derived from creatively solving practical problems.
- The engineer shares the scientist's job in understanding the laws and riddles of the universe.
- The sheer magnitude of the nature – oceans, rivers, mountains and prairies – leads engineers to build engineering marvels like ships, bridges, tunnels, etc., which appeal to human passion.
- The pleasure of being in the presence of machines generating a comforting and absorbing sense of a manageable, controlled and ordered world.
- Strong sense of helping, of directing efforts towards easing the lot of one's fellows.

MODELS OF PROFESSIONAL ENGINEERS

1. SAVIOR: The representative engineer is a savior who will redeem society from poverty, inefficiency, waste and the drudgery of manual labor.
2. GUARDIAN: Engineers know, the directions in which and pace at which, technology should develop.
3. BUREAUCRATIC SERVANT: The engineer as the loyal organization person uses special skills to solve problems.
4. SOCIAL SERVANT: Engineers, in co-operation with management,

have the task of receiving society's directives and satisfying society's desires. 5. SOCIAL ENABLER AND CATALYST: Engineers play a vital role beyond mere compliance with orders. They help management and society understand their own needs and to make informed decisions.

6. GAME PLAYER: Engineers are neither servants nor masters of anyone. They play by the economic game rules that happen to be in effect at a given time.

TYPES OF ETHICAL THEORIES

S.NO	TYPES	BASED ON
1	Virtue ethics	Virtues and vices
2	Utilitarianism	Most good for most people
3	Duty ethics	Duties to respect persons

4	Rights ethics	Human Rights
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VIRTUE ETHICS

- “*The unexamined life is not worth living.*” (Socrates, 470-399 B.C.)
- “*The happy life is thought to be virtuous; now a virtuous life requires exertion and does not consist in amusement.*” (Aristotle, 384-322 B.C.)

The Four Main Virtues

- Prudence (mind): to think about a moral problem clearly and completely
- Temperance (emotions): control attraction to positive emotions
- Fortitude (emotions): control aversion for negative emotions
- Justice (will): choose according to truth and fairness.

Virtue Ethics

- Focuses on the type of person we should strive to be
 - Actions which reflect *good character* traits (virtues) are inherently *right*
 - Actions which reflect *bad character* traits (vices) are inherently *wrong*
 - Virtue ethics are tied more to individual behavior than to that of an organization (e.g. business, government)
- ARISTOTLE** says that moral virtues are tendencies, acquired through habit formation, to reach a proper balance between extremes in conduct, emotion, desire and attitude i.e. virtues are tendencies to find the Golden Mean between the extremes of too much and too little.

Some of the virtues are defined using examples here:

Virtue	Too much	Too less
(Golden mean between extremes)		
<i>Courage</i>	<i>Foolhardiness</i>	<i>Cowardice</i>
<i>Truthfulness</i>	<i>Revealing all in violation of tact and confidentiality</i>	<i>Being secretive or lacking in candor</i>
<i>Generosity</i>	<i>Wasting one's resources</i>	<i>Being miserly</i>
<i>Friendliness</i>	<i>Being annoyingly effusive</i>	<i>Sulky or surly</i>

PROFESSIONAL RESPONSIBILITY

- Being morally responsible as a professional.
- Most basic and comprehensive professional virtue.
- Creation of useful and safe technological products while respecting the autonomy of clients and public, especially in matters of risk taking.

This encompasses a wide variety of the more specific virtues grouped as follows:

1. SELF DIRECTION VIRTUES:

Fundamental virtues in exercising our moral autonomy and responsibility. e.g. self-understanding, humility, good moral

judgment, courage, self-discipline, perseverance, commitments, self-respect and dignity

2. PUBLIC SPIRITED VIRTUES:

Focusing on the good of the clients and public affected by the engineers' work by not directly and intentionally harming others i.e. „no maleficence“.

Beneficence, sense of community, generosity are other virtues falling in this category.

3. TEAMWORK VIRTUES:

Enables professionals to work successfully with others. E.g. collegiality, cooperativeness, the ability to communicate, respect for authority, loyalty to employers and leadership qualities.

4. PROFICIENCY VIRTUES:

Mastery of one's craft that characterize good engineering practice e.g. competence, diligence, creativity, self-renewal through continuous education.

MORAL INTEGRITY

Moral integrity is the unity of character on the basis of moral concern, and especially on the basis of honesty. The unity is consistency among our attitudes, emotions and conduct in relation to justified moral values.

SELF-RESPECT

- Valuing oneself in morally appropriate ways.
- Integral to finding meaning in one's life and work
- A pre-requisite for pursuing other moral ideals and virtues.
- Self-respect is a moral concept of properly valuing oneself but self-esteem is a psychological concept of positive attitude towards oneself.

Self-respect takes two forms.

1. *Recognition self-respect* is properly valuing oneself because of one's inherent moral worth, the same worth that every other human being has.
2. *Appraisal self-respect* is properly valuing ourselves according to how well we meet moral standards and our personal ideals.

VARIOUS SENSES OF RESPONSIBILITY

Responsibility ascribed by i) virtue, ii) obligations, iii) general moral capacities of people, iv) liabilities and accountability for actions and v) blameworthiness or praiseworthiness.

1. By virtue: A person is said to be a responsible person when we ascribe a moral virtue to the person. We expect that the person is regularly concerned to do the right thing, is conscientious and diligent in meeting obligations. In this sense, professional responsibility is the central virtue of engineers.
2. By obligation: Moral responsibilities can be thought of as obligations or duties to perform morally right acts.
3. By general moral capacity: When we view a person as a whole rather than one with respect to a specific area, we are actually thinking about the active capacity of the person for knowing how to act in morally appropriate ways e.g. the capacity of children grows as they mature and learn.
4. By accountability: Responsibility also means being accountable, answerable or liable to meet particular obligations. The virtue of professional responsibility implies a willingness to be accountable for one's conduct.
5. By being blameworthy: When accountability for a wrongdoing is at issue, responsible becomes a synonym for blameworthy. When right conduct is the issue, the context is praiseworthiness.

CAUSAL AND LEGAL RESPONSIBILITIES

Causal Responsibility: consists simply in being a cause of some event. E.g. lightning as being responsible for a house catching fire.

Legal Responsibility: consists simply in being a cause for harm that was so unlikely and also unforeseeable that no moral responsibility is involved.

UTILITARIANISM

- That which produces the maximum benefit for the greatest number of people (e.g. Democracy)
- Tries to achieve a balance between the good and bad consequences of an action
- Tries to maximize the well-being of society and emphasizes what will provide the most benefits to the largest group of people
- This method is fundamental to many types of engineering analysis, including risk-benefit analysis and cost-benefit analysis

Drawbacks:

- Sometimes what is best for the community as a whole is bad for certain individuals in the community
- It is often impossible to know in advance which decision will lead to the most good

Organizing Principles to Resolving Ethical Issues

- Utilitarian thinking
 - a standard that promotes those individual actions or rules that produce the greatest total amount of utility to those affected.
 - A code that enjoins engineers to promote the safety, health, and welfare of the public.
 - What is utility, though? Happiness?
- Preference utilitarianism
 - promote those conditions that allow each individual to pursue happiness as he or she conceives it.
 - Two conditions necessary for this: freedom and well-being.
 - Practically, for engineers, this advocates cost/benefit analyses.

Problems with Utilitarianism

- Difficult to quantify benefits for ALL those affected.
- “Greatest good” difficult to apply to an all-inclusive population.
- Someone gets “shafted” – approach justifies perpetrating injustice on

individuals, i.e., s someone gets left out.

- Three approaches:
 1. Cost/benefit – quantifiable approach. Maximize positive utilities (benefits) against negative utilities (costs).
 2. Act utilitarian – “Will the course of action produce more good than any alternative course of action that I could take”?
 3. Rule utilitarian – “Would utility be maximized if everyone did the same thing in the same circumstances”? Adoption of commonly accepted rules.

1. COST-BENEFIT ANALYSIS:

- Assess the available options
- Assess the costs and benefits of each option for the entire audience affected
- Make the decision that is likely to result in the greatest benefit relative to cost.

2. ACT-UTILITARIANISM:

(professed by John Stuart Mills)

- Focuses on individual actions, rather than general rules.
- An act is right if it is likely to produce the best for the most people involved in the particular situation.
- Rules may be broken whenever doing so will produce the best in a specific situation.
- Happiness is the only „intrinsic“ good and all others are „instrumental“ goods that serve as the means of happiness.

3. RULE-UTILITARIANISM:

(professed by Richard Brandt)

- This regards moral values as primary.

- We should follow the rules and avoid bribes, even when those acts do not have the best consequences in a particular situation, because the general practice of following rules and not bribing produce the most overall good
- Rules should be considered in sets called „moral codes“. A moral code is justified when followed, would maximize the public good more than alternative codes would.

DUTY ETHICS (Immanuel Kant's view)

Contents that certain acts (or duties) should be performed because they are inherently ethical such as:

- be honest,
- keep promises,
- do not inflict sufferings on other people,
- be fair,
- make reparation when you have been unfair,
- how gratitude for kindness extended by others
- seek to improve own intelligence and character,
- develop one's talents,
- don't commit suicide.
- Duties, rather than good consequences, is fundamental.
- Individuals who recognize their ethical duties will choose ethically correct moral actions

These duties should meet Kant's 3 conditions i.e.

1. It should express respect for persons,
 - People deserve respect because they have capacity to be *autonomous and for exercising goodwill*.
 - Goodwill is the *conscientious and honest effort* to do what is right according to universal principles of duties.
 - Moral motives and intentions play a prominent role in duty ethics rather than utilitarianism.
2. It is an universal principle

- Duties are binding on us only if they are applicable to everyone. They must be universal sable.

3.It expresses command for autonomous moral agents. Duties prescribe certain actions categorically, without qualifications or conditions attached. Valid principles of duties are *Categorical Imperatives*. They contrast with non-moral commands called *Hypothetical Imperatives* which are conditional.

The above —► „RESPECT for PERSONS“

Drawback of Kant's duty ethics: It has failed to be sensitive to how principles of duty can *conflict* with each other thereby creating Moral dilemmas.

Rawls Development on Kant's Duty Ethics

Rawls argues that all rational people would agree to abide by two basic moral principles:

1. Each person is entitled to the most extensive amount of liberty compatible with an equal amount for others and
2. Differences in social power and economic benefits are justified only when they are likely to benefit everyone, including members of most disadvantaged groups.

RIGHTS ETHICS (JOHN LOCKE – 1632-1704)

- Everyone has inherent moral rights
 - Everyone has rights that arise from *EXISTING* (i.e. right to Life, maximum individual Liberty, and human Dignity are Fundamental Rights).
 - Other rights arise as a Consequence.
 - Duties arise because people have rights, not vice versa.
 - Any act that violates an individual's moral rights is ethically unacceptable.
 - Rights ethics was highly individualistic.
 - Rights are primarily entitlements that prevent other people from meddling in one's life. These are referred to as Liberty Rights or Negative Rights that place duties on other people not to interfere with one's life.
- e.g. Individuals do not have rights to life because others have duties not to kill them. Instead, possessing the right to life is the reason why others ought not to kill them.

Drawbacks

- How do we prioritize the rights of different individuals?

- Rights ethics often promote the rights of individuals at the expense of large groups/society

A.I.Melden's version of Rights Ethics

- Human rights are intimately related to communities of people.
- This version is known as POSITIVE WELFARE RIGHTS and is defined as rights to community benefits for living a minimally decent human life.

EVALUATION OF ETHICAL THEORIES

We are basically not interested in which of the ethical theories is the best. It is believed that there are areas in which each theory complements others by how they differ.

Procedure for General Evaluation:

1. The theory must be clear and formulated with concepts that are coherent and applicable.
2. It must be internally consistent in that none of its tenets contradicts any other.
3. Neither the theory nor its defense can rely upon false information.
4. It must be sufficiently comprehensive to provide guidance in specific situations of interest to us.
5. It must be compatible with our most carefully considered moral convictions about concrete situations.

SELF-INTEREST AND ETHICAL EGOISM

Psychological Egoism

All of our actions can be reduced to self-interest

- We always do what we most *want* to do. e.g., a man who helps others has *chosen* to do so, so he sees doing it, is in his *self-interest*
- We do what makes us feel good. e.g., a man who helps others must get *pleasure* from doing it – hence it is in his *self-interest*

The Problem of Counter Examples

What about *charity* and *pity*?

These require the egoist to distinguish selfish and unselfish *acts* from selfish and unselfish *motives*

- Charity – I enjoy showing *my power*
- Pity – I worry that it might happen to *me* So again, doing these, we act from *self-interest*

Confusion over self-interest and selfishness

- Not all actions are done from selfishness
- Brushing my teeth (self-interested but not selfish)

Also confusion over self-interest and pleasure

- Not all actions are done from self-interest
- Smoking cigarettes (pleasurable but not self-interested)
- *Self-interest = any interest the self has*

What do all major Ethical Theories say about this?

All major theories acknowledge the *importance* of Self Interest.

- Utilitarian's take into account one's own good as well as others.

- Duty ethics emphasizes duties to ourselves.
- Right ethicists talk about our rights to pursue our own good.
- Virtue ethicists emphasize the importance of self-respect.

But all these theories also emphasize that the pursuit of self-interest must be balanced with our moral responsibilities to others.

Ethical Egoism

- A different view, which talks of morality as only the pursuit of self interest
 - Self-interest is a „rational concern“ requiring consideration of one’s long-term interests.
E.g., taking bribe may appear to serve one’s self-interest but it does not serve the long-term interest of self. Hence taking bribe is not acceptable since it would not do any good on a long-term. This was professed by Thomas Hobbes (1588-1679) and Ayn Rand (1905-1982).
- ☐ Ayn Rand – with only one life to live, the individual is of utmost importance
 - ☐ It is in one’s self-interest to adopt the Moral Point of View (Hobbes’ Social Contract)

CUSTOMS and ETHICAL RELATIVISM

Relativism:

- Distinction between “morals” (“treatment of others”) and “mores” (“harmless customs”)
- Cultural (Descriptive) Relativism:**
- Factual Claims: “x is considered right in society y at time t” and “is considered wrong in society z at time t”
 - Empirical Conclusion: Moralities are relative
 - This is either true or false (anthropology – a study of mankind, its customs, beliefs, etc. can figure it out)

Normative (Ethical) Relativism:

- Normative Claim: “What is considered right in society x at time t *is right for that society*”
- A particular culture cannot be judged from outside of that culture.
- „Ethical Relativism“ says that actions are morally right when they are approved by law and custom.
- They are wrong when they violate laws and custom.
- Ethical *egoism* tries to reduce moral reasons to matters of self-interest, „ethical *relativism*“ attempts to reduce moral values to laws, conventions and customs of particular societies.

Consequences of Normative Relativism

- We cannot say other “morals” are inferior to our own society’s
- We decide the value of our actions based only on what our particular society thinks
- We should show a lot of tolerance for different customs and outlooks in a society in which we live in. It means that customs can have moral significance in deciding how we should act. This view is called „ethical pluralism“.

Reasons for Acceptance of Ethical Relativism

The reasons professed for acceptance of ethical relativism is threefold.

1. Laws seem so tangible and clear-cut. They provide a public way ending seemingly endless disputes about rights and wrongs. But many times, moral reasons seem to be at variance with laws e.g. apartheid laws.
2. Moral standards vary dramatically from one culture to another. The only kind of objectivity possible is limited to a given set of laws in a given society. Acknowledging this relativity of morality encourages the virtue of tolerance of differences among societies.
- 3.. Moral judgments should be made in relation to factors that from case to case, usually making it impossible to formulate rules which are simple. Customs and laws are usually morally relevant factors that should be taken into account.

RELIGION and DIVINE COMMAND ETHICS**Ethics and Religion:**

Moral issues and religious belief are related in several positive ways.

- First, they are shaped over time from the central moral values of major world religions.
- Second, religious views often support moral responsibility by providing additional motivation for being moral.
- Third, sometimes religions set a higher moral standard than is conventional.
- Societies often benefit from a variety of religions that make prominent particular virtues, inspiring their members to pursue them beyond what is ordinarily seen as morally obligatory.

Divine Command Ethic:

- This says that an act which is right is commanded by god and the one which is wrong is forbidden by God.
- The difficulty in this is to know precisely what God's commands are and in knowing whether God exists.

We can view that moral reasons are *not reducible* to religious matters, although religious belief may provide an *added inspiration* for responding to them.

Uses of Ethical Theories

1. Ethical theories aid in identifying the moral considerations or reasons that constitute a dilemma.
2. They provide a precise sense of what kinds of information are relevant to solving moral development.
3. They sometimes, offer ways to rank the relevant moral considerations in order of importance and provide a rough guidance in solving moral problems.
4. The theories help us identify the full moral ramifications of alternative courses of action, urging a wide perspective on the moral implications of the options and providing a systematic framework of comparing alternatives.
5. The theories augment the precision with which we use moral terms and they provide frame works for moral reasoning when discussing moral issues with colleagues.
6. By providing frame works for development of moral arguments, the theories strengthen our ability to reach balanced and insightful judgments.

UNIT III - ENGINEERING AS SOCIAL EXPERIMENTATION

To undertake a great work and especially a work of novel type means, carrying out an experiment. It means taking up a struggle with the forces of nature without the assurance of emerging as a victor after the first attack.

Louis Marie Henri Navier (1785 - 1836) - *Founder of Structural Analysis*

ENGINEERING AS EXPERIMENTATION

- Experimentation (Preliminary tests or Simulations) plays a vital role in the design of a product or process.
- In all stages of converting a new engineering concept into a design like,
 - ☐ first rough cut design,
 - ☐ usage of different types of materials and processes,
 - ☐ detailed design,
 - ☐ further stages of work design and
 - ☐ the finished product,

Experiments and tests are conducted to evaluate the product. Modifications are made based on the outcome of these experiments.

- The normal design process is thus iterative (modifications being made on the basis of feedback information acquired from the tests).

Even though various tests and experiments are conducted at various stages, the engineering project as a whole in its *totality* can be viewed as an *experiment*.

SIMILARITIES TO STANDARD EXPERIMENTS

1. Any project is carried out in partial ignorance due to
 - The uncertainties in the abstract model used for the design calculations,
 - The uncertainties in the precise characteristics of the materials purchased,
 - The uncertainties caused by variations in processing and fabrication of materials and
 - The uncertainties about the nature of stresses the finished product will encounter.

Indeed, Engineer's success lies in the *ability to accomplish tasks* with only a *partial knowledge* of scientific laws about nature and society.

2. The final outcome of engineering projects, like those of experiments, is generally uncertain. Very often, possible outcomes are not even known and great risks may be presented which could never be thought of.
3. Effective Engineering relies upon knowledge gained about products both before and after they leave the factory-knowledge needed for improving current products and creating better ones. That is, ongoing success in engineering depends upon gaining new knowledge.

LEARNING FROM THE PAST

Engineers should learn not only from their own earlier design and operating results, but also from other engineers.

Engineers repeat the past mistakes of others due to the following reasons.

- Lack of established channels of communication.
- Misplaced pride in not asking for information
- Embarrassment at failure or fear of litigation (legal problems).
- Negligence.

Examples:

1. The *Titanic* lacked sufficient number of life boats resulting in the death of 1522 out of 2227 (life boat capacity available was only 825), a few decades later *Arctic* perished due to the same problem.
2. In June 1966, a section of the Milford Haven Bridge in Wales collapsed during construction. A bridge of similar design, erected by the same bridge-builder in Melbourne, Australia, also partially collapsed in the month of October, same year. During this incident 33 people were killed and many were injured.
3. Malfunctions occurred at nuclear reactors at various locations and the information reports were with Babcock and

Wilcox, the reactor manufacturer. In spite of these, no attention was paid leading to a pressure relief valve giving rise to the Three Mile Island nuclear accident on March 28, 1979.

CONTRASTS WITH STANDARD EXPERIMENTS

1. EXPERIMENTAL CONTROL: In standard experiments, members are in two different groups. Members of *one group receive special* experimental treatment. The other group members, called „*control group*“ *do not receive special* treatment, though they are from the same environment in all other respects.

But this is not true in engineering, since most of the experiments are not conducted in laboratories. The subjects of experiments are human beings who are outside the experimenter's control.

Thus it is not possible to study the effects of changes in variable on different groups. Hence only historical and retrospective data available about various target groups has to be used for evaluation. Hence engineering as a social experimentation seems to be an extended usage of the concept of experimentation.

2. INFORMED CONSENT: has two elements, *knowledge* and *voluntariness*. The subjects (human beings) should be given all the information needed to make a reasonable decision. Next, they must get into the experiment without being subjected to *force, fraud or deception*. Supplying complete information is neither necessary nor in most cases possible. But *all relevant information* needed for making a reasonable decision on whether to participate should be conveyed. Generally, we all prefer to be the subject of our own experiments rather than those of somebody else.

Conditions defining Informed or Valid Consent

- a. The consent is given voluntarily
- b. The consent is based on information a rational person would want, together with any other information requested and presented to them in understandable form.
- c. The consent was competent to process the information and make rational decisions.
- d. Information has been widely disseminated.
- e. The subject's consent is offered by proxy by a group that collectively represents many subjects like interests, concerns and exposure to risk.

„Engineering experiments are not conducted to gain new knowledge unlike scientific experiments“. Is this distinction necessary?

This distinction is not vital because we are concerned *about the manner* in which the experiment is conducted, such as *valid consent* of human subjects being sought, *safety measures* taken and means exist for *terminating* the experiment *at any time* and providing all participants a *safe exit*.

Features of morally responsible engineers in social experimentation

Conscientiousness: A primary obligation to protect the safety of human subjects and

respect their right of consent.

Relevant information: A constant awareness of the experimental nature of any project, imaginative forecasting of its possible side effects and a reasonable effort to monitor them.

Moral autonomy: Autonomous, personal involvement in all steps of the project. **Accountability:** Accepting accountability for the results of the project.

CONSCIENTIOUSNESS:

- ☐ Conscientious moral commitment means sensitivity to the full range of relevant moral values.
- ☐ Sensitivity to responsibilities that is relevant.
- ☐ Willingness to develop the skill and expend the effort needed to reach the best balance possible among these considerations.
- ☐ Conscientiousness means consciousness because mere intent is not sufficient.

Conceiving engg as social experimentation restores the vision of engineers as guardians of the public interest in that they are duty bound to guard the welfare and safety of those affected by engg projects.

RELEVANT INFORMATION:

Conscientiousness is blind without relevant factual information. Moral concern involves a commitment to obtain and assess all available pertinent information. Another dimension to factual information is the consequences of what one does. While regarding engg as social experimentation points out the importance of context, it also urges the engineer to view his or her specialized activities in a project as part of a larger whole having a social impact that may involve a variety of unintended effects. It may be better to practice „defensive engg“ (Chauncy Starr) or „preventive engg“ (Ruth Davis).

MORAL AUTONOMY

- ☐ People are morally autonomous when their moral conduct and principles of action are their own.
- ☐ Moral beliefs and attitudes must be a critical reflection and not a passive adoption of the particular conventions of one's society, religion or profession.
- ☐ Moral beliefs and attitudes cannot be agreed to formally and adhered to merely verbally.
- ☐ They must be integrated into the core of one's personality and should lead to committed action.

- ☐ It is wrong to think that as an employee when one performs „acts“ serving company's interests, one is no longer morally and personally identified with one's actions.
- ☐ Viewing engg as a social experimentation helps to overcome this flawed thought and restores a sense of autonomous participation in one's work.
- ☐ As an experimenter, an engineer is exercising the specialized training that forms the core of one's identity as a professional.
- ☐ A social experiment that can result in unknown consequences should help inspire a critical and questioning attitude about the adequacy of current economic and safety standards.
- ☐ In turn, this leads to better personal involvement with work.

ACCOUNTABILITY:

- ☐ Responsible people accept moral responsibility for their actions.
- ☐ Accountability is the willingness to submit one's actions to moral scrutiny and be open and responsive to the assessment of others.
- ☐ It should be understood as being culpable and blameworthy for misdeeds.

Submission to an employer's authority creates in many people a narrow sense of accountability for the consequences of their action. This is because of

- i) Only a small contribution is made by one individual, when large scale engineering work is fragmented. The final product which is far away from one's immediate workplace, does not give a proper understanding of the consequences of one's action.
- ii) Due to the fragmentation of work, a vast diffusion of accountability takes place. The area of personal accountability is delimited to the portion of work being carried out by one.
- iii) The pressure to move on to another new project does not allow one to complete the observations long enough. This makes people accountable only for meeting schedules and not for the consequences of action.
- iv) To avoid getting into legal issues, engineers tend to concentrate more on legal liabilities than the containment of the potential risks involved in their area of work.

Viewing engineering as a social experimentation makes one overcome these difficulties and see the problem in whole rather than as part.

ENGINEERING CODES OF ETHICS

Engineering Codes of Ethics have evolved over time

EARLY CODES

- Codes of personal behavior
- Codes for honesty in business dealings and fair business practices
- Employee/employer relations

NEWER CODES

- Emphasize commitments to safety, public health and environmental protection
- Express the rights, duties and obligations of members of the Profession

- Do not express new ethical principles, but coherently restate existing standards of responsible engineering practice
- Create an environment within the Profession where ethical behavior is the norm
- Not legally binding; an engineer cannot be arrested for violating an ethical code (but may be expelled from or censured by the engineering society)

Are Engineering Codes Needed? NO:

- Engineers are capable of fending for themselves
- Common law is available to defend in ethical disputes
- Offended public can seek redress through courts

Are Engineering Codes Needed? YES:

- Engineers have few or no resources to defend themselves in an ethical dispute
- Common law is available in reality only with great difficulty
- Conversely, the public has similar problems in seeking redress through legal channels

Objections to Existing Engineering Codes of Ethics:

- Relatively few engineers are members of engineering societies.
- Non-members don't necessarily follow the ethical codes.
- Many engineers either don't know that the codes exist, or have not read them.

Which ethical codes apply?

—Depending upon your discipline and organizational affiliations, you may be bound by one, two or even more ethical codes:

- Discipline related (ASME, IEEE, ASCE, IIE etc.)
- National Society of Professional Engineers (NSPE)
- Employee codes (corporation, university, etc.)
- Union Codes

Engineering Ethics

Our engineering ethics codes are derived from a Western cultural tradition

- Ancient Greeks
- Judeo-Christian religions
- Philosophers and thinkers (e.g. Locke, Kant, Mills)

The Hammurabi Code

If a builder has built a house for a man and has not made his work sound, and the house he has built has fallen down and so caused the death of the householder, that builder shall be put to death. If it causes the death of the householder's son, they shall put the builder's son to death.... (Hammurabi, King of Babylon, 1758 B.C.)

Code of Ethics for Engineers

Accreditation Board for Engineering and Technology (ABET)

The Fundamental Principles

Engineers shall uphold and advance the integrity, honor, and dignity of the engineering profession by:

- *using their knowledge and skill for the enhancement of the human race;*
- *being honest and impartial and serving with fidelity the public, their employers, and clients;*
- *striving to increase the competence and prestige of the engineering profession.*
- *supporting the professional and technical societies of their discipline.*

The Fundamental Cannons

Engineers shall

- *hold paramount the safety, health, and welfare of the public in the performance of their professional duties;*
- *perform service only in areas of their competence;*
- *issue public statements only in an objective and truthful manner;*
- *act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest;*
- *build their professional reputations on the merits of their services and shall not compete unfairly with others*
- *act in such manner as to uphold and enhance the honor, integrity and dignity of the profession;*
- *continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision.*

CODES OF ETHICS - ROLES OR FUNCTIONS

1. Inspiration and Guidance:

- ☐ Codes provide positive stimulus for ethical conduct and helpful guidance by using positive language.
- ☐ Codes should be brief to be effective and hence such codes offer only general guidance.
- ☐ Supplementary statements or guidelines to give specific directions are added by a number of societies or professional bodies.

2. Support:

- ☐ Codes give positive support to those seeking to act ethically.
- ☐ An engineer under pressure to act unethically can use one of the publicly proclaimed codes to get support for his stand on specific moral issues.
- ☐ Codes also serve as legal support for engineers.

3. Deterrence and discipline:

- ☐ Codes can be used as a basis for conducting investigations on unethical conduct.
- ☐ They also provide a deterrent for engineers to act immorally.
- ☐ Engineers who are punished by professional societies for proven unethical behavior by revoking the rights to practice as engineers are also subjected to public ridicule and loss of respect from colleagues and local community.
- ☐ This helps to produce ethical conduct even though this can be viewed as a negative way of motivation.

4. Education and mutual understanding:

The codes can be used for discussion and reflection on moral issues and thereby improve the understanding of moral responsibilities among all engineers, clients, public and good organizations.

5. Contributing to the profession's public image:

Codes present the engineering profession as an ethically committed society in the eyes of the public thus enhancing their image.

6. Protecting status quo:

Codes establish ethical conventions, which can help promote an agreed upon minimum level of ethical conduct.

7. Promoting business interests:

Codes can place unwarranted restraints of commerce on business dealings.

Relative importance of the various functions of codes of ethics

- ☐ The perspective of engg as social experimentation clearly emphasizes the primary role „supportive function“ of the codes of ethics. This is so because, only this support enables engineers, speak out clearly and openly their views, to those affected by engg projects.
- ☐ The, „inspiration and guidance“ and „educative“ functions are also important in promoting mutual understanding and in motivating engineers to act with higher moral standards.
- ☐ The „disciplinary“ function in engg codes is of secondary importance. Those with unethical conduct when exposed are subject to law. Developing elaborate paralegal procedures within professional societies duplicates a function which can be done better by legal system. At best, codes should try to discipline engineers in areas which are not covered by law.
- ☐ The worst abuse of codes has been to restrict honest moral effort in the name of „preserving profession's public

mage” and „protecting status quo”. The best way to increase trust is by encouraging and aiding engineers to speak freely and responsibly about public safety.

Limitations of Codes of Ethics

1. Codes are restricted to general and vague wording. They cannot be straightaway applied to all situations. It is impossible to foresee the full range of moral problems that can arise in a c complex profession like engg.
2. It is easy for different clauses of codes to come into conflict with each other. Usually codes provide no guidance as to which clause should have priority in those cases, creating moral dilemmas.
3. They cannot serve as the final moral authority for professional conduct. If the code of a professional society is taken as the last word, it means that we are getting into a particular set of conventions i.e. ethical conventionalism.
4. *Andrew Oldenquist and Edward Slowter pointed out how the existence of separate codes for different professional societies can give members the feeling that ethical conduct is more relative than it is and that it can convey to the public the view that none is „really right”. The current codes are by no means perfect but are definitely steps in the right direction.*

The problems of law in engineering

1. The greatest problem of law in engg is of „minimal compliance”. Engineers and employers can search for loop holes in the law to barely keep to its letter while violating its spirit. Engineers will tend to refer to standard readymade specifications rather than come up with innovative ideas. Minimal compliance led to the tragedy of the „Titanic”.
2. Continually updating laws and regulations may be counter-productive and will make law always lag behind technology. This also overburdens the rules and regulators.
3. Many laws are „non-laws” i.e. laws without enforceable sanctions. These merely serve as window dressing, frequently gives a false sense of security to the public.
4. The opponents of the law may burden it intentionally with many unreasonable provisions that a repeal will not be far off.
5. Highly powerful organizations, like the government can violate the laws when they think they can get away with it by inviting would be challengers, to face them in lengthy and costly court proceedings. This also creates frustration with the law.

Role of law in engineering

- ☐ It is wrong to write off rule-making and rule following as futile. Good laws, effectively enforced, clearly produce benefits.
- ☐ Reasonable minimum standards are ensured of professional conduct.
- ☐ It also provides a self-interested motive for most people and corporations to comply.
- ☐ They also serve as powerful support and defense for those who wish to act ethically in situations where ethical conduct might not be welcome.
- ☐ Viewing engineering as social experimentation provides engineers with a better perspective on laws and regulations.
- ☐ Precise rules and enforceable sanctions are appropriate in cases of ethical misconduct that involve violations of well established and regularly reexamined procedures that have as their purpose the safety of public.
- ☐ In areas of experimentation, rules must not attempt to cover all possible outcomes of an experiment, nor must they force the engineer to adopt a rigidly specified course of action. Here the regulations should be broad based guidelines but should hold the engineer accountable for his or her decisions.

UNIT IV SAFETY, RESPONSIBILITIES AND RIG SAFETY AND RISK

Imagine you are a fresh graduate.

You get a job as an engineer in a large atomic power plant.

- | | |
|---|--|
| <input type="checkbox"/> Would you take it or not?
<input type="checkbox"/> Under what conditions would you take it? | <input type="checkbox"/> Under what conditions would you not?
<input type="checkbox"/> Why? |
|---|--|

People as Consumers:

- ☐ *Active Consumers*: directly involve themselves e.g., mowing the lawn, washing clothes or toasting bread.
- ☐ *Passive Consumers*: have less choice and less control e.g., Water, Electricity, Petrol,
- ☐ *Bystanders*: e.g., exposed to Pollution from unknown sources

Typically several groups of people are involved in safety matters but have their own interests at stake. Each group may differ in what is safe and what is not.

Concept of Safety

1. "A ship in harbor is safe, but that is not what ships are built for" – John A. Shedd
 2. „A thing is safe if its risks are judged to be acceptable“ - William W. Lawrence
- ☐ We buy an ill-designed Iron box in a sale-> Underestimating risk
 - ☐ We judge fluoride in water can kill lots of people -> Overestimating risk
 - ☐ We hire a taxi, without thinking about its safety -> Not estimating risk
 - ☐ How does a judge pass a judgement on safety in these 3 cases?
-So, this definition won't do in real life.

Then, what is acceptable also depends upon the individual or group's value judgment. Hence a better, *working definition of concept of safety* could be,

"A thing is safe (to a certain degree) with respect to a given person or group at a given time if, were they fully aware of its risks and expressing their most settled values, they would judge those risks to be acceptable (to that certain degree)." - Mike Martin and Roland Schinzinger

A thing is NOT SAFE if it exposes us to unacceptable danger or hazard

RISK is the potential that something unwanted and harmful may occur.

a. We take a risk when we undertake something or use a product that is not safe.

Risk in technology could include dangers of

- a. bodily harm,
- b. economic loss, or
- c. environmental degradation.

- ☐ Some may assume that "safety" is a concrete concept, while "risk" is a vague, hypothetical concept
- ☐ In fact, its the other way around

- ☐ Risks always exist. But true safety never exists, except in hypothetical situations
- ☐ So, risk is *reality*, safety is *fantasy*

What degree of risk is acceptable?

Safety is a matter of how people would find risks acceptable or unacceptable, if they knew the risks, and are basing their judgments on their *most settled value* perspective.

So, to this extent, it is *objective*.

Perspectives differ. To this extent, it is *subjective*.

So, Safety is '*acceptable risk*'.

Acceptable Risk

A risk is acceptable when those affected are generally *no longer (or not) apprehensive* about it."

Apprehension (i.e. anxiety) depends largely on factors such as

- ☐ whether the risk is assumed voluntarily.
- ☐ how the probabilities of harm (or benefit) is perceived?
- ☐ job-related or other pressures that causes people to be aware of or to overlook risks.
- ☐ whether the defects of a risky activity or situation are immediately noticeable or close at hand.
- ☐ whether the potential victims are identifiable beforehand.

Assessment of Safety and Risk

A person is said to take „*VOLUNTARY RISK*”

-when he is subjected to risk by either his own actions or action taken by others and - *volunteers* to take that risk without any apprehension.

-For example, John and Ann Smith enjoy riding motorcycles over rough ground for amusement. They take voluntary risk, part of being engaged in such a potentially dangerous sport.

Connected to this notion of voluntarism is the matter of *Control*. In the example cited, the Smiths are aware of the high probability of accident figures in such a sport, but they display characteristically *unrealistic confidence* of most people when they believe the dangers to be *under their control*. In terms of engineering as social experimentation, people are more *willing to be the subjects of their own experiments* than of someone else's (whether social experiment or not).

Chauncey Starr informs us that individuals are more ready to assume voluntary risks than involuntary risks, even when voluntary risks are 1000 times more likely to produce a fatality than the involuntary ones.

- ☐ A DISASTER = A seriously disruptive event + A state of unprepared ness.

Effect of information on risk assessments

The manner in which information necessary for decision making is presented can greatly influence how risks are perceived. Consider this example:

In a particular case of disaster management, the only options available are provided in 2 different ways to the public for one to be chosen (where lives of 600 people are at stake).

Alternate 1

If program A is followed, 200 people will be saved. If Program B is followed, 1/3 probability is 600 people will be saved and 2/3 probability that nobody will be saved.

Response

72% of the target group chose option A and 28% option B

Alternate 2

If program A is followed, 400 people will die. If Program B is followed, 1/3 probability is that nobody will die and 2/3 probability that 600 people will die.

Response

This time only 22% of the target group chose option A and 78% option B

Conclusion:

1. The option perceived as yielding firm gain will tend to be preferred over those from which gains are perceived as risky or only probable.
2. Option emphasizing firm losses will tend to be avoided in favour of those whose chances of success are perceived as probable.

Secondary Costs of Products

Cost of products is High, if designed unsafely

- ☐ Returns and Warranty Expenses
- ☐ Loss of Customer Goodwill
- ☐ Cost of litigation
- ☐ Loss of Customers due to injuries in using it
- ☐ Cost of rework, lost time in attending to design problems

Manufacturer's understanding of the risk in a product is necessary:

- ☐ To help reduce secondary costs
- ☐ To know the possible risk for purposes of pricing, disclaimers, legal terms and conditions, etc.
- ☐ To know the cost of reducing the risks
- ☐ To take a decision before finalizing the design.

Buyer's understanding of the risk in a product is necessary:

- ☐ To judge whether he/she wants to take the risks
- ☐ To judge whether the „risk vs. costs“ justifies taking the risk.

‘JOB RELATED RISKS’

- ☐ Many workers *are taking risks in their jobs* in their stride like being exposed to asbestos.
- ☐ Exposure *to risks* on a job is in one sense of *voluntary nature* since one can always refuse to submit to the work or may have control over how the job is done.
- ☐ But generally workers have *no choice* other than what they are told to do since they *want to stick to the only job* available to them.
- ☐ But they are *not generally informed* about the exposure to toxic substances and other dangers which are *not readily* seen, smelt, heard or otherwise sensed.
- ☐ Occupational health and safety regulations and unions can have a better say in correcting these situations but still things are far below expected safety standards.
- ☐ Engineers while designing work stations must take into account the casual attitude of workers on safety (esp. when they are paid on piece rate).

Problems faced by engineers about *public concept of safety*

The optimistic attitude that things that are familiar, that have not caused harm before and over which we have some control *present no risks*.

The serious shock people feel when an accident kills or maims people *in large numbers* or *harms those we know*, even though statistically speaking such accidents might occur infrequently.

‘Safety in a commodity comes with a price’ – Explain.

Absolute safety is never possible to attain and safety can be improved in an engineering product only with an increase in cost.

On the other hand, *unsafe products incur secondary costs* to the producer beyond the primary (production) costs, like warranty costs loss of goodwill, loss of customers, litigation costs, downtime costs in manufacturing, etc.

Figure indicates that P- *Primary costs are high for a highly safe* (low risk) product and S- *Secondary costs are high for a highly risky* (low safe) product.

If we draw a curve $T=P+S$ as shown, there is a *point at which costs are minimum* below which the cost cannot be reduced.

If *the risk* at Minimum Total Cost Point is *not acceptable*, then the producer has to *choose a lower acceptable risk* value in which case the *total cost* will be *higher* than M and the product designed accordingly.

It should now be clear that „*safety comes with a price*” only

Knowledge of risk for better safety

- ☐ Robert Stephenson writes that all the accidents, the harms caused and the means used to repair the damage *should be recorded* for the benefit of the younger Members of Profession.

- ☐ A faithful account of those accidents and the damage containment was really *more valuable* than the description of successful work.
 - ☐ Hence it is imperative that knowledge of risks will definitely help to attain better safety.
 - ☐ But it should be borne in mind, that still gaps remain, because
- i)there are some industries where information is *not freely shared* and ii)there are always *new applications of old technology* that render the available information *less useful*.

Uncertainties encountered in design process

- ☐ A decision on maximizing profit or maximizing the return on investment.
- ☐ Uncertainties about applications like dynamic loading instead of static loading, vibrations, wind speeds.
- ☐ Uncertainties regarding materials and skills required in the manufacturing.
- ☐ Changing economic realities.
- ☐ Unfamiliar environmental conditions like very low temperature.
- ☐ The available standard data on items like steel, resistors, insulators, optical glass, etc are based on statistical averages only.
- ☐ Due to the inherent nature of processes, all competes have a tolerance in design leading to the probability statistics by which assemblies' capability is assessed.

Testing strategies for safety

Some commonly used testing methods:

- ☐ Using the past experience in checking the design and performance.
- ☐ Prototype testing. Here the one product tested may not be representative of the population of products.
- ☐ Tests simulated under approximately actual conditions to know the performance flaws on safety.
- ☐ Routine quality assurance tests on production runs.

The above testing procedures are not always carried out properly. Hence we cannot trust the testing procedures uncritically. Some tests are also destructive and obviously it is impossible to do destructive testing and improve safety.

In such cases, a simulation that traces hypothetical risky outcomes could be applied.

- ☐ Scenario Analysis (Event -> Consequences)
- ☐ Failure Modes & Effects Analysis (Failure modes of each component)
- ☐ Fault Tree Analysis (System Failure -> Possible Causes at component level)
- ☐ What if there is a combination of factors?
- ☐ All Analysis pre-suppose a thorough understanding of the physical system

Failure modes and effect analysis (FMEA) :

This approach systematically examines the failure modes of each component, without however, focusing on relationships among the elements of a complex system.

Fault Tree Analysis (FTA) :

A system failure is proposed and then events are traced back to possible causes at the component level. The reverse of the fault-tree analysis is „event – tree analysis“. This

method most effectively illustrates the disciplined approach required to capture as much as possible of everything that affects proper functioning and safety of a complex system

Risk Benefit Analysis

Ethical Implications

- ☐ When is someone entitled to *impose* a risk on another in view of a supposed benefit to others?
- ☐ Consider the worst case scenarios of persons exposed to *maximum risks* while they are reaping only *minimum benefits*. Are their rights *violated*?
- ☐ Are they provided *safer* alternatives?
- ☐ Engineers should keep in mind that *risks to known persons are perceived differently* from statistical risks
- ☐ Engineers may have *no control* over grievance redressal.

Conceptual difficulties in Risk-Benefit Analysis

Both risks and benefits lie *in future*

Heavy discounting of future because the very low present values of cost/benefits do not give a true picture of future sufferings.

- Both have related uncertainties but difficult to arrive at expected values
- What if *benefits* accrue to *one party* and *risks to another*?
- Can we *express* risks & benefits in a *common set of units*?
e.g. Risks can be expressed in one set of units (*deaths* on the highway) and benefits in another (*speed of travel*)?

Many projects, which are highly beneficial to the public, have to be *safe also*.

Hence these projects can be justified using RISK-BENEFIT analysis. In these studies, one should find out

- i) What are the benefits that would accrue?
- ii) What are the risks involved?
- iii) When would benefits be derived and when risks have to be faced?
- iv) Who are the ones to be benefited and who are the ones subjected to risk-?
are they the same set of people or different?

The issue here is *not*, say, *cost-effective* design but it is only *cost of risk taking Vs benefit* analysis. Engineers should *first recommend* the *project feasibility* based on risk-benefit analysis and once it is justified, *then* they may get into *cost-effectiveness* without increasing the risk visualized.

In all this, engineers should ask themselves this ethical question: „Under what conditions, is someone in society entitled to *impose a risk on someone* else on behalf of a *supposed benefit to others*. “

Difficulties in assessing Personal Risks

- Individuals are ready to *assume voluntary* risks than *involuntary* risks.
- The difficulty here is generally in assessing personal risks which are involuntary.
- The problem of quantification of risk raises innumerable problems.
- For example, how to assign a rupee *value to one's life*. There is no over the counter trade in lives.
- Even for a sale, it has to be clear *under what conditions* the sale is to take place.
- If one buys a kg of rice it matters whether it is just one additional purchase one makes *regularly* or it is the first rice purchase *after quite some time*.
- Even when compensations are made to people exposed to involuntary risk, the basis on which it is made or even the intensity of risk could be *different for different people*.
- As of now, the one suggestion could be to employ an *open procedure*, overseen by trained arbiters, in each case, where *risk to individuals is to be studied and remedied*.

Public Risk and Public Acceptance

- ☐ Risks and benefits to public are more easily determined than to individuals
- ☐ National Highway Traffic Safety Administration (NHTSA)- proposed a value for life based on:
 - ☐ loss of future income
 - ☐ other costs associated with the accident
 - ☐ estimate of quantifiable losses in social welfare resulting from a fatality
 - ☐ NOT a proper basis for determining the optimal expenditure allocated to saving lives

Accounting publicly for benefits and risks

Engineers should account publicly for benefits and risks in the following manner:

- ☐ Engineers must remain as *objective* as humanly possible in their investigations and conclusions.
- ☐ They must also state openly any *personal biases* that they may have about the project being investigated.
- ☐ Engineers, even if they are acknowledged experts, may *not have complete knowledge* of the issues at hand.
- ☐ They should, if necessary, *admit their lack of knowledge*, in any particular area publicly.
- ☐ A willingness to *admit uncertainty* and also to *reveal methodology* and sources particularly when numerical data is presented.
- ☐ The way statistical information is presented can create misconceptions in the public mind. Hence it should be *presented in a way to improve realistic interpretations*.
- ☐ They must *consider the views of the parties affected* by the project under study *before* coming to conclusions.
- ☐ The type of action taken should be morally evaluated regardless of its consequences. If it is wrong to violate certain rights, then figuring out the benefit of the consequences of doing so is irrelevant.

Difficulties in establishing Safeguards

- ☐ Incomplete knowledge of the engineering subject
- ☐ Refusal to face hard questions caused by lack of knowledge
- ☐ False sense of security

- ☐ e.g. Nuclear waste disposal problem
- ☐ Caution in stating probabilities of rare events
- ☐ Varying understanding of risk based on presentation of facts
- ☐ Risk assessments based on incorrect/unacceptable assumptions/data
- ☐ Only a few persons/groups participate in the exercise

Some of the ways by which engineers may try to reduce risks.

- ☐ In all the areas of works, engineers should give top priority for product safety.
- ☐ They should believe that accidents are caused by dangerous conditions that can be corrected. Negligence and operator errors are not the principal causes of accidents.
- ☐ If a product is made safe, the initial costs need not be high if safety is built into a product from the beginning. It is the design changes done at a later **date** that are costly. Even then life cycle costs can be made lower for the redesigned or retrofitted product (for safety).
- ☐ If safety is not built into the original design, people can be hurt during testing stage itself.
- ☐ They should get out of the thinking that warnings about hazards are adequate and that insurance coverage is cheaper than planning for safety.
- ☐ All it takes to make a product safe is to have different perspective on the design problem with emphasis on safety.

Examples of Improved Safety

- ☐ Magnetic door catch introduced on refrigerators
- ☐ Prevent death by asphyxiation of children accidentally trapped inside
- ☐ The catch now permits the door to be opened from inside easily
- ☐ Cheaper than older types of latches
- ☐ Dead-man Handle for Drivers in trains
- ☐ Semaphore signaling
- ☐ Volkswagen's car safety belt
- ☐ Attachment on the door so that belt automatically goes in place on entry

Liability

Early logic and social philosophy: (Richard C. Vaughan)

- ☐ "Caveat Emptor": buyer beware
- ☐ Examine what you want before you buy
- ☐ If he is negligent, he suffers the bad bargain.
- ☐ Law will not aid those who are negligent
- ☐ "Privity of Contract": User, if he is not a party to the contract, has no rights for any claim (user buys from the retailer and not from the manufacturer) Gradually.... Manufacturer was made liable for injuries resulting from negligence in the design/manufacture
- ☐ The new law: concept of Strict Liability was established in the case „Green man vs. Yuba Power Products“ in California.
- ☐ ☐ If the product sold is defective, the manufacturer is liable for any harm that results to users

Implications to Engineers:

- ☐ Engineers must weigh chances of *defect causing injury* against *cost of minimizing defects*

- Minimal *compliance is insufficient* □ – adhering to accepted practices & standards not enough
- Standards are *mere checklists* □ - use them creatively and judgmentally
- Engineers *can be sued* personally even when *acting according* to guidelines set by *employers*
- e.g. One county highway engineer was sued for failure to repair roads-- had to pay \$2 million
- Some Cos. protect their engineers and allow themselves to be sued for such money damages
- Independent engineers can write liability limits into their contracts
- Good knowledge of liability is necessary for engineers

‘SAFE EXIT’

It is almost impossible to build a completely safe product or one that will never fail. When there is a failure of the product *SAFE EXIT* should be provided.

Safe exit is to assure that

- i) when a product fails, it will fail safely,
- ii) That the product can be abandoned safely and iii) that the user can safely escape the product.

More than the questions of who will build, install, maintain and pay for a safe exit, the most important question is who will recognize the need for a safe exit. This responsibility should be an integral part of the experimental procedure.

Some examples of providing „SAFE EXIT“:

- Ships need lifeboats with sufficient spaces for all passengers and crew members.
- Buildings need usable fire escapes
- Operation of nuclear power plants calls for realistic means of evacuating nearby communities
- Provisions are needed for safe disposal of dangerous materials and products.

Respect for Authority

Collegiality & Its Elements

Collegiality is a kind of connectedness grounded in *respect for professional expertise* and in a *commitment to the goals and values of the profession* and as such, collegiality includes a disposition to *support and co-operate with one's colleagues*.

The central elements of collegiality are *respect, commitment, connectedness and co-operation*.

Respect: Acknowledge the worth of other engineers engaged in producing socially useful and safe products.

Commitment: Share a devotion to the moral ideals inherent in the practice of engineering.

Connectedness: Aware of being part of a co-operative undertaking created by shared

commitments and expertise.

Collegiality, like most virtues, can be misused and distorted.

It should not be reduced to „group interest’ but should be a shared devotion for public good.

It is not defaming colleagues, but it does not close the eyes to unethical practices of the co-professionals, either.

Classifications of Loyalty

Agency-Loyalty

- Fulfill one’s contractual *duties* to an employer.
- Duties are particular *tasks for which one is paid*
- *Co-operating* with colleagues
- *Following* legitimate *authority* within the organization.

Identification-Loyalty

- It has to do with attitudes, emotions and a sense of *personal identity*.
- Seeks to meet one’s moral duties with personal *attachment and affirmation*
- It is against
- *detesting* their employers and companies, and do work
- *reluctantly and horribly* (this is construed as *disloyalty*)

This means

- Avoid conflicts of interest,
- Inform employers of any possible conflicts of interest,
- Protect confidential information,
- Be honest in making estimates,
- Admit one’s errors, etc.

Loyalty - Obligation of Engineers

Agency-Loyalty

- Engineers are *hired* to do their duties.
- Hence *obligated* to employers within proper limits

Identification-Loyalty

Obligatory on two conditions;

1. When some important *goals are met* by and through a group in which the engineers participate
2. When employees are *treated fairly*, receiving the share of benefits and burdens.

But clearly, identification-loyalty is a *virtue* and *not* strictly an *obligation*.

Relationship - Professionalism and Loyalty

1. Acting on professional *commitments* to the public is *more effective* to serve a company *than just following* company orders.
2. *Loyalty to employers* may not mean *obeying* one's immediate supervisor.
3. Professional obligations to both an employer and to the public might *strengthen rather than contradict* each other.

Need for Authority

Authority is needed since

- a) Allowing everyone to exercise *uncontrolled individual discretion creates chaos* (confusion).
- b) Clear lines of authority *identifies areas of* personal responsibility and *accountability*.

Institutional Authority and Expert Authority

Institutional authority

The institutional right given to a person to exercise power based on the resources of the institution.

- o It is acquired, exercised and defined within institutions.
- o It is given to individuals to perform their institutional duties assigned within the organisation. There is not always a perfect match between the authority granted and the qualifications needed to exercise it.

Expert authority

The possession of special knowledge, skill or competence to perform some task or to give sound advice.

Engineers may have expert authority but their institutional authority, *may only be*, to *provide management* with analysis of possible ways to perform a technical task, after which they are *restricted to following management's directive* about which option to pursue. In large companies, *engineers, advisors and consultants* in staff function carry *expert authority*, while *institutional authority* is vested only with *line managers*.

Authority Vs Power

Ineffective persons, even if vested with authority by their institution, *may not be able to summon* the power their position allows them to exercise. On the other hand, people who are *effective* may be *able to wield greater power* that goes beyond the authority attached to the positions they hold. Highly respected engineers of proven integrity belong to this class.

Authority - Morally justified

Observations on authority.

- o An *employer* who has institutional authority may *direct engineers* to do something that is *not morally justified*.
- o Engineers may feel that they have an institutional *duty to obey* a directive that is *morally unjustified*, but their moral *duty*, all things considered, is *not to obey*.
- o To decide whether a specific act of *exercising institutional authority is morally justified*, we need to know whether the institutional *goals are themselves morally permissible* or desirable and whether that *act violates* basic moral duties.

‘Zone of Acceptance’ of Authority

A subordinate is said to accept authority whenever he permits his behavior to be guided by the decision of a superior, without independently examining the merits of that decision

- Herbert Simon

- o Simon notes that all employees tend to have a „*zone of acceptance*’ in which they are willing to accept their employer’s authority.
- o *Within that zone*, an individual, relaxing his own critical faculties, *permits* the decision of the *employer to guide him*.
- o Employees generally *do not make an issue* of questionable incidents on morality, *out of a sense of responsibility* to give their employer leeway within which to operate and often *not to risk their jobs*.
- o The *problem increases* when employees slowly *expand* the boundaries of *tolerance and rationalize* it.

This only shows that engineers should *never stop* critically *reviewing* the employer’s *directives* especially *on moral issues*.

‘Faithful Agent Argument’

Board of Ethical Review argued that engineers *have a higher standard* than self-interest and that their ethical duty is to act for their employer as a faithful agent or trustee.

Collective bargaining

Collective bargaining is *inconsistent with loyalty* to employers because it is against the desires of the employer uses force or coercion against the employer and involves collective and organized opposition.

But *every instance* of such conduct *need not be unethical*.

An example:

Three engineers sincerely feel that they are underpaid. After their representations to their bosses are in vain, they threaten their employer, politely, that they would seek employment elsewhere. Here, even though, they act against the desires of their employer and have acted collectively, they have not acted unethically or violated their duty.

Conclusion: *Faithful agency* only concerns with performing one’s duty but does not mean that safety, salary and other economical *benefits cannot be negotiated* from a position of strength. Employee’s duty to employer *does not mean unlimited sacrifice* of self-interest.

Public Service Argument- Collective bargaining.

- o Public Service Argument is an *argument against* collective bargaining.
- o The paramount duty of engineers is *to serve the public*.
- o *Unions*, by definition, *promote the interests of their members* and whenever there is a clash of interests, the interest of the general public is ignored by them. Though the argument is a valid one, it looks at the worst possible scenarios with unions and *decides that engineering unions act only irresponsibly*.
- o A body of engineers can *promote engineers' interest* within limits set *by professional concern* for the public good.

Benefits of Collective Bargaining.

- a) Unions have created *healthy salaries* and *high standard of living* of employees.
- b) They give a *sense of participation* in company *decision making*.
- c) They are a good *balance to the power* of employers to fire employees at will.
- d) They provide an *effective grievance redressal* procedure for employee complaints.

Harms Caused by Collective Bargaining.

- a) Unions are devastating the economy of a country, being a main source of inflation
- b) With unions, there is no congenial (friendly), cooperative decision making.
- c) Unions does not promote quality performance by making job promotion and retention based on seniority.
- d) They encourage unrest and strained relations between employees and employers.

Confidentiality

‘Confidentiality or confidential information’

- Information considered desirable to be kept secret.
- Any information that the employer or client would like to have kept secret in order to compete effectively against business rivals.
- This information includes how business is run, its products, and suppliers, which directly affects the ability of the company to compete in the market place
- Helps the competitor to gain advantage or catch up

Privileged information, Proprietary information and Patents.

o *Privileged information:*

- Information available only on the *basis of special privilege* such as granted to an employee working on a special assignment.

o *Proprietary information:*

- Information that a company *owns or is the proprietor of*.
- This is primarily used in *legal sense*.
- Also called *Trade Secret*. A trade secret can be virtually any type of information that has *not become public* and which an employer has *taken steps to keep secret*.

o **Patents:**

- ☐ Differ from trade secrets.
- ☐ Legally *protect specific products* from being manufactured and sold by competitors *without the express permission of the patent holder*.
- ☐ They have the *drawback of being public* and competitors may *easily work around them* by creating alternate designs.

Obligation of Confidentiality

1. Based on ordinary moral considerations: **I. Respect for autonomy:**

- ☐ Recognizing *the legitimate control* over private information (individuals or corporations).
- ☐ o This control is required *to maintain their privacy* and protect their self-interest.

II. Respect for Promise:

- ☐ Respecting promises in terms of *employment contracts* not to divulge certain information considered sensitive by the employer

III. Regard for public well-being:

- ☐ Only when there is a *confidence* that the physician *will not reveal* information, the patient will have the *trust to confide* in him.
- ☐ Similarly, *only when companies maintain* some degree of *confidentiality* concerning their products, the benefits of *competitiveness* within a free market are *promoted*.

2. **Based on Major Ethical Theories:**

- ☐ All theories profess that employers have *moral and institutional rights* to decide what information about their organization should be released publicly.
- ☐ They acquire these rights as *part of their responsibility to protect the interest of the organization*.
- ☐ All the *theories*, rights ethics, duty ethics and utilitarianism *justify this confidentiality* but in different ways.

Effect of Change of Job on Confidentiality

- ☐ Employees are *obliged* to protect confidential information regarding former employment, *after a change of job*.
- ☐ The confidentiality *trust* between employer and employee *continues beyond* the period of employment.
- ☐ But, the employee *cannot be forced not to seek* a change of job.
- ☐ The employer's *right* to keep the trade secrets confidential by a former employee *should be accepted* at the same time, the *employee's right* to seek career advancement *cannot also be denied*.

Conflict of Interest

Conflict of Interest arises when two conditions are met:

1. The professional is in a relationship or a role that requires exercising good judgment on behalf of the interests of an employer or client and
2. The professional has some additional or side interest that could threaten good

judgment in serving the interests of the employee or client. E.g. *When an engineer is paid based on a percentage of the cost of the design and there is no incentive for him to cut costs-* The distrust caused by this situation compromises the engineers' ability to cut costs and calls into question his judgement.

“An act of gift and An act of bribe”

A gift is a *bribe* if you can't eat, drink or smoke it in a day

If you think that your offer of acceptance of a particular gift would have *grave* or merely *embarrassing consequences for your company if made public*, then the gift should be considered a bribe. *Bribe* can be said to be a *substantial* amount of money or goods offered beyond a stated business contract with the *aim of winning an advantage* in gaining or keeping the contract. Here *substantial* means that which is *sufficient to distort the judgment* of a typical person.

Conflict of Interest created by Interest in other companies

- When one *works actually for the competitor* or subcontractor as an employee or consultant.
- Having *partial ownership or substantial stock holdings* in the competitor's business.
- It may not *arise* by merely having a *spouse working for sub- contractor* to one's company, but it *will arise* if one's *job also includes granting contracts* to that subcontractor.
- *Tempting customers away* from their current employer, while still working for them *to form their own competing business*.
- *Moonlighting* usually creates *conflicts* when working for competitors, suppliers or customers but *does not conflict* when working for others *without affecting* the present employer's business.
- *Moonlighting means working in one's spare time for another employer*.

Conflicts of Interest created by Insider information

- Using *inside information* to *set-up a business opportunity* for *oneself or family or friends*.
- Buying *stock* in the company for which one works is *not objectionable* but it should be based on the *same information* available to the public.
- The *use* of any company *secrets* by employee to *secure a personal gain* threatens the interest of the company.

Avoiding Conflicts of Interests

- Taking guidance from *Company Policy*
- In the absence of such a policy taking a *second opinion from a coworker or manager*. This gives an impression that there no intension on the part of the engineer to hide anything.
- In the absence of either of these options, to *examine one's own motives* and *use the ethical problem solving techniques*.
- One can look carefully into the professional codes of ethics *which uniformly forbid conflicts of interest*. Some of these codes have very explicit statements that can help determine whether or not the situation constitutes conflict of interest.

Occupational Crime

Types Of Crime

- **Domestic crime** Non-accidental crime committed *by members* of the family
- **Professional Crime** When crime is *pursued as a profession* or day to day occupation
- **Blue collar crime (or) Street crime** **Crime against person, property** (theft, assault on a person, rape)
- **Victimless crime** Person *who commits* the crime *is the victim* of the crime. E.g. Drug addiction
- **Hate crime** Crime done on the banner of *religion, community, linguistics*

Occupational Crime

- Occupational crimes are *illegal acts* made possible through one's *lawful employment*.
- It is the *secretive violation of laws* regulating work activities.
- When committed by office workers or *professionals*, occupational crime is called „*white collar crime*’.

People Committing Occupational Crimes

- Usually have *high standard of education*
- From a *non-criminal family background*
- Middle class male around *27 years of age* (70% of the time) with *no previous history*
- *No involvement* in drug or alcohol abuse
- Those who had *troublesome life* experience in the childhood (Blum)
- People *without firm principles* (Spencer)
- Firms **with declining profitability** (Coleman, 1994)
- Firms in *highly regulated areas and volatile market* -pharmaceutical, petroleum **industry**. (Albanese, 1995)

Price Fixing

An act was passed, which *forbade* (prevented) companies from *jointly setting prices* in ways that *restrain free competition* and trade. Unfortunately, many senior people, well respected and positioned were of the opinion that „*price fixing*’ was good for their organizations and the public.

Employees Endangering Lives of Employees

Employers indulge in exposing their employees to safety hazards. They *escape criminal action* against them, by paying *nominal compensations* even if their crimes are proved in court. And even this happens *only when the victim sues company* for damages under civil law.

Engineers’ Moral Rights

Engineers’ moral rights fall into categories of *human, employee, contractual and professional rights*.

Professional rights:

- The right to form and *express one's professional judgment freely*
- The right to *refuse* to carry out *illegal and unethical activity*
- The right to *talk publicly* about one's work *within bounds* set by confidentiality obligation
- The right to *engage* in the activities of *professional societies*
- The right to *protect* the clients and the public *from the dangers* that might arise from one's work
- The right to professional *recognition* of one's services.

Right of Professional Conscience

- There is one *basic* and generic professional right of engineers, the *moral right to exercise responsible professional judgment* in pursuing professional responsibilities.
- Pursuing these responsibilities involves *exercising* both *technical judgment* and reasoned *moral* convictions.
- This basic right can be referred to as *the right of professional conscience*.

Right of Conscientious Refusal

The right of Conscientious refusal is the right to *refuse to engage in unethical behavior* and to refuse to do so *solely because one views it as unethical*.

Two situations to be considered.

1. *Where there is widely shared agreement in profession as to whether an act is unethical.*
Here, professionals have a moral right to refuse to participate in such activities.

2. *Where there is room for disagreement among reasonable people over whether an act is unethical.*

Here, it is possible that there could be *different ethical view points* from the professional and the employer.

In such cases the engineers can have a *limited right* to *turn down* assignments that violates their personal conscience *only in matters of great importance* such as threats to human life.

This right also depends on the *ability* of the employer *to reassign* the engineer to alternate projects *without serious economic hardships* to the organ.

The *right of professional conscience* does not extend to the right to be paid for not working.

Right to Recognition

Right to Recognition involves two parts.

The right to ***reasonable remuneration*** gives the moral right for fighting against corporations making good profits while engineers are being paid poorly. Also is the case where patents are not being rewarded properly by the corporations benefiting from such patents.

The other ***right to recognition*** is non-monetary part of recognition to the work of engineers.

But *what is reasonable remuneration or reasonable recognition* is a difficult question and should be resolved by discussions between employees and employers only.

Professional Rights & Ethical Theories

1. Rights Ethics:

- o The most basic human right, which needs no justification, as per A.I.Meldon, is to pursue one's legitimate (those that do not violate others' rights) interests.
- o The right to pursue legitimate interests gives a person right to pursue professional moral obligations.
- o This may be viewed as a human right of conscience directly derived from the basic human right.

2. Duty Ethics:

- o I have a right to something only because others have duties or obligations to allow me (and not interfere) to do so.
- o If we derive the meaning of „others' as employers, then the basic professional right is justified by reference to others' duties to support or not interfere with the work related exercise of conscience by professionals.

3. Utilitarianism:

- o Public good can be served by allowing professionals to meet their obligations to the public.
- o These obligations arise due to the professional's role in promoting public good.
- o The basic goal of producing the best for the greatest number of people is enough to justify the right of professional conscience.

Whistle-blowing and Its Features

Whistle blowing is an act of conveying information about a significant moral problem by a present or former employee, outside approved channels (or against strong pressure) to someone, in a position to take action on the problem.

The features of *Whistle blowing* are:

- ☐ Act of Disclosure: *Intentionally conveying information outside approved organizational channels when the person is under pressure not to do so from higher-ups.*
- ☐ Topic: *The information is believed to concern a significant moral problem for the organization.*
- ☐ Agent: *The person disclosing the information is an employee or former employee.*
- ☐ Recipient: *The information is conveyed to a person or organization who can act on it.*

Types of Whistle Blowing

External Whistle blowing: The act of passing on information outside the organization.

Internal Whistle blowing: The act of passing on information to someone within the organization but outside the approved channels.

Either type is likely to be considered as disloyalty, but the second one is often seen as less serious than the latter. From corporations' point of view both are serious because it leads to distrust, disharmony, and inability of the employees to work together.

Open Whistle blowing: Individuals openly revealing their identity as they convey the information.

Anonymous Whistle blowing: Individual conveying the information conceals his/her identity.

Procedures to be followed before Whistle Blowing

- ☐ *Except for extreme emergencies, always try working through normal organizational channels.*
- ☐ Be prompt in expressing objections.
- ☐ Proceed in a tactful manner with *due consideration to the feelings* of others involved.
- ☐ As much as possible, *keep supervisors informed* of your actions, both informally and formally.
- ☐ Be accurate in observations and claims and *keep all formal records* documenting relevant events.
- ☐ Consult colleagues for *advice* and also to *avoid isolation*.
- ☐ *Consult the ethics committee* of your professional society before going outside the organization.
- ☐ *Consult a lawyer* regarding potential legal liabilities.

A great deal of introspection and reflection are required before WB. Motive should neither be for revenge upon fellow employee, supervisor or company nor in the hope of future gains like book contracts or speaking tours etc.

Conditions to be satisfied before Whistle Blowing

Richard T. De George suggests the following:

1. The *harm* that will be done by the product to the public is *serious* and considerable.
2. The individual makes his/her concern *known to his/her superiors*
3. If one does not get any proper response from immediate superiors, then one should *exhaust the channels* that are available *within the organization* including the board of directors.
4. One must have *documented* evidence that would *convince* a reasonable and impartial *observer* that one's view of the situation is correct and the company policy is wrong.
5. There must be *strong evidence* that making the information public will in fact *prevent the threatened serious harm*.

Prevention of Whistle Blowing

The following *actions* will *prevent/reduce* whistle blowing:

1. Giving *direct access* to higher levels of management by announcing „*open door*’ policies with guarantee that *there won't be retaliation*. Instead such employees should be *rewarded for fostering ethical behavior* in the company.
2. This gives greater freedom and promotes open communication within the organization.
3. Creation of an Ethics Review Committee with *freedom to investigate complaints and make independent recommendations* to top management.
4. Top priority should be given to *promote ethical conduct* in the organization *by top management*.

5. Engineers should be *allowed to discuss in confidence*, their moral concerns with the ethics committee of their professional societies.
6. When there are differences on ethical issues between engineers and management, *ethics committee members* of the professional societies *should be allowed* to enter into these discussions.
7. *Changes and updation* in law must be explored by engineers, organizations, professional societies and government organizations on a continuous basis.

Employee Rights

Employee rights are any rights, moral or legal, that involve the status of being an employee.

Employee rights are:

- There should be *no discrimination* against an employee *for criticizing* ethical, moral or legal policies and practices of the organization.
- The organization will *not also discriminate* against an employee *for engaging in outside activities* or for objecting to an organization directive that violates common norms of morality.
- The employee *will not be deprived* of any enjoyment of *reasonable privacy* in his/her workplace.
- *No personal information* about employees *will be collected* or kept other than what is necessary to manage the organization efficiently and to meet the legal requirements.
- *No employee* who alleges that her/his rights have been violated *will be discharged* or penalized *without a fair hearing* by the employer organization.

Some clear examples: falsifying data, avoidance on the safety of a product

Intellectual Property Rights

- *Intellectual Property* is a product of the *human intellect* that has *commercial value*
- Many of the rights of the ownership common to real and *personal property* are also *common* to *Intellectual Property*
- *Intellectual Property* can be *bought, sold, and licensed*
- Similarly, it can be *protected against theft* and *infringement* by others

Patent

1. Derived from the Latin word „LITTERAE PATENTES’ which means „Open Letters’ or Open Documents to confer rights and privileges.
 2. A contract between an Inventor and the Government
- An exclusive privilege monopoly right granted by the Government to the Inventor
 - Invention may be of an Industrial product or process of manufacture
 - Invention should be new, non-obvious, useful and patentable as per Patents Act
 - The right to the inventor is for limited period of time and valid only within the territorial limits of a country of grant.

Examples: a drug compound, a tool, maybe software effects

DESIGN

- Meant for beautifying an industrial product to attract the consumer public
- Shaping, Configuration or Ornamentation of a vendible Industrial product
- Exclusive „Design Rights’ to the originator for a limited term

- Patents & design embrace the production stage of an industrial activity

TRADE MARK

- Trade Mark is a name or symbol adopted for identifying goods
- Public can identify from the Trade Mark from whom the product is emanating
- Trade Marks protection is given for an industrial product by the Government

Examples: Channel No.5's smell, Jacque Villeneuve's face!

COPY RIGHTS

- The right to original literary and artistic works
- Literary, written material
- Dramatic, musical or artistic works
- Films and audio-visual materials
- Sound recordings
- Computer Programmes/software
- SOME databases

Example: Picasso's Guernica, Microsoft code, Lord of the Rings

Need For A Patent System

- Encourages an inventor to disclose his invention
- Encourages R & D activities as the industries can make use of the technology, & avoids redundant research
- Provides reasonable assurance for commercialisation.
- Provides an inducement to invest capital in the new lines of production and thus , help for technical development and upgradation.
- One may get a very good return of income through Patent Right on the investment made in R & D.

Effect of Patent

- A patentee gets the exclusive monopoly right against the public at large to use,sell or manufacture his patented device.
- A patentee can enforce his monopoly right against any infringement in the court of law for suitable damages or profit of account.
- The Government ensures full disclosure of the invention to the public for exchange of exclusive monopoly patent right to the inventor.

Bhopal Gas Tragedy.

On December 3, 1984, Union Carbide's pesticide-manufacturing plant in Bhopal, India leaked 40 tons of the deadly gas, methyl isocyanate into a sleeping, impoverished community - killing 2,500 within a few days, 10000 permanently disabled and injuring 100,000 people. Ten years later, it increased to 4000 to 7000 deaths and injuries to 600,000.

Risks taken:

- Storage tank of Methyl Isocyanate gas was filled to more than 75% capacity as against Union Carbide's spec. that it should never be more than 60% full.
- The company's West Virginia plant was controlling the safety systems and detected

leakages thro' computers but the Bhopal plant only used manual labour for control and leak detection.

- The Methyl Isocyanate gas, being highly concentrated, burns parts of body with which it comes into contact, even blinding eyes and destroying lungs.

Causal Factors:

- Three protective systems out of service
- Plant was understaffed due to costs.
- Very high inventory of MIC, an extremely toxic material.
- The accident occurred in the early morning.
- Most of the people killed lived in a shanty (poorly built) town located very close to the plant fence.

Workers made the following attempts to save the plant:

- They tried to turn on the plant refrigeration system to cool down the environment and slow the reaction. (The refrigeration system had been drained of coolant weeks before and never refilled -- it cost too much.)
- They tried to route expanding gases to a neighboring tank. (The tank's pressure gauge was broken and indicated the tank was full when it was really empty.)
- They tried to purge the gases through a scrubber. (The scrubber was designed for flow rates, temperatures and pressures that were a fraction of what was by this time escaping from the tank. The scrubber was as a result ineffective.)
- They tried to route the gases through a flare tower -- to burn them away. (The supply line to the flare tower was broken and hadn't been replaced.)
- They tried to spray water on the gases and have them settle to the ground -- by this time the chemical reaction was nearly completed. (The gases were escaping at a point 120 feet above ground; the hoses were designed to shoot water up to 100 feet into the air.)

In just 2 hours the chemicals escaped to form a deadly cloud over hundreds of thousands of people incl. poor migrant laborer's who stayed close to the plant.

Discrimination

o Discrimination generally means *preference* on the grounds of *sex, race, skin colour, age or religious outlook*.

o in everyday speech, it has come to mean *morally unjustified treatment of people on arbitrary or irrelevant grounds*.

o Therefore to call something „Discrimination’ is to condemn it.

o But when the question of justification arises, we will call it „*Preferential Treatment*’.

1. The educator values the worth and dignity of every person, the pursuit of truth, devotion to excellence, acquisition of knowledge, and the nurture of democratic citizenship. Essential to the achievement of these standards are the freedom to learn and to teach and the guarantee of equal opportunity for all.

2. The educator's primary professional concern will always be for the student and for the development of the student's potential. The educator will therefore strive for professional growth and will seek to exercise the best professional judgment and integrity.

3. Aware of the importance of maintaining the respect and confidence of one's colleagues, of students, of parents, and of other members of the community, the educator strives to achieve and sustain the highest degree of ethical conduct.

UNIT-5 GLOBAL ISSUES

MULTINATIONAL CORPORATIONS:

Organizations, who have established business in more than one country, are called Multinational Corporation. The headquarters are in the home country and the business is extended in many host countries. The Western organizations doing business in the less-economically developed (developing, and overpopulated) countries gain the advantage of inexpensive labor, availability of natural resources, conducive-tax atmosphere, and virgin market for the products. At the same time, the developing countries are also benefited by fresh job opportunities, jobs with higher remuneration and challenges, transfer of technology, and several social benefits by the wealth developed. But this happens invariably with some social and cultural disturbance. Loss of jobs for the home country, and loss or exploitation of natural resources, political instability for the *host* countries are some of the threats of globalization.

International Human Rights:

To know what are the moral responsibilities and obligations of the multinational corporations operating in the host countries, let us discuss with the framework of rights ethics. Common minimal rights are to be followed to smoothen the transactions when the engineers and employers of MNCs have to interact at official, social, economic and sometimes political levels. At international level, the organizations are expected to adopt the minimum levels of

- (a) Values, such as mutual support, loyalty, and reciprocity,
- (b) The negative duty of refraining from harmful actions such as violence
- (c) Basic fairness and practical justice in case of conflicts.

The ten international rights to be taken care of:

1. Right of freedom of physical movement of people
2. Right of ownership of properties
3. Freedom from torture
4. Right to fair trial on the products
5. Freedom from discrimination on the basis of race or sex. If such discrimination against women or minorities is prevalent in the host country, the MNC will be compelled to accept. MNCs may opt to quit that country if the human rights violations are severe.
6. Physical security. Use of safety gadgets have to be supplied to the workers even if the laws of the host country do not suggest such measures.
7. Freedom of speech and forming association
8. Right to have a minimum education
9. Right to political participation
10. Right to live and exist (i.e., coexistence). The individual liberty and sanctity of the human life are to be respected by all societies.

Technology Transfer

It is a process of moving technology to a new setting and implementing it there. Technology includes hardware (machines and installations) and the techniques (technical, organizational, and managerial skills and procedures). It may mean moving the technology applications from laboratory to the field/factory or from one country to another. This transfer is effected by governments, organizations, universities, and MNCs.

Appropriate Technology

Identification, transfer, and implementation of most *suitable* technology for a set of new situations, is called *appropriate technology*. Technology includes both hardware (machines and installations) and software (technical, organizational and managerial skills and procedures). Factors such as economic, social, and engineering constraints are the causes for the modification of technology. Depending on the availability of resources, physical conditions (such as temperature, humidity, salinity, geographical location, isolated land area, and availability of water), capital opportunity costs, and the human value system (social acceptability) which includes their traditions, beliefs, and religion, the appropriateness is to be determined.

For example, small farmers in our country prefer to own and use the power tillers, rather than the high-powered tractors or sophisticated harvesting machines. On the other hand, the latest technological device, the cell phones and wireless local loop phones have found their way into remote villages and hamlets, than the landline telephone connections. Large aqua-culture farms should not make the existing

fishermen jobless in their own village. The term *appropriate* is value based and it should ensure fulfillment of the human needs and protection of the environment.

ENVIRONMENTAL ETHICS:

Environmental ethics is the study of

(a) Moral issues concerning the environment, and

(b) Moral perspectives, beliefs, or attitudes concerning those issues. Engineers in the past are known for their negligence of environment, in their activities. It has become important now that engineers design eco-friendly tools, machines, sustainable products, processes, and projects. These are essential now to (a) ensure protection (safety) of environment (b) prevent the degradation of environment, and (c) slow down the exploitation of the natural resources.

So that the future generation can survive. The American Society of Civil Engineers (ASCE) code of ethics, has specifically requires that “engineers shall hold paramount the safety, health, and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of professional duties” The term *sustainable development* emphasizes on the investment, orientation of technology, development and functioning of organizations to meet the present needs of people and at the same time ensuring the future generations to meet their needs.

Compaq Computer Corporation (now merged with HP) was the leader, who exhibited their commitment to environmental health, through implementation of the concept of ‘Design for environment’ on their products, unified standards all over the world units, and giving priority to vendors with a record of environmental concern.

Engineers as experimenters have certain duties towards environmental ethics, namely:

1. **Environmental impact assessment:** One major but sure and unintended effect of technology is wastage and the resulting pollution of land, water, air and even space. Study how the industry and technology affects the environment.

2. **Establish standards:** Study and to fix the tolerable and actual pollution levels.

3. **Counter measures:** Study what the protective or eliminating measures are available for immediate implementation

4. **Environmental awareness:** Study on how to educate the people on environmental practices, issues, and possible remedies.

Disasters:

1. Plastic Waste Disposal:

In our country, several crores of plastic bottles are used as containers for water and oil, and plastic bags are used to pack different materials ranging from vegetables to gold ornaments. Hardly any of these are recycled. They end up in gutters, roadsides, and agricultural fields. In all these destinations, they created havoc. The worse still is the burning of plastic materials in streets and camphor along with plastic cover in temples, since they release toxic fumes and threaten seriously the air quality. Cities and local administration have to act on this, collect and arrange for recycling through industries.

2. Industrial Waste Disposal:

There have been a lot of complaints through the media, on (a) against the Sterlite Copper Smelting Plant in Thuthukkudi (1997) against its pollution, and (b) when Indian companies imported the discarded French Warship *Clemenceau* for disposal, the poisonous *asbestos* compounds were expected to pollute the atmosphere besides exposing the labor to a great risk, during the disposal. The government did not act immediately. Fortunately for Indians, the French Government intervened and withdrew the ship, and the serious threat was averted!

3. Depletion of Ozone Layer

The *ozone* layer protects the entire planet from the ill-effects of ultraviolet radiation and is vital for all living organisms in this world. But it is eaten away by the Chlorofluorocarbons (CFC) such as *Freon* emanating from the refrigerators, air conditioners, and aerosol can spray. This has caused also skin cancer to sun-bathers in the Western countries. Further NO and NO₂ gases were also found to react with the ozone. Apart from engineers, the organizations, laws of the country and local administration and market mechanisms are required to take up concerted efforts to protect the environment.

4. Global Warming

Over the past 30 years, the Earth has warmed by 0.6 °C. Over the last 100 years, it has warmed by 0.8 °C. It is likely to push up temperature by 3 oC by 2100, according to NASA’s studies. The U.S. administration has accepted the reality of global climate change, which has been associated with stronger hurricanes, severe

droughts, intense heat waves and the melting of polar ice. Greenhouse gases, notably carbon dioxide emitted by motor vehicles and coal-fired power plants, trap heat like the glass walls of a greenhouse, cause the Earth to warm up. Delegates from the six countries — Australia, China, India, Japan, South Korea and US met in California in April 2006 for the first working session of the Asia-Pacific Partnership on Clean Development and Climate. These six countries account for about half of the world's emissions of climate-heating greenhouse gases. Only one of the six, Japan, is committed to reducing greenhouse gas emissions by at least 5.2 per cent below 1990 levels by 2012 under the Kyoto Agreement. About 190 nations met in Germany in the middle of May 2006 and tried to bridge vast policy

gaps between the United States and its main allies over how to combat climate change amid growing evidence that the world is warming that could wreak havoc by stoking more droughts, heat waves, floods, more powerful storms and raise global sea levels by almost a meter by 2100.

5. Acid Rain

Large emissions of sulphur oxides and nitrous oxides are being released in to the air from the thermal power stations using the fossil fuels, and several processing industries. These gases form compounds with water in the air and precipitates as rain or snow on to the earth. The acid rain in some parts of the world has caused sufficient damage to the fertility of the land and to the human beings.

COMPUTER ETHICS:

Computer ethics is defined as

- (a) Study and analysis of nature and social impact of computer technology,
- (b) Formulation and justification of policies, for ethical use of computers.

This subject has become relevant to the professionals such as designers of computers, programmers, system analysts, system managers, and operators. The use of computers has raised a host of moral concerns such as free speech, privacy, intellectual property right, and physical as well as mental harm. There appears to be no conceptual framework available on ethics, to study and understand and resolve the problems in computer technology.

Types of Issues

Different types of problems are found in computer ethics.

1. Computer as the Instrument of Unethical Acts

- (a) The usage of computer replaces the job positions. This has been overcome to a large extent by readjusting work assignments, and training everyone on computer applications such as word processing, editing, and graphics.
- (b) Breaking privacy. Information or data of the individuals accessed or erased or the ownership changed.
- (c) Defraud a bank or a client, by accessing and withdrawing money from other's bank account.

2. Computer as the Object of Unethical Act

The data are accessed and deleted or changed.

- (a) *Hacking*: The software is stolen or information is accessed from other computers. This may cause financial loss to the business or violation of privacy rights of the individuals or business. In case of defense information being hacked, this may endanger the security of the nation.
- (b) *Spreading virus*: Through mail or otherwise, other computers are accessed and the files are erased or contents changed altogether. 'Trojan horses' are implanted to distort the messages and files beyond recovery. This again causes financial loss or mental torture to the individuals. Some hackers feel that they have justified their right of free information or they do it for fun. However, these acts are certainly unethical.
- (c) *Health hazard*: The computers pose threat during their use as well as during disposal.

3. Problems Related to the Autonomous Nature of Computer

- (a) *Security risk*: Recently the Tokyo Stock Exchange faced a major embarrassment. A seemingly casual mistake by a junior trader of a large security house led to huge losses including that of reputation. The order through the exchange's trading system was to sell one share for 600,000 Yen. Instead the trader keyed in a sale order for 600,000 shares at the rate of one Yen each.

Naturally the shares on offer at the ridiculously low price were lapped up. And only a few buyers agreed to reverse the deal! The loss to the securities firm was said to be huge, running into several hundred thousand. More important to note, such an obvious mistake could not be corrected by some of the advanced technology available. For advanced countries like Japan who have imbibed the latest technology, this would be a new kind of learning experience.¹²

- (b) *Loss of human lives*: Risk and loss of human lives lost by computer, in the operational control of military weapons. There is a dangerous instability in automated defense system. An unexpected error in the software

or hardware or a conflict during interfacing between the two, may trigger a serious attack and cause irreparable human loss before the error is traced. The Chinese embassy was bombed by U.S. military in Iraq a few years back, but enquiries revealed that the building was shown in a previous map as the building where insurgents stayed.

(c) In flexible manufacturing systems, the autonomous computer is beneficial in obtaining continuous monitoring and automatic control.

Computer Crime:

The ethical features involved in computer crime are:

1. Physical Security

The computers are to be protected against theft, fire, and physical damage. This can be achieved by proper insurance on the assets.

2. Logical security

The aspects related are

(a) The privacy of the individuals or organizations.

(b) Confidentiality.

(c) Integrity, to ensure that the modification of data or program is done only by the authorized persons.

(d) Uninterrupted service. This is achieved by installing appropriate uninterrupted power supply or back-up provisions.

(e) Protection against hacking that causes dislocation or distortion.

Licensed Anti-virus packages and firewalls are used by all computer users to ensure this protection. Passwords and data encryption have been incorporated in the computer software as security measures. But these have also been attacked and by-passed. But this problem is not been solved completely.

Major weaknesses in this direction are:

(a) The difficulty in tracing the evidence involved and

(b) Absence of stringent punishment against the crime. The origin of a threat to the Central Government posted from an obscure browsing center, remained unsolved for quite a long time. Many times, such crimes have been traced, but there are no clear *cyber laws* to punish and deter the criminals.

WEAPONS DEVELOPMENT:

Military activities including the world wars have stimulated the growth of technology. The growth of Internet amply illustrates this fact. The development of warfare and the involvement of engineers bring out many ethical issues concerned with engineers, such as the issue of integrity in experiments as well as expenditure in defense research and development, issue of personal commitment and conscience, and the issues of social justice and social health.

Engineers involve in weapons development because of the following reasons:

1. It gives one job with high salary.

2. One takes pride and honor in participating in the activities towards the defense of the nation (patriotic fervor).

3. One believes the he fights a war on terrorism and thereby contribute to peace and stability of the country. Ironically, the wars have never won peace, only peace can win peace!

4. By research and development, the engineer is reducing or eliminating the risk from enemy weapons, and saving one's country from disaster.

5. By building-up arsenals and show of force, a country can force the rogue country, towards regulation. Engineers can participate effectively in arms control negotiations for surrender or peace, e.g., bombing of Nagasaki and Hiroshima led to surrender by the Japanese in 1945.

Many engineers had to fight and convince their personal conscience. The scene such as that of a Vietnamese village girl running wild with burns on the body and horror in the face and curse in her mind has moved some engineers away from their jobs.

ENGINEERS AS MANAGERS:

Characteristics

The characteristics of engineers as managers are:

1. Promote an ethical climate, through framing organization policies, responsibilities and by personal attitudes and obligations.

2. Resolving conflicts, by evolving priority, developing mutual understanding, generating various alternative solutions to problems.

3. Social responsibility to stakeholders, customers and employers. They act to develop wealth as well as the welfare of the society. Ethicists project the view that the manager's responsibility is only to increase the profit of the organization, and only the engineers have the responsibility to protect the safety, health, and welfare of the public. But managers have the ethical responsibility to produce safe and good products (or useful service), while showing respect for the human beings who include the employees, customers and the public. Hence, the objective for the managers and engineers is to produce valuable products that are also profitable.

Managing Conflicts:

In solving conflicts, force should not be resorted. In fact, the conflict situations should be tolerated, understood, and resolved by participation by all the concerned. The conflicts in case of project managers arise in the following manners:

- (a) Conflicts based on schedules: This happens because of various levels of execution, priority and limitations of each level.
- (b) Conflicts arising out of fixing the priority to different projects or departments. This is to be arrived at from the end requirements and it may change from time to time.
- (c) Conflict based on the availability of personnel.
- (d) Conflict over technical, economic, and time factors such as cost, time, and performance level.
- (e) Conflict arising in administration such as authority, responsibility, accountability, and logistics required.
- (f) Conflicts of personality, human psychology and ego problems.
- (g) Conflict over expenditure and its deviations.

Most of the conflicts can be resolved by following the principles listed here:

1. People

Separate people from the problem. It implies that the views of all concerned should be obtained. The questions such as what, why, and when the error was committed is more important than to know who committed it. This impersonal approach will lead to not only early solution but also others will be prevented from committing errors.

2. Interests

Focus must be only on interest i.e., the ethical attitudes or motives and not on the positions (i.e., stated views). A supplier may require commission larger than usual prevailing rate for an agricultural product. But the past analysis may tell us that the material is not cultivated regularly and the monsoon poses some additional risk towards the supply. Mutual interests must be respected to a maximum level. What is right is more important than who is right!

3. Options

Generate various options as solutions to the problem. This helps a manager to try the next best solution should the first one fails. Decision on alternate solutions can be taken more easily and without loss of time.

4. Evaluation

The evaluation of the results should be based on some specified objectives such as efficiency, quality, and customer satisfaction. More important is that the means, not only the goals, should be ethical.

CONSULTING ENGINEERS:

The consulting engineers work in private. There is no salary from the employers. But they charge fees from the sponsor and they have more freedom to decide on their projects. Still they have no absolute freedom, because they need to earn for their living. The consulting engineers have ethical responsibilities different from the salaried engineers, as follows:

1. Advertising

The consulting engineers are directly responsible for advertising their services, even if they employ other consultants to assist them. But in many organizations, this responsibility is with the advertising executives and the personnel department.

They are allowed to advertise but to avoid deceptive ones. Deceptive advertising such as the following are prohibited:

- (a) By white lies.
- (b) Half-truth, e.g., a product has actually been tested as prototype, but it was claimed to have been already introduced in the market. An architect shows the photograph of the completed building with flowering trees around but actually the foundation of the building has been completed and there is no real garden.
- (c) Exaggerated claims. The consultant might have played a small role in a well-known project. But they could claim to have played a major role.

(d) Making false suggestions. The reduction in cost might have been achieved along with the reduction in strength, but the strength details are hidden.

(e) Through vague wordings or slogans.

2. Competitive Bidding

It means offering a price, and get something in return for the service offered. The organizations have a pool of engineers. The expertise can be shared and the bidding is made more realistic. But the individual consultants have to develop creative designs and build their reputation steadily and carefully, over a period of time. The clients will have to choose between the reputed organizations and proven qualifications of the company and the expertise of the consultants. Although competent, the younger consultants are thus slightly at a disadvantage.

3. Contingency Fee

This is the fee or commission paid to the consultant, when one is successful in saving the expenses for the client. A sense of honesty and fairness is required in fixing this fee. The NSPE Code III 6 (a) says that the engineers shall not propose or accept a commission on a contingent basis where their judgment may be compromised. The fee may be either as an agreed amount or a fixed percentage of the savings realized. But in the contingency fee-agreements, the judgment of the consultant may be biased. The consultant may be tempted to specify inferior materials or design methods to cut the construction cost. This fee may motivate the consultants to effect saving in the costs to the clients, through reasonably moral and technological means.

4. Safety and Client's Needs

The greater freedom for the consulting engineers in decision making on safety aspects, and difficulties concerning truthfulness are the matters to be given attention. For example, in design-only projects, the consulting engineers may design something and have no role in the construction. Sometimes, difficulties may crop-up during construction due to non-availability of suitable materials, some shortcuts in construction, and lack of necessary and adequate supervision and inspection. Properly-trained supervision is needed, but may not happen, unless it is provided. Further, the contractor may not understand and/or be willing to modify the original design to serve the clients best. A few on-site inspections by the consulting engineers will expose the deficiency in execution and save the workers, the public, and the environment that may be exposed to risk upon completion of the project.

The NSPE codes on the advertisement by consultants provide some specific regulations. The following are the activities prohibited in advertisement by consultant:

1. The use of statement containing misrepresentation or omission of a necessary fact.
2. Statement intended or likely to create an unjustified expectation.
3. Statement containing prediction of future (probable) success.
4. Statement intended or likely to attract clients, by the use of slogans or sensational language format.

ENGINEERS AS EXPERT WITNESS:

Frequently engineers are required to act as consultants and provide expert opinion and views in many legal cases of the past events. They are required to explain the causes of accidents, malfunctions and other technological behavior of structures, machines, and instruments, e.g., personal injury while using an instrument, defective product, traffic accident, structure or building collapse, and damage to the property, are some of the cases where testimonies are needed. The focus is on the past.

The functions of eye-witness and expert-witness are different as presented in the

<i>Eye-witness</i>	<i>Expert-witness</i>
1. Eye-witness gives evidence on only what has been seen or heard actually (perceived facts).	1. Gives expert view on the facts in their area of their expertise. 2. Interprets the facts, in term of the cause and effect relationship. 3. Comments on the view of the opposite side. 4. Reports on the professional standards, especially on the precautions when the product is made or the service is provided.

The engineers, who act as expert-witnesses, are likely to abuse their positions in the following manners:

1. Hired Guns

Mostly lawyers hire engineers to serve the interest of their clients. Lawyers are permitted and required to project the case in a way favorable to their clients. But the engineers have obligations to thoroughly examine the events and demonstrate their professional integrity to testify only the truth in the court.

They do not serve the clients of the lawyers directly. The hired guns forward white lies and distortions, as demanded by the lawyers. They even withhold the information or shade the fact, to favor their clients.

2. Money Bias

Consultants may be influenced or prejudiced for monetary considerations, gain reputation and make a fortune.

3. Ego Bias

The assumption that the one side is innocent and the other side is guilty, is responsible for this behavior. An inordinate desire to serve one's client and get name and fame is another reason for this bias.

4. Sympathy Bias

Sympathy for the victim on the opposite side may upset the testimony. The integrity of the consultants will keep these biases away from the justice. The court also must obtain the balanced view of both sides, by examining the expert witnesses of lawyers on both sides, to remove a probable bias.

ENGINEERS AS ADVISORS IN PLANNING AND POLICY MAKING:**Advisors**

The engineers are required to give their view on the future such as in planning, policy-making, which involves the technology. For example, should India expand nuclear power options or support traditional energy sources such as fossil fuels or alternative forms like solar and wind energy? In the recent past, this topic has created lot of fireworks, in the national media.

Various issues and requirements for engineers who act as advisors are:

1. Objectivity

The engineers should study the cost and benefits of all possible alternative means in objective manner, within the specified conditions and assumptions.

2. Study All Aspects

They have to study the economic viability (effectiveness), technical feasibility (efficiency), operational feasibility (skills) and social acceptability, which include environmental and ethical aspects, before formulating the policy.

3. Values

Engineers have to possess the qualities, such as (a) honesty, (b) competence (skills and expertise), (c) diligence (careful and alert) (d) loyalty in serving the interests of the clients and maintaining confidentiality, and (e) public trust, and respect for the common good, rather than serving only the interests of the clients or the political interests.

4. Technical Complexity

The arbitrary, unrealistic, and controversial assumptions made during the future planning that are overlooked or not verified, will lead to moral complexity. The study on future is full of uncertainties than the investigations on the past events. On the study of energy options, for example, assumptions on population increase, life style, urbanization, availability of local fossil resources, projected costs of generating alternative forms of energy, world political scenario, world military tensions and pressures from world organizations such as World Trade Organization (W.T.O.) and European Union (EU) may increase the complexity in judgment on future.

5. National Security

The proposed options should be aimed to strengthen the economy and security of the nation, besides safeguarding the natural resources and the environment from exploitation and degradation.

MORAL LEADERSHIP:

Engineers provide many types of leadership in the development and implementation of technology, as managers, entrepreneurs, consultants, academics and officials of the government. Moral leadership is not merely the dominance by a group. It means adopting reasonable means to motivate the groups to achieve morally desirable goals. This leadership presents the engineers with many challenges to their moral principles.

Moral leadership is essentially required for the engineers, for the reasons listed as follows:

1. It is leading a group of people towards the achievement of global and objectives. The goals as well as the means are to be moral. For example, Hitler and Stalin were leaders, but only in an instrumental sense and certainly not on moral sense.
2. The leadership shall direct and motivate the group to move through morally desirable ways.
3. They lead by thinking ahead in time, and morally creative towards new applications, extension and putting values into practice. 'Morally creative' means the identification of the most important values as applicable to the situation, bringing clarity within the groups through proper communication, and putting those values into practice.
4. They sustain professional interest, among social diversity and cross-disciplinary complexity. They contribute to the professional societies, their professions, and to their communities. The moral leadership in engineering is manifested in leadership within the professional societies. The professional societies provide a forum for communication, and canvassing for change within and by groups.
5. *Voluntarism*: Another important avenue for providing moral leadership within communities, by the engineers is to promote services without fee or at reduced fees (pro bono) to the needy groups. The professional societies can also promote such activities among the engineers. This type of voluntarism (or philanthropy) has been in practice in the fields of medicine, law and education. But many of the engineers are not self-employed as in the case of physicians and lawyers. The business institutions are encouraged to contribute a percentage of their services as free or at concessional rates for charitable purposes.
6. *Community service*: This is another platform for the engineers to exhibit their moral leadership. The engineers can help in guiding, organizing, and stimulating the community towards morally- and environmentally-desirable goals. The corporate organizations have come forward to adopt villages and execute many social welfare schemes, towards this objective.

CODES OF CONDUCT:

National Society of Professional Engineers

Preamble

Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the higher standards of honesty and integrity. Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness, and equity, and must be dedicated to the protection of then public health, safety, and welfare. Engineer must perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

I Fundamental Canons

Engineers in the fulfillment of their professional duties shall

1. Hold paramount the safety, health, and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

II Rules of Practice

1. Engineers shall hold paramount the safety, health, and welfare of the public.
2. Engineers shall perform services only in the areas of their competence.
3. Engineers shall issue public statements only in an objective and truthful manner.
4. Engineers shall at for each employer or client as faithful agents or trustees
5. Engineers shall avoid deceptive acts

III Professional Obligations

1. Engineers shall be guided in all their relation by the highest standards of honesty and integrity.
2. Engineers shall at all times strive to serve the public interest.
3. Engineers shall avoid all conduct or practice that deceives the public.
4. Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve.
5. Engineers shall not be influenced in their professional duties by conflicting interests.
6. Engineers shall not attempt to obtain employment or advancement or professional engagements by untruthfully criticizing other engineers, or by other improper methods.

7. Engineers shall not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice, or employment of other engineers. Engineers who believe others are guilty of unethical or illegal practice shall resent such information to the proper authority for action.
8. Engineers shall accept personal responsibility for their professional activities, provided, however, the engineers may seek indemnification for services arising out of their practice for other than gross negligence, where the engineer's interests cannot otherwise be protected.
9. Engineers shall give credit for engineering work to those to whom credit is due, and will recognize the proprietary interests of others.

The Institute of Electrical & Electronics Engineers

We the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:

1. To accept responsibility in making engineering decisions consistent with the safety, health and welfare of the public, and to disclose prompt factors that might endanger the public or the environment.
2. To avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist.
3. To be honest and realistic in stating claims or estimates based on available data.
4. To reject bribery in all its forms.
5. To improve the understanding of technology, its appropriate application, and potential consequences.
6. To maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations.
7. To seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others.
8. To treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin.
9. To avoid injuring others, their property, reputation, or employment by false or malicious action.
10. To assist colleagues and co-workers in their professional development and to support them in following code of ethics.

Institution of Engineers (India)

Introduction

Engineers serve all members of the community in enhancing their welfare, health, and safety by a creative process utilizing the engineers' knowledge, expertise and experience. The code of ethics is based on broad principles of truth, honesty, justice, trustworthiness, respect and safeguard of human life and welfare, competence and accountability, which constitutes the moral values every corporate member of the institution must recognize, uphold and abide by.

1.0 Preamble

The corporate members of the IEI are committed to promote and practice the profession of engineering for the common good of the community bearing in mind the following concerns:

1. The ethical standard
2. Social justice, social order, and human rights
3. Protection of the environment
4. Sustainable development
5. Public safety and tranquility

2.0 The Tenets of the Code of Ethics

A corporate member

1. Shall utilize his/her knowledge and expertise for the welfare, health, and safety of the community without any discrimination for sectional or private interests.
2. Shall maintain the honour, integrity and dignity in all his professional actions to be worthy of the trust of the community and the profession.
3. Shall act only in the domains of his competence and with diligence, care, sincerity and honesty.
4. Shall apply his knowledge and expertise in the interest of his employer or the clients for whom he shall work without compromising with other obligations to these tenets.
5. Shall not falsify or misrepresent his own or his associates qualification, experience etc.

6. Wherever necessary and relevant, shall take all reasonable steps to inform, himself, his employer or clients, of the environmental, economic, social and other possible consequences, which may arise out of his actions.
7. Shall maintain utmost honesty and fairness in making a statement or giving witness and shall do so on the basis of adequate knowledge.
8. Shall not directly or indirectly injure the professional reputation of another member.
9. Shall reject any kind of offer that may involve unfair practice or may cause avoidable damage to the eco-system.
10. Shall be concerned about and shall act in the best of his abilities for maintenance of sustainability of the process of development.
11. Shall not act in any manner which may injure the reputation of the institution or which may cause any damage to the institution financially or otherwise.

3.0 General Guidance

The tenets of the code of ethics are based on the recognition that-

1. A common tie exists among the humanity and that the Institution of Engineers (India) derives its value from the people, so that the actions of its corporate members should indicate the member's highest regard for equality of opportunity, social justice and fairness
2. The corporate members of the institution hold a privileged position in the community so as to make it a necessity for their not using the position for personal and sectional interests.

4.0 And as Such, a Corporate Member

1. Should keep his employer or client fully informed on all matters in respect of his assignment which are likely to lead to a conflict of interest or when, in his judgment, a project will not be viable on the basis of commercial, technical, environment or any other risks.
2. Should maintain confidentiality of any information with utmost sincerity unless expressly permitted to disclose such information or unless such permission, if withheld, any adversely affects the welfare, health and safety of the community.
3. Should neither solicit nor accept financial or other considerations from anyone related to a project or assignment of which he is in the charge.
4. Should neither pay nor offer direct or indirect inducements to secure work.
5. Should compete on the basis of merit alone.
6. Should refrain from inducing a client to breach a contract entered into with another duly-appointed engineer.
7. Should, if asked by the employer or a client, to review the work of another person or organization, discuss the review with the other person or organization to arrive at a balanced opinion.
8. Should make statements or give evidence before a tribunal or a court of law in an objective and accurate manner and express any opinion on the basis of adequate knowledge and competence.
9. Should reveal the existence of any interest-pecuniary or otherwise—which may affect the judgment while giving an evidence or making a statement.

Indian Institute of Material Management

1. To consider first the total interest of one's organization in all transactions without impairing the dignity and responsibility to one's office.
2. To buy without prejudice seeking to obtain the maximum ultimate value for each rupee of expenditure.
3. To subscribe and work for honesty and truth in buying and selling.
4. To denounce all forms and manifestations of commercial bribery and to eschew anti-social practices.
5. To respect one's obligations and those of one's organization consistent with good business practice.