

K D K College of Engineering, Nagpur

Department of Civil Engineering

V Semester B E Civil Engineering

Professional Practice, Law and Ethics

Unit 1: Human Values

Scope

Engineering is defined as ‘the creative application of scientific principles to design or develop structures, machines, apparatus, processes, or works utilizing them singly or in combination; or to construct or operate the same with full cognizance of their design; or to forecast their behavior under specific operating conditions; all as respects an intended function, economics of operation or safety to life and property’. Engineering therefore is about transforming science into useful products for human comfort. Engineering is something that engineers do, and what they do has profound effects on others.

Ethics in engineering then is the ability as well as responsibility of an engineer to judge his decisions from the context of the general wellbeing of the society. It is the study of moral issues that confront engineers and engineering organizations when some crucial decisions are taken. Engineering research and practice requires that the task being performed considers all the pros and cons of a certain action and its implementation.

The study of engineering ethics within an engineering program helps students prepare for their professional lives. A specific advantage for engineering students who learn about ethics is that they develop clarity in their understanding and thought about ethical issues and the practice in which they arise. The study of ethics helps students to develop widely applicable skills in communication, reasoning and reflection. These skills enhance students' abilities and help them engage with other aspects of the engineering program such as group work and work placements.

OBJECTIVES: WHY ETHICS IN ENGINEERING?

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

Subject Teacher: Mahendra Umare

Moral reasonableness i.e., willing and able to be morally responsible.

Respect for persons, which means showing concern for the well-being of others, besides oneself.

Tolerance of diversity i.e., respect for ethnic and religious differences, and acceptance of reasonable differences in moral perspectives.

Moral hope i.e., believe in using rational dialogue for resolving moral conflicts.

Integrity, which means moral integrity, and integrating one's professional life and personal convictions.

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.

VALUES

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.

Types of Values²

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

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.

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).

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

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 ETHICS

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:

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.

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.

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.

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.

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 'life-long 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.

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.

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.

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.

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.

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 affirm s 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

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.

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.

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

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

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

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

Pure thoughts in one's soul (loving others, blessing others, friendly, and

not

criticizing or hurting others by thought, word or deed).

Creativity in one's head (useful and constructive).

Beauty in one's heart (love, service, happiness, and peace).

Good health/body (physical strength for service).

Help the needy with head, heart, and hands (charity). Service to the poor is considered holier than the service to God.

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

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

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 can not 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

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

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).

Unit – 2: Engineering Ethics

OVERVIEW

Engineering Ethics is the activity and discipline aimed at

- (a) understanding the moral values that ought to guide engineering profession or practice,
- (b) resolving moral issues in engineering, and
- (c) justifying the moral judgments in engineering. It deals with set of moral problems and issues connected with engineering.

Engineering ethics is defined by the codes and standards of conduct endorsed by engineering (professional) societies with respect to the particular set of beliefs, attitudes and habits displayed by the individual or group.

Another important goal of engineering ethics is the discovery of the set of justified moral principles of obligation, rights and ideals that ought to be endorsed by the engineers and apply them to concrete situations. Engineering is the largest profession and the decisions and actions of engineers affect all of us in almost all areas of our lives, namely public safety, health, and welfare.

There are conventionally two approaches in the study of ethics:

1. Micro-ethics which deals with decisions and problems of individuals, professionals, and companies.
2. Macro-ethics which deals with the societal problems on a regional/national level. For example, global issues, collective responsibilities of groups such as professional societies and consumer groups.

SENSES OF ENGINEERING ETHICS

There are two different senses (meanings) of engineering ethics, namely the Normative and the Descriptive senses. The normative sense include:

- (a) Knowing moral values, finding accurate solutions to moral problems and justifying moral judgments in engineering practices,
- (b) Study of decisions, policies, and values that are morally desirable in the engineering practice and research, and
- (c) Using codes of ethics and standards and applying them in their transactions by engineers. The descriptive sense refers to what specific individual or group of engineers believe and act, without justifying their beliefs or actions.

VARIETY OF MORAL ISSUES

It would be relevant to know why and how do moral issues (problems) arise in a profession or why do people behave unethically? The reasons for people including the employer and employees, behaving unethically may be classified into three categories:

1. Resource Crunch

Due to pressure, through time limits, availability of money or budgetary constraints, and technology decay or obsolescence. Pressure from the government to complete the project in time (e.g., before the elections), reduction in the budget because of sudden war or natural calamity (e.g., Tsunami) and obsolescence due technology innovation by the competitor lead to manipulation and unsafe and unethical execution of projects.

Involving individuals in the development of goals and values and developing policies that allow for individual diversity, dissent, and input to decision-making will prevent unethical results.

2. Opportunity

- (a) Double standards or behavior of the employers towards the employees and the public. The unethical behaviors of World Com (in USA), Enron (in USA as well as India) executives in 2002 resulted in bankruptcy for those companies,
- (b) Management projecting their own interests more than that of their employees. Some organizations over-emphasize short-term gains and results at the expense of themselves and others,
- (c) Emphasis on results and gains at the expense of the employees, and
- (d) Management by objectives, without focus on empowerment and improvement of the infrastructure.

This is best encountered by developing policies that allow 'conscience keepers' and whistle blowers and appointing ombudsman, who can work confidentially with people to solve the unethical problems internally.

3. Attitude

Poor attitude of the employees set in due to

- (a) Low morale of the employees because of dissatisfaction and downsizing,

- (b) Absence of grievance redressal mechanism,
- (c) Lack of promotion or career development policies or denied promotions,
- (d) Lack of transparency,
- (e) Absence of recognition and reward system, and
- (f) Poor working environments.

Giving ethics training for all, recognizing ethical conduct in work place, including ethics in performance appraisal, and encouraging open discussion on ethical issues, are some of the directions to promote positive attitudes among the employees⁹.

To get firm and positive effect, ethical standards must be set and adopted by the senior management, with input from all personnel.

TYPES OF INQUIRIES

The three types of inquiries, in solving ethical problems are: normative inquiry, conceptual inquiry, and factual or descriptive inquiry.

The three types of inquiries are discussed below to illustrate the differences and preference.

1. Normative Inquiry

It seeks to identify and justify the morally-desirable norms or standards that should guide individuals and groups. It also has the theoretical goal of justifying particular moral judgments. Normative questions are about what ought to be and what is good, based on moral values. For example,

1. How far does the obligation of engineers to protect public safety extend in any given situation?
2. When, if ever, should engineers be expected to blow whistle on dangerous practices of their employers?
3. Whose values ought to be primary in making judgment about acceptable risks in design for a public transport system or a nuclear plant? Is it of management, senior engineers, government, voters or all of them?
4. When and why is the government justified in interfering with the organisations?
5. What are the reasons on which the engineers show their obligations to their employees or clients or the public?

2. Conceptual Inquiry

It is directed to clarify the meaning of concepts or ideas or principles that are expressed by words or by questions and statements. For example,

- (a) What is meant by safety?
- (b) How is it related to risk?
- (c) What is a bribe?
- (d) What is a profession?

When moral concepts are discussed, normative and conceptual issues are closely interconnected.

3. Factual or Descriptive Inquiry

It is aimed to obtain facts needed for understanding and resolving value issues. Researchers conduct factual inquiries using mathematical or statistical techniques. The inquiry provide important information on business realities, engineering practice, and the effectiveness of professional societies in fostering moral conduct, the procedures used in risk assessment, and psychological profiles of engineers. The facts provide not only the reasons for moral problems but also enable us to develop alterative ways of resolving moral problems. For example,

1. How were the benefits assessed?
2. What are procedures followed in risk assessment?
3. What are short-term and long-term effects of drinking water being polluted?
and
4. Who conducted the tests on materials?

MORAL DILEMMA

Definition

Dilemmas are situations in which moral reasons come into conflict, or in which the application of moral values are problems, and one is not clear of the immediate choice or solution of the problems. Moral reasons could be rights, duties, goods or obligations. These situations do not mean that things had gone wrong, but they only indicate the presence of moral complexity. This makes the decision making complex. For example, a person promised to meet a friend and dine, but he has to help his uncle who is involved in an accident — one has to fix the priority.

There are some difficulties in arriving at the solution to the problems, in dilemma. The three complex situations leading to moral dilemmas are:

1. The problem of *vagueness*: One is unable to distinguish between good and bad (right or wrong) principle. Good means an action that is obligatory. For example, code of ethics specifies that one should obey the laws and follow standards. Refuse bribe or accept the gift, and maintain confidentiality
2. The problem of *conflicting reasons*: One is unable to choose between two good moral solutions. One has to fix priority, through knowledge or value system.
3. The problem of *disagreement*: There may be two or more solutions and none of them mandatory. These solutions may be better or worse in some respects but not in all aspects. One has to interpret, apply different morally reasons, and analyze and rank the decisions. Select the best suitable, under the existing and the most probable conditions.

Steps to Solve Dilemma

The logical steps in confronting moral dilemma are:

1. Identification of the moral factors and reasons. The clarity to identify the relevant moral values from among duties, rights, goods and obligations is obtained (conceptual inquiry). The most useful resource in identifying dilemmas in engineering is the professional codes of ethics, as interpreted by the professional experience. Another resource is talking with colleagues who can focus or narrow down the choice of values.

2. Collection of all information, data, and facts (factual inquiry) relevant to the situation.
3. Rank the moral options i.e., priority in application through value system, and also as obligatory, all right, acceptable, not acceptable, damaging, and most damaging etc. For example, in fulfilling responsibility, the codes give prime importance to public safety and protection of the environment, as compared to the individuals or the employers (conceptual inquiry).
4. Generate alternate courses of action to resolve the dilemma. Write down the main options and sub-options as a matrix or decision tree to ensure that all options are included.
5. Discuss with colleagues and obtain their perspectives, priorities, and suggestions on various alternatives.
6. Decide upon a final course of action, based on priority fixed or assumed. If there is no ideal solution, we arrive at a partially satisfactory or 'satisficing' solution.

MORAL AUTONOMY

Moral autonomy is defined as, decisions and actions exercised on the basis of moral concern for other people and recognition of good moral reasons. Alternatively, moral autonomy means 'self determinant or independent'. The autonomous people hold moral beliefs and attitudes based on their critical reflection rather than on passive adoption of the conventions of the society or profession. Moral autonomy may also be defined as a skill and habit of thinking rationally about the ethical issues, on the basis of moral concern.

Viewing engineering as social experimentation will promote autonomous participation and retain one's professional identity. Periodical performance appraisals, tight-time schedules and fear of foreign competition threatens this autonomy. The attitude of the management should allow latitude in the judgments of their engineers on moral issues. If management views *profitability* is more important than *consistent quality and retention of the customers* that discourage the moral autonomy, engineers are compelled to seek the support from their professional societies and outside organizations for moral support. It appears that the blue-collar workers with the support of the union can adopt better autonomy than the employed professionals. Only recently the legal support has been obtained by the professional societies in exhibiting moral autonomy by professionals in this country as well as in the West.

The engineering skills related to moral autonomy are listed as follows:

1. Proficiency in recognizing moral problems in engineering and ability to distinguish as well as relate them to problems in law, economics, and religion,
2. Skill in comprehending, clarifying, and critically-assessing arguments on different aspects of moral issues,
3. Ability to form consistent and comprehensive view points based on facts,
4. Awareness of alternate responses to the issues and creative solutions for practical difficulties,
5. Sensitivity to genuine difficulties and subtleties, including willingness to undergo and tolerate some uncertainty while making decisions,
6. Using rational dialogue in resolving moral conflicts and developing tolerance of different perspectives among morally reasonable people, and
7. Maintaining moral integrity.

Autonomy which is the independence in making decisions and actions, is different from authority. Authority provides freedom for action, specified within limits, depending on the situation. Moral autonomy and respect for authority can coexist. They are not against each other. If the authority of the engineer and the moral autonomy of the operator are in conflict, a consensus is obtained by the two, upon discussion and mutual understanding their limits.

MORAL DEVELOPMENT (THEORIES)

1. Kohlberg Theory

Moral development in human being occurs overage and experience. Kohlberg suggested there are three levels of moral development, namely pre-conventional, conventional, and post-conventional, based on the type of reasoning and motivation of the individuals in response to moral questions.

In the pre-conventional level, right conduct for an individual is regarded as whatever directly benefits oneself. At this level, individuals are motivated by obedience or the desire to avoid punishment or to satisfy their own needs or by the influence by power on them. All young children exhibit this tendency. At the conventional level, people respect the law and authority. Rules and norms of one's family or group or society is accepted, as the standard of morality. Individuals in this level want to please or satisfy, and get approval by others and to meet the expectations of the society, rather than their self interest (e.g., good boy, good girl). Loyalty is regarded as most important. Many adults do not go beyond this level.

At the post-conventional level, people are called *autonomous*. They think originally and want to live by universally good principles and welfare of others. They have no self-interest. They live by principled conscience. They follow the golden rule, 'Do unto others as you would have them do unto you'. They maintain moral integrity, self-respect and respect for others.

Kohlberg believed that individuals could only progress through these stages, one stage at a time.

He believed that most of the moral development occurs through social interactions.

2. Gilligan's Theory

Carol Gilligan found that Kohlberg's theory had a strong male bias. According to Gilligan's studies, men had a tendency to solve problems by applying abstract moral principles. Men were found to resolve moral dilemma by choosing the most important moral rule, overriding other rules. In contrast, women gave importance to preserve personal relationships with all the people involved. The context oriented emphasis on maintaining personal relationships was called the *ethics of care*, in contrast with the *ethics of rules and rights* adopted by men.

Gilligan revised the three levels of moral development of Kohlberg, as stages of growth towards ethics of caring. The pre-conventional level, which is same as that of Kohlberg's first one, right conduct, is viewed in a selfish manner solely as what is good for oneself. The second level called *conventional level*, the importance is on not hurting others, and willing to sacrifice one's own interest and help others. This is the characteristic feature of women. At the post-conventional level, a reasoned balance is found between caring about others and pursuing the self-interest. The balance one's own need and the needs of others, is aimed while maintaining relationship based on mutual caring. This is achieved by context-oriented reasoning, rather than by hierarchy of rules.

The theories of moral development by Kohlberg and Gilligan differ in the following respects.

<i>Kohlberg's Theory</i>	<i>Carol Gilligan's Theory</i>
<i>A. Basic Aspects</i>	
<ol style="list-style-type: none"> 1. Is based on the study on men. 2. Men give importance to moral rule. 3. Ethics of rules and rights. 	<ol style="list-style-type: none"> 1. Is based on the study on men and women 2. Women always want to keep up the personal relationships with all the persons involved in the situations. 3. Women give attention to circumstances leading to critical situations rather than rules: (context-oriented and ethics of care)
<i>B Characteristic Features</i>	
<ol style="list-style-type: none"> 1. Justice 2. Factual 3. Right or wrong 4. Logic only 5. Logic and rule-based 6. Less of caring 7. Matter of fact (practical) 8. Present focus 9. Strict rules 10. Independence 11. Rigid 12. Taking a commanding role 13. Transactional approach 	<ol style="list-style-type: none"> 1. Reason 2. Emotional 3. Impact on relationships 4. Compassion too 5. Caring and concern 6. More of caring 7. Abstract 8. Future focus 9. Making exceptions 10. Dependence 11. Human-oriented 12. Shying away from decision-making 13. Transformational approach

The difference in these two theories is explained through the well-known example, *Heinz's dilemma*¹. Heinz being poor and a debtor could not buy the costly medicine for his sick wife, at ten times the normal cost. Initially he begged the Pharmacist to sell at half the price or allow him to pay for it later. Pharmacist refused to oblige him either way. Finally he forcibly entered the Pharmacy and stole the drug.

According to Kohlberg study, men observed that the theft was morally 'wrong' at the conventional level, because the property right was violated. But men at the post-conventional level, concluded that the theft was 'right', as the life of the human being was in danger. But women observed that Heinz was wrong. They observed that instead of stealing he could have tried other solutions (threatening or payment in installments?) to convince the Pharmacist. Gilligan however attributed the decision by women as context-oriented and not on the basis of rules ranked in the order of priority.

Unit III

Engineering as Experimentation

Before manufacturing a product or providing a project, we make several assumptions and trials, design and redesign and test several times till the product is observed to be functioning satisfactorily. We try different materials and experiments. From the test data obtained we make detailed design and retests. Thus, design as well as engineering is iterative process as illustrated in

Engineers as responsible Experimenters

Although the engineers facilitate experiments, they are not alone in the field. Their responsibility is shared with the organizations, people, government, and others. No doubt the engineers share a greater responsibility while monitoring the projects, identifying the risks, and informing the clients and the public with facts. Based on this, they can take decisions to participate or protest or promote. The engineer, as an experimenter, owe several responsibilities to the society, namely,

1. A conscientious commitment to live by moral values.
2. A comprehensive perspective on relevant information. It includes constant awareness of the progress of the experiment and readiness to monitor the side effects, if any.
3. Unrestricted free-personal involvement in all steps of the project/product development (autonomy).
4. Be accountable for the results of the project (accountability).

Codes of Ethics

The 'codes of ethics' exhibit, rights, duties, and obligations of the members of a profession and a professional society. The codes exhibit the following essential roles:

1. Inspiration and guidance. The codes express the collective commitment of the profession to ethical conduct and public good and thus inspire the individuals. They identify primary responsibilities and provide statements and guidelines on interpretations for the professionals and the professional societies.

2. Support to engineers. The codes give positive support to professionals for taking stands on moral issues. Further they serve as potential legal support to discharge professional obligations.

3. Deterrence (discourage to act immorally) and discipline (regulate to act morally). The codes serve as the basis for investigating unethical actions. The professional societies sometimes revoke membership or suspend/expel the members, when proved to have acted unethical. This sanction along with loss of respect from the colleagues and the society are bound to act as deterrent.

4. Education and mutual understanding. Codes are used to prompt discussion and reflection on moral issues. They develop a shared understanding by the professionals, public, and the government on the moral responsibilities of the engineers. The Board of Review of the professional societies encourages moral discussion for educational purposes.

5. Create good public image. The codes present positive image of the committed profession to the public, help the engineers to serve the public effectively. They promote more of self regulation and lessen the government regulations. This is bound to raise the reputation of the profession and the organization, in establishing the trust of the public.

6. Protect the status quo. They create minimum level of ethical conduct and promotes agreement within the profession. Primary obligation namely the safety, health, and welfare of the public, declared by the codes serves and protects the public.

7. Promotes business interests. The codes offer inspiration to the entrepreneurs, establish shared standards, healthy competition, and maximize profit to investors, employees, and consumers.

Limitations: The codes are not remedy for all evils. They have many limitations, namely:

1. General and vague wordings. Many statements are general in nature and hence unable to solve all problems.
2. Not applicable to all situations. Codes are not sacred, and need not be accepted without criticism. Tolerance for criticisms of the codes themselves should be allowed.
3. Often have internal conflicts. Many times, the priorities are clearly spelt out, e.g., codes forbid public

remarks critical of colleagues (engineers), but they actually discovered a major bribery, which might have caused a huge loss to the exchequer.

4. They can not be treated as final moral authority for professional conduct. Codes have flaws by commission and omission. There are still some grey areas undefined by codes. They can not be equated to laws. After all, even laws have loopholes and they invoke creativity in the legal practitioners.

5. Only a few enroll as members in professional society and non-members can not be compelled.

6. Even as members of the professional society, many are unaware of the codes

7. Different societies have different codes. The codes can not be uniform or same! Unifying the codes may not necessarily solve the problems prevailing various professions, but attempts are still made towards this unified codes.

8. Codes are said to be coercive. They are sometimes claimed to be threatening and forceful.

A Balanced Outlook on Law.

The 'balanced outlook on law' in engineering practice stresses the necessity of laws and regulations and also their limitations in directing and controlling the engineering practice. Laws are necessary because, people are not fully responsible by themselves and because of the competitive nature of the free enterprise, which does not encourage moral initiatives. Laws are needed to provide a minimum level of compliance.

The following codes are typical examples of how they were enforced in the past:

Proper Role of Laws

Good laws when enforced effectively produce benefits. They establish minimal standards of professional conduct and provide a motivation to people. Further they serve as moral support and defense for the people who are willing to act ethically. Thus, it is concluded that:

1. The rules which govern engineering practice should be construed as of responsible experimentation rather than rules of a game. This makes the engineer responsible for the safe conduct of the experiment.

2. Precise rules and sanctions are suitable in case of ethical misconduct that involves the violation of established engineering procedures, which are aimed at the safety and the welfare of the public.

3. In situations where the experimentation is large and time consuming, the rules must not try to cover all possible outcomes, and they should not compel the engineers to follow rigid courses of action.

4. The regulation should be broad, but make engineers accountable for their decisions, and 5. Through their professional societies, the engineers can facilitate framing the rules, amend wherever necessary, and enforce them, but without giving-in for conflicts of interest.

Industrial Disputes Act, 1947

Long Title: An Act to make provision for the investigation and settlement of industrial disputes, and for certain other purposes.

Assented 11th March 1947

Commenced 1st April 1947

The Industrial Disputes Act, 1947 is the primary legislation governing dispute resolution in India. It was

enacted to provide for the investigation and settlement of industrial disputes, to prevent illegal strikes and lockouts, to provide relief to workmen during lay-off or after retrenchment or wrongful dismissal.

Objectives of the Industrial Disputes Act, 1947

The act was drafted to make provision for the investigation and settlement of industrial disputes and to secure industrial peace and harmony by providing mechanism and procedure for the investigation and settlement of industrial disputes by conciliation, arbitration and adjudication which is provided under the statute.

This Act was passed with a key objective of "Maintenance of Peaceful work culture in the Industry in India" which are mentioned under the Statement of Objects & Reasons of the statute.

The Act also lays down:

The provision for payment of compensation to the workman on account of closure or lay off or retrenchment.

The procedure for prior permission of appropriate Government for laying off or retrenching the workers or closing down industrial establishments

The actions to be taken against unfair labour practices on part of an employer or a trade union or workers.

PURPOSE

The act was drafted to make provision for the investigation and settlement of industrial disputes and to secure industrial peace and harmony by providing mechanism and procedure for the investigation and settlement of industrial disputes by conciliation, arbitration and adjudication which is provided under the statute.

Causes of Conflict In The Organization

Misunderstanding.

Personal Differences.

Information Deficiency.

Goal Differences.

Lack of Role Clarification.

Threat To Status.

Lack of Trust.

Scarce Resources.

Industrial Employment Act, 1946

Long Title: This act may be called the Industrial Employment (Standing Orders) Act, 1946.

This Act is to require employers in industrial establishments to formally define conditions of employment under them and submit draft standing orders to certifying Authority for its Certification.

The Industrial Employment (Standing orders) Act, was introduced for the employers in industrial establishments to ensure the employment conditions under the establishments. Standing Orders states the laws which govern the relationship between the employer and a workman in an industrial establishment with includes the elements such as classification of workers, working hours, attendance, suspension, termination etc. In this article, we look at the various aspects of the Industrial Employment (Standing Orders) Act in detail.

Objective of the Act

The objective of the Industrial Employment (Standing Orders) Act, are as follows:

To provide regular standing orders for workers, factories, and working relationship.

To ensure that the employee recognizes the terms and conditions of the employees and thus to minimize exploitation of the workers.

To promote industrial peace and harmony by supporting fair industrial practices.

THE EMPLOYEE'S COMPENSATION ACT,1923

This Act may be called the Workmen's Compensation Act, 1923.

It extends to the whole of India. It came into force on the first day of July, 1924.

The compensation act for workmen was formed after it came into notice that the laborers were becoming exposed to the danger by using more sophisticated and advanced machinery. According to the compensation act of 1884, the employer would take responsibility for the compensation of its workmen only when some major or fatal accidents occur on road. However, in 1885, the mining and factory inspectors realized that this Fatal Act, 1885, is not sufficient.

The Government gave it a hearing ear, when the Legislative Assembly members, representatives of employer, experts in medicine, workers, and insurance experts formed a committee that provided a report that led to the Workmen's Compensation Act, 1923.

When this act was passed, it put a stop and provided relief to the workers who would have gone through the processing of court that is generally expensive. It was an effort to seek compensation whenever they encounter some injury during employment.

Scope of Workmen's Compensation Act :

The workmen's compensation act, 1923, is applicable for those workers who are working with an industry that is mentioned in the act. Under this act, the protection of workmen from injuries and losses caused through an accident in course of and arising out of the employment subject to specific expectations as mentioned in the act.

The objective of the Workmen's Compensation Act :

The Workmen's Compensation Act, 1923 was majorly formed to provide compensation to the workmen at the time of an accident. The act mentions that it is the duty and responsibility of the employer to include the welfare of the workers when an injury is the result of the employment in the same way the employer has reserved the right of making profits. The main aim of this act is to ensure that the workmen have sustainable life even after encountering an employment-related injury.

The Liability of the Employer for Compensation :

To make the employer pay the workers compensation at the time of injury or death suffered by the employee or workman should be a consequence of some accident in course of or out of his/her employment depends on the following four conditions:

- ❖ The causal connection between the accident and the injury (which is personal injury is caused to a workman while he/she is on work).
- ❖ The probability is based on the reason that work has contributed because of personal injury.
- ❖ The accident and injury that is caused during the employment course.
- ❖ The applicant who proves that the accident or injury occurred during work and its results strain that has aggravated or contributed to the injury.

The Rules for Workmen's Compensation Have Changed in 2020

There is good news for the workers as the Central Government has changed the rules for the calculation of the compensation of the employees under the Workmen's Compensation Act, 1923. The notification for the same has sent on 3rd January 2020 in which the amount of the wages, which were considered previously for compensation's calculation was Rs.8, 000, are now increased to Rs.15, 000 as per the Ministry of Labour and Employment.

Since 2010, the Workmen's Compensation Act, 1923 was known as the Employee's Compensation Act. It offers compensation to the employees who suffer or die total or partial disablement because of an accident while on work. The compensation is paid by the employer and an employee who is eligible to get compensation from ESIC cannot claim compensation under the Employee's Compensation Act, 1923.

Conditions When Employer is Not Liable to Pay Compensation :

According to the workmen's compensation act, an employer has to pay the compensation to its employee when he/she encounters some personal injury due to an accident that arose during an employee's employment. An employer is not liable for paying the compensation if:

- ❖ An injury that doesn't result in partial or total disablement of the employee for more than three days.
- ❖ Any injury that does not result in permanent total disability or death because of an accident in the influence of drugs or drink.
- ❖ If an employee meets with an accident that is caused because of wilful disobedience of the rules by him/her and wilful safety guard removal.

Calculation of the Compensation:

The calculation of compensation as per the act is performed according to the provisions under Section four of the Workmen's Compensation Act:

- ❖ In Case of an Accident that Results in Permanent Total Disablement: In this case, an amount equal to 60% of injured employee's monthly wage into the relevant factor or Rs.1, 20, 000, whichever is more is given.
- ❖ When an Accident Results in Death: An amount that is equal to 50% of the monthly wage of the deceased employee into the relevant factor or an amount equal to Rs.1, 20, 000, whichever is more.
- ❖ Note: According to the new rule mentioned by the government, Rs.15, 000 is considered as wage for computation under the workmen's compensation act, 1923. The relevant factor here is provided in Section IV of this Act.

The Final Words:

The Workmen's Compensation Act, 1923 was made to offer compensation to the workers who have encountered injuries due to an accident during their employment. This act ensures that rights of the laborers are maintained even after they encounter some disability or death due to an accident during their work. Therefore, the employers are obligated to offer compensation to their workers who encountered injuries that have led to demise or disablement during employment.

Building & Other Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998)

Objectives

To regulate the employment & conditions of Service

To provide for Safety, Health & Welfare measures

To give the building and construction workers social security.

Applicability

Every establishment which employs or had employed ten or more workers directly or through a Contractor / Subcontractor

Responsibilities of Employer

It shall be the duty of every employer to comply with requirements of rules

Employer shall not permit an employee to do anything not in accordance with the generally accepted principles of standard safe operations connected with building and other construction work. Employer will not allow lifting appliances, lifting gear, lifting device, transport equipment, vehicles which does not comply with provision of rules. Employers shall maintain the latrines, urinals, washing facilities and canteen in a clean and hygienic conditions.



Lifting and carrying of excessive weight

No building worker lifts by hand or carries over head or over his back or shoulders any material, article, tool or appliances exceeding in weight the maximum limit set out in following table

Person	Maximum Weight Load
Adult - man	55 kg
Adult - woman	30 kg
Adolescent - male	30 kg
Adolescent - female	20 kg

(Note : At present No adolescent worker is permitted to work in construction sites)

unless aided by any other building worker or a mechanical device

12



Dust, gases, fumes etc.

An employer shall prevent concentration of dust, gases or fumes by providing suitable means to control their concentration within the permissible limit so that they may not cause injury or pose health hazard to building worker

13



Excessive noise, vibration etc.

An employer shall ensure that adequate measures are taken to protect building workers against the harmful effects of excessive noise or vibration

PERMISSIBLE EXPOSURE IN CASES OF CONTINUOUS NOISE	
Total time of exposure (continuous or a number of short term exposures) per day (in hours)	Sound level (in dBA)
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
3/4	107
1/2	110
1/4	115

Fire protection

An employer shall ensure that site is provided with fire extinguishing equipment sufficient to extinguish any probable fire.

Number of trained persons required to operate the fire extinguishing equipment

Fire extinguishers shall be properly maintained and inspected at regular intervals of not more than one year

Emergency Action Plan

Where more than 500 building workers are employed emergency action plan to handle the emergencies is prepared and submitted for the approval of the directorate general.

Corrosive substances

Corrosive substances, including alkalis and acids, shall be stored in such a manner that it does not endanger the workers. Suitable protective equipment shall be provided during handling or use of such substances. In case of spillage of such substance immediate remedial actions must be taken by the employers.

Eye protection

Suitable personal protective equipment for the protection of eyes shall be provided Building worker engaged in operations like welding, cutting, chipping, grinding.

Penalty for contravention of provisions regarding safety measures

Whoever contravenes the provisions of any rules shall be punishable with imprisonment for term which may extend to 3 months or 2 thousand rupees fine or both. Recurrence of the offence will be punishable with 6 months of imprisonment or two thousand rupees or both.

RERA Act 2017

Real Estate Regulatory Authority (RERA) Act was launched on the 1st of May 2017, and is aimed at protecting the interests of buyers in the real estate sector and to establish an arbitrating mechanism for speedy dispute redressal.

Salient Features of the Real Estate (Regulation and Development) Act, 2017

- Establish the Real Estate Regulatory Authority for regulation and promotion of the real estate sector
- Ensure sale of plot, apartment of building, as the case may be, or sale of real estate project, in an efficient and transparent manner
- Ensure protect the interest of consumers in the real estate sector
- Establish an adjudicating mechanism for speedy dispute redressal and also to establish the Appellate Tribunal to hear appeals from the decisions, directions or orders of the Real Estate Regulatory Authority (RERA)
- Regulates transactions between buyers and promoters of residential real estate projects
- Establishes state level regulatory authorities called Real Estate Regulatory Authorities (RERAs)
- Residential real estate projects, with some exceptions, need to be registered with RERAs
- Promoters cannot book or offer these projects for sale without registering them. Real estate agents dealing in these projects also need to register with RERAs
- Registration, the promoter must upload details of the project on the website of the RERA. These include the site and layout plan, and schedule for completion of the real estate project
- Amount collected from buyers for a project must be maintained in a separate bank account and must only be used for construction of that project. The state government can alter this amount
- Right to Legal Representation on behalf of Client by Company Secretaries or chartered accountants or cost accountants or legal practitioners

- Imposes stringent penalty on promoter, real estate agent and also prescribes imprisonment.

Important Definitions

"Advertisement

"Agreement for sale

"Allottee

"Apartment

"Building

"Carpet area

"Commencement certificate

"Common areas

Immovable property

Sanctioned plan, etc

These are some of the aspects which are define in this act.

NBC 2017

The National Building Code of India (NBC of India) is a comprehensive building code, formulated and published by the Bureau of Indian Standards (BIS). It provides guidelines for construction activities, maintenance and fire safety of buildings.

SCOPE

•This Part deals with the development control rules and general building requirements to ensure health and safety of the public.

LAND USE CLASSIFICATION AND USES PERMITTED

The land use classification may be as indicated below:

SNO.	USE ZONE (LEVEL 1)	USE ZONE (LEVEL 2)
1	Residential (R)	Primary Residential Zone (R-1) Mixed Residential Zone (R-2) Unplanned/Informal Residential Zone (R-3)
2	Commercial (C)	Retail Shopping Zone (C-1) General Business and Commercial District/ Centres (C-2) Wholesale, Go downs, Warehousing/Regulated Markets (C-3)
3	Manufacturing (M)	Service and Light Industry (M-1) Extensive and Heavy Industry (M-2) Special Industrial Zone Hazardous, Noxious and Chemical (M-3)

As per the National Building Code of India, residential buildings include any building that is equipped with sleeping accommodation for normal residential purposes, with or without cooking and dining facilities.

Residential buildings are classified into the following categories:

Lodging or rooming houses.

One or two-family private dwellings.

Dormitories.

Apartment houses or flats.

Hotels.

Unit No. 4

SAFETY AND RISK

Safety was defined as *the risk that is known and judged as acceptable*. But, risk is a potential that something unwanted and harmful may occur. It is the result of an unsafe situation, sometimes unanticipated, during its use.

Probability of safety = 1 – Probability of risk

Risk = Probability of occurrence × Consequence in magnitude
Different methods are available to determine the risk (testing for safety)

1. Testing on the functions of the safety-system components.
2. *Destructive testing*: In this approach, testing is done till the component fails. It is too expensive, but very realistic and useful.
3. *Prototype testing*: In this approach, the testing is done on a proportional scale model with all vital components fixed in the system. Dimensional analysis could be used to project the results at the actual conditions.
4. *Simulation testing*: With the help of computer, the simulations are done. The safe boundary may be obtained. The effects of some controlled input variables on the outcomes can be predicted in a better way.

RISK ANALYSIS

4.2.1 Analytical Methods

Several analytical methods are adopted in testing for safety of a product/project.

1. Scenario Analysis

This is the most common method of analysis. Starting from an event, different consequences are studied. This is more a qualitative method.

For example, a disaster recovery plan, for an organization is discussed. When the probability and size of loss (indicating possibility and financial significance, respectively) are both high, risk exists. On the other hand, risk is not associated with very low probability of occurrence, or with losses that under any other circumstances would be considered “affordable”. But there is a gray area between probability/loss combinations that are truly risky, and those that are not. This reflects the fact that the boundary between risky and non-risky events is fuzzy, not exact.

To assess the risk faced by the organization, the planner matches the probability and loss characteristics of various exposures to one’s intuition of risk. This exposure analysis can be most effectively carried out using ‘loss scenarios’. A scenario is a synopsis of events or conditions leading to an accident and subsequent loss. Scenarios may be specified informally, in the form of narrative, or formally using diagrams and flow charts.

Steps for Risk Assessment

1. What can go wrong that could lead to an outcome of hazard exposure? (identification and characterization of risk)
2. How likely is this to happen? (quantification of risk, likelihood, and magnitude)

3. If it happens, what are the consequences? Scenarios are constructed and the ways and means of facing the consequences are designed.

Consider three loss scenarios facing the company which is transporting various cargoes, some hazardous. The three scenarios involve the legal liability arising from use of company vehicles on public roads. The probability/loss combinations associated with these scenarios are 0.1, 1, and 10.4%. Scenario A represents an upset or overturn of a truck carrying dangerous cargoes in a populated area. It is further assumed that the spill leads to an explosion or release of toxic chemicals. Scenario B represents the company's liability for an accident involving bodily injury and property damage from relatively "ordinary" road hazards. No spill or disruption of cargoes is involved. Finally, Scenario C identifies a situation involving multiple simultaneous catastrophes to the company fleet.

Scenario A has a probability of occurrence of 0.001 and a loss potential of Rs. 50 million. It is deemed sufficiently "possible" and significant so as to be unequivocally classified as "risky". Scenario B, on the other hand, while more probable than A, involves losses that this firm considers "affordable". As such, it is rated not risky with confidence. Not so easy to classify is Scenario C. While the probability of multiple catastrophes is not strictly zero, it is rare (10^{-6} , or one chance in a million). So, while the loss potential is great, the chance of occurrence is "virtually impossible". Scenario C, nonetheless, resides in that gray area of risk that results in considerable anxiety over its classification.

The steps for Scenario building may alternatively be detailed as follows:

1. Identify the hazard of interest
2. State the question to be investigated
3. Develop a planned scenario
4. Develop a scenario tree
5. Collect evidence to evaluate the nodes of the scenario tree
6. Quantify the number of scenario tree, and
7. Link the information generated by scenario analysis with empirical evidence.

Using the Scenario

The uses of scenario-based risk analysis are many and varied. The explicit analysis of scenarios may suggest ways of reducing or eliminating exposures through risk or loss-control activities. Risk or loss control actions have the effect of reducing probability and amount of risk or loss or both. Often, scenarios are posited on the basis that risk potential is as low as reasonably achievable (ALARA). This type of analysis recognizes that even under the best of risk control programs, accidents will happen.

As the cornerstone of planning, scenario-based risk analysis allows identification and prioritization of disaster potential. Knowing what can happen, and the risk involved, allows the analyst to make effective plans for safety in the event of disaster. By concentrating on risky scenarios, the disaster planner can tailor actions to exposures. This ensures the best allocation of resources at the time of crisis.

2. Failure Mode and Effect Analysis

In this method, various parts or components of the system and their modes (patterns, propagation and nature) of failure are studied. The causes of failure or the interrelationships between the components

are not studied. FMEA is one of the qualitative tools, which support proactive quality strategies. Successful implementation of FMEA requires relevant knowledge and insight as well as engineering judgment. FMEA concept was introduced in 1960s by aerospace companies. Then the use of FMEA was extended to automobile industries and other types of industries, understanding the value of this approach. In the last decade, it has undergone metamorphosis where focus was on severity, occurrence and detection rating. Thus, FMEA is defined as a systematic tool to

- (a) identify possible failure modes in the products/process,
- (b) to understand failure mechanism (process that leads to failure),
- (c) risk analysis, and
- (d) plan for action on elimination or reduction of failure modes.

A. STEPS TO CONDUCT FMEA

FMEA is a cross-functional team management. Throughout the product development cycles, changes and updates will be introduced to the product and process. These changes have to be reviewed because they can introduce new risks or failure modes. It is thus necessary to review and update changes.

1. Product/process and its function must be understood first. This is the most fundamental concept to be adopted in this methodology. This understanding helps the engineer to identify product/process function that fall with the intended and unintended users.
2. Block diagram of product/process is created and developed. The diagram shows the major components or process steps as blocks, identifies their relations namely, input, function and output of the design. The diagram shows logical relationship of components and establishes a structure for FMEA. The block diagram should always be included in the FMEA form.
3. Header on FMEA form is completed. FMEA form includes part/process name, model date, revision date, and responsibility.
4. The items/functions are listed logically in the FMEA form, based on the block diagram.
5. Then failure modes are identified. A failure mode is defined wherein a component, subsystem, system, and process could potentially fail to meet the design intent.
6. A failure mode in one component can cause failure in another. Each failure should be listed in technical terms. Listing should be done component- or process-wise.
7. Then the effects of each risk/failure mode are described. This is done as perceived by both internal and external customers. The examples of risk/failure effect may include injury to the user, environment, equipment, and degraded performance. Then a numerical ranking is assigned to each risk or failure. It depends upon the severity of the effect. Commonly, in the scale, No.1 is used to represent no effect and 10 to indicate very severe failure, affecting system of operation and user. By this, the failures can be prioritized and real critical risks can be addressed first.
8. Then the causes of each failure mode have to be identified. A cause is defined as a design weakness that results in a failure. The potential causes for each failure mode are identified. The potential causes, for example, may be improper torque or contamination or excessive loading or external vibration.

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9. The probability factor indicating the frequency of occurrence is considered. A numerical weightage can be assigned to each cause depending upon the probability of occurrence. A standard scale is used, 1 indicating 'not likely' and 10 indicating 'inevitable'.
 10. Design or Process mechanism has to be identified, which can prevent the cause of failure or detect failure, before it reaches customer. Accordingly, the team has to identify tests, analysis, monitoring and other techniques to detect the risk or failure. Previously undetected or unidentified failures may appear when a new product/process are introduced. Therefore, FMEA should be updated and the required plans for the elimination of risks or failures have to be drawn.
 11. Assessment of detection rating is done by assigning a numerical weightage. Value 1 indicates design control will certainly detect the potential cause, 10 indicates design control will not detect the cause or mechanism. A normal scale of 1 – 10 is used.
 12. Risk Priority Number (RPN) is calculated and reviewed.

$$\text{RPN} = \text{Severity} \times \text{Probability} \times \text{Detection}$$

It is used to prioritise failure modes and viewed as a relative measure of the design risk

13. Recommended actions are determined to address potential risks or failures with high RPN.
14. Revalidate each action by reassessing severity, probability and detection and review the revised RPN. Check any further action is needed. FMEA has to be updated as and when the design or process is modified or changed.

B. STAGES OF FMEA

The analysis can be executed in four stages as given below.

Stage 1: Identifying possibilities and defining the scope. It includes function, possible failure mode, causes and effects of failure mode and detection/prevention of failure mode.

Stage 2: Measuring the volume of risk involved from the failure modes identified. It includes the probability of cause and occurrence, severity of effect and effectiveness of control to prevent cause, assessment of RPN.

Stage 3: Classification of severity of effects and the solution for the causes of high risk. Based on RPN, it prioritizes work, indicates detailed action, and assigning responsibility and target completion time to the team.

Stage 4: Revalidation of the above procedure, after corrective and preventive actions are implemented. Check whether target data and work is met. Review RPN and decide if any further action is needed.

C. FMEA DOCUMENT

The top portion of document is called *header* and mainly used for tracking. Except the first column of work sheet, all other details remain the same. The header includes following:

1. *Model no.:* It includes name and identification number of system, sub-system or component in order to avoid confusion between similar components.
2. *Prepared by:* The details like name, telephone number, address of the personnel should be included in the space for clarification, if any.

1. *Responsibility:* The team incharge of design or process should be included. It also includes the company or department of the person or group responsible for preparing the document. It is a common work sheet that can be used both for design FMEA and process FMEA.

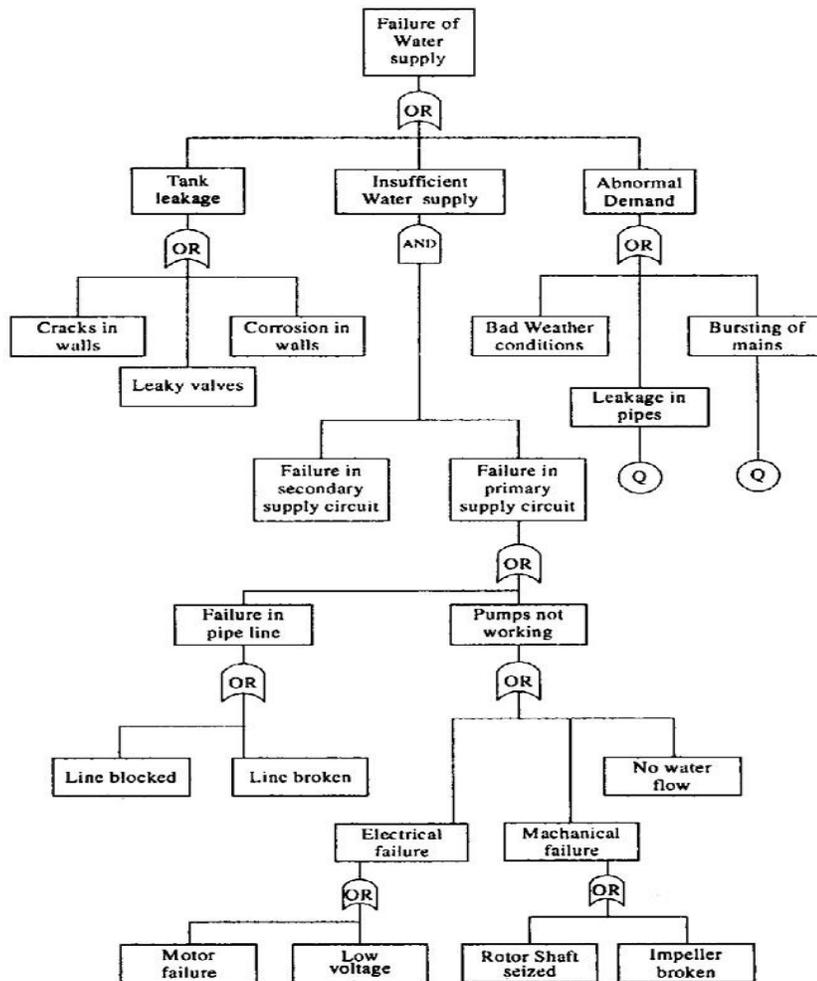
In design FMEA, following points are to be entered: name and number of item, listing the functions of the item (system or sub-system or component-wise), Environment in which system operates. In process FMEA, descriptions of processes, listing of processes and complete purpose of processes have to be entered.

2. *FMEA team*: The names of responsible individuals and departments that have authority to perform task are included.
3. *FMEA date*: The date of original FMEA compiled should be entered. In revision column latest revision date is entered.

3. Fault-tree Analysis

This is a qualitative method and was originated by Bell Telephones. It is technology-based deductive logic. The failure (undesirable event) is initially defined, and the events (causal relationships) leading to that failure are identified at different components level. This method can combine hardware failures and human failures

Example 1: Consider the failure of the steam flow in a thermal station. The water is pumped from a big reservoir nearby. The details are shown in Fig.



RISK-BENEFIT ANALYSIS

The major reasons for the analysis of the risk benefit are:

- 1 To know risks and benefits and weigh them each
- 2 To decide on designs, advisability of product/project
- 3 To suggest and modify the design so that the risks are eliminated or reduced

There are some limitations that exist in the risk-benefit analysis. The economic and ethical limitations are presented as follows:

1. Primarily the benefits may go to one group and risks may go to another group. Is it ethically correct?
2. Is an individual or government empowered to impose a risk on some one else on behalf of supposed benefit to some body else? Sometimes, people who are exposed to maximum risks may get only the minimum benefits. In such cases, there is even violation of rights.
3. The units for comparison are not the same, e.g., commissioning the express highways may add a few highway deaths versus faster and comfortable travel for several commuters. The benefits may be in terms of fuel, money and time saved, but lives of human being sacrificed. How do we then compare properly?
4. Both risks and benefits lie in the future. The quantitative estimation of the future benefits, using the discounted present value (which may fluctuate), may not be correct and sometime misleading.

HUMAN RIGHTS

Human rights are defined as moral entitlements that place obligations on other people to treat one with dignity and respect. Organisations and engineers are to be familiar with the minimum provisions under the human rights, so that the engineers and organizations for a firm base for understanding and productivity. Provisions under 'human rights' are as follows:

1. Right to pursue legitimate personal interest
2. Right to make a living
3. Right to privacy
4. Right to property
5. Right of non-discrimination
6. No sexual harassment

Under professional rights, the following provisions are protected:

1. *Right to form and express professional judgment*: It is also called the *right of professional conscience*. In pursuing professional responsibilities, this empowers one to form and exercise the professional judgment. Both technical and moral judgments are included. This right is bound by the responsibilities to employers and colleagues.
2. *Right to refuse to participate in unethical activities*: It is also called the *right of conscientious refusal*. It is the right to refuse to engage in unethical actions and to refuse to do so solely because one views that as unethical. The employer can not force or threaten the employee to do something that is considered by that employee as unethical or unacceptable. For example, unethical and illegal activities that can be refused are: falsifying data, forging documents, altering test results, lying, giving or taking bribe etc. There may be situations, when there is a disagreement or no shared agreement among reasonable people over whether an act is unethical. Medical practitioners have a right not to participate in abortions. Similarly, the engineers must have a right to refuse assignments that violate their personal conscience, such as when there exists a threat to human life or moral disagreement among reasonable people.

3. *Right to fair recognition and to receive remuneration for professional services:* Engineers have a right to professional recognition for their work and achievements. This includes fair monetary and non-monetary forms of recognition. It is related to morality as well as self-interest. They motivate them to concentrate their energy on jobs and to update their knowledge and skills through continuing education. This will prevent the engineers from diversion such as moonlighting or bother on money matters. Many times, the engineers who have labored to get patents on the organizations are not adequately remunerated. Based on the resources of the organization and the bargaining power of the engineers, the reasonable salary or remuneration for patent discovery can be worked out.

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4. *Right to warn the public about dangers:* It should be done without damaging the reputation of the employer. The views can be expressed through the professional society to get a backing.
 5. *Right to talk publicly about the job:* This should be done within the limits of decency, confidentiality, and loyalty.
 6. *Right to engage in the activities of professional societies:* Attending membership campaign and seminars are typical activities to promote the professional society.

4.14 EMPLOYEE RIGHTS

Employee rights are the moral and legal rights that are obtained by the status of being an employee. The provisions made to the employees under this category are:

1. Professional rights (discussed already)
2. Basic human rights (discussed already)
3. Institutional rights or contractual employee rights. This include the rights to the institution due to the organisational policies or contracts, right to receive specified salary and annual increments, and profit sharing. The quantum of such benefits, scale of pay etc. are fixed and reviewed periodically by the employers and employees.
4. Non-contractual employee rights: These are the rights provided in common, besides the contractual ones. They include:

1. Right to Privacy

It is the right to control the access to and use of information about oneself. This right is limited in certain situations by employers' rights. But who among the employers can access the personal information is again restricted. Only duly authorized persons can get the personal information.

For example,

- (a) The Pay Bill Section can access the information on insurance premium paid, medical reimbursement etc. but one's immediate boss need not get this data.
- (b) Persons who have applied for the jobs of cashier are required to report if there are any criminal or civil cases pending against them. Those persons may mishandle the money. Hence, that information may be sought from them.
- (c) A supervisor might suspect a worker and conduct a search in his cupboard when the worker is absent. But the supervisor is to have another officer as witness, in such cases. Otherwise the supervisor may plant-in some evidences against the worker.
- (d) Upon frequent pilferage reported from the stores, the company may install surveillance cameras or bugging devices to monitor personal conversations, without notifying the employees. Prior notice to the employees on the intentions of such a step along with the proposed date of implementation should have been communicated to all concerned.

2. Right to Choose Outside Activities

This is also interpreted as a right to personal privacy as that means a right to have a private life outside the job. There are some situations when this right can be curbed. For example,

1. When those activities lead to violation or found detrimental to the duties of their job.
2. When the activities of the employees form a conflict or interest (e.g., when moonlighting).
3. When the interest of the employer is getting damaged (if the employee transfers some vital information on plans or strategies to the competitor).

2. Right to Due Process from Employer

It is the right to fair process or procedures in firing, demotion and in taking any disciplinary actions against the employees. Written explanation should be initially obtained from the charged employee and the orders are given in writing, with clearly-stated reasons. Simple appeal procedures should be framed and made available to all those affected. Fairness here is specified in terms of the process rather than the outcomes.

3. Right to Equal Opportunity—Non-discrimination

Discrimination because of caste, sex, religion, creed, and language are regressive actions. Discrimination which means a morally unjust treatment of people in the workplace is damaging to the human dignity. For example,

- (a) A senior manager post is vacant. There is competent and proven candidate from outside the state. A local engineer with lesser competence is promoted.
- (b) Prize amounts for the winners in the world sport events are not the same for men and women.

4. Right to Equal Opportunity—Sexual Harassment in the Workplace

The sexual harassment is a display of arrogance and misuse of power through sexual means. It is against the moral autonomy i.e., freedom to decide on one's own body. It is also an assault on one's human dignity and trust.

Sexual harassment may be defined as the unwanted compulsion or attack on sexual requirements (gratification) in the context of unequal power. It includes physical as well as psychological attack or coercion and indecent gestures by men shown on women or by women on men. Two such forms of harassment are found to exist. In one type called 'exchange of favors', senior officers demand sexual favor as a condition for giving a job, or granting a promotion or increment. It may be either in the form of a physical or verbal threat or sexual offer. In another type called 'hostile work environment', it is the sexually-oriented work environment that threatens the employee's right to equal opportunity. Undesirable sexual proposals, advances, lewd remarks, mailing obscene photographs are some of the typical examples of this type of harassment.

A rights ethicist interprets this as a serious violation of human right to pursue one's job free from extraneous force, compulsion, punishment or threat or insult. A duty ethicist would call it as a blatant violation of duty to treat human being with dignity and individual freedom, and not to treat as inanimate object for immoral gratifications. The utilitarian would expose the effect on the happiness and the welfare of the victims, especially of women.

5. Right to Equal Opportunity—Affirmative Action or Preferential Treatment

It means giving a preference or advantage to a person of a group that was denied equal treatment in the past. Such treatments are given especially to women and minorities all over the world. It is also called 'reverse preferential treatment', because it reverses the historical preferences.

COLLECTIVE BARGAINING

It is the bargain by the trade union for improving the economic interests of the worker members. The process includes negotiation, threatening verbally, and declaration of 'strike'. It is impossible to endorse fully the collective bargaining of unions or to condemn. There exist always conflicting views between the professionalism and unionism.

UNIT 5

Global issues:

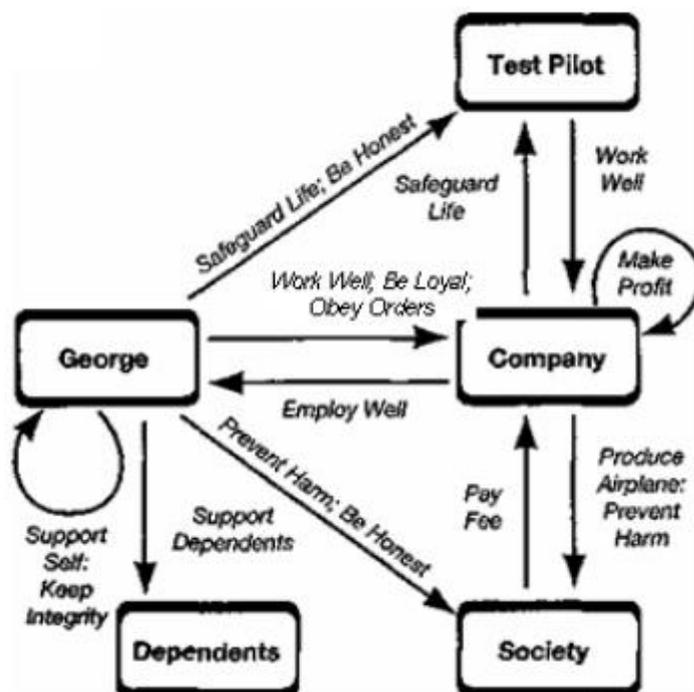
DEF: global issue is a matter of public concern worldwide. This list of global issues presents problems or phenomena affecting people around the world, including but not limited to widespread social issues, economic issues, and environmental issues.

1. Biodiversity loss:- This includes the worldwide extinction of different species, as well as the local reduction or loss of species in a certain habitat, resulting in a loss of biological diversity. The latter phenomenon can be temporary or permanent, depending on whether the environmental degradation that leads to the loss is reversible through ecological restoration/ecological resilience or effectively permanent (e.g. through land loss). The current global extinction (frequently called the sixth mass extinction or Anthropocene extinction), has resulted in a biodiversity crisis being driven by human activities which push beyond the planetary boundaries and so far has proven irreversible
2. climate change:- It describes global warming the ongoing increase in global average temperature and its impacts on Earth's climate system. Climate change in a broader sense also includes previous long-term changes to Earth's climate. The current rise in global average temperature is more rapid than previous changes, and is primarily caused by humans burning fossil fuels. Fossil fuel use, deforestation, and some agricultural and industrial practices increase greenhouse gases like carbon dioxide and methane. Greenhouse gases absorb some of the heat that the Earth radiates after it warms from sunlight. Larger amounts of these gases trap more heat in Earth's lower atmosphere, causing global warming.
3. Existential risk from artificial general intelligence:- This is the hypothesis that substantial progress in artificial general intelligence (AGI) could result in human extinction or some other unrecoverable global catastrophe. It is argued that the human species currently dominates other species because the human brain has some distinctive capabilities that other animals lack. If AI surpasses humanity in general intelligence and becomes "super intelligent", then it could become difficult or impossible for humans to control. Just as the fate of the mountain gorilla depends on human goodwill, so might the fate of humanity depend on the actions of a future machine super intelligence.
4. A nuclear holocaust:- it is also known as a nuclear apocalypse, nuclear Armageddon or atomic holocaust, is a theoretical scenario where the mass detonation of nuclear weapons causes globally widespread destruction and radioactive fallout. Such a scenario envisages large parts of the Earth becoming uninhabitable due to the effects of nuclear warfare, potentially causing the collapse of civilization and, in the worst case, extinction of humanity and/or termination of life on Earth.
5. Biotechnology:- This risk is a form of existential risk that could come from biological sources, such as genetically engineered biological agents.[1][2] The origin of such a high-consequence pathogen could be a deliberate release (in the form of bioterrorism or biological weapons), an accidental release, or a naturally occurring event.
6. Risk of Global Recession:- The study highlights the unusually fraught circumstances under which central banks are fighting inflation today. Several historical indicators of global recessions are already flashing warnings. The global economy is now in its steepest slowdown following a post-recession recovery since 1970. Global consumer confidence has already suffered a much sharper decline than in the run-up to previous global recessions. The world's three largest economies—the United States, China, and the euro area—have been slowing sharply. Under the circumstances, even a moderate hit to the global economy over the next year could tip it into recession.

Multinational Corporations:

Multinational corporations conduct extensive business in more than one country. In some cases, their operations are spread so thinly around the world that their official headquarters in any one home country, as distinct from the additional host countries in which they do business, is largely incidental and essentially a matter of historical circumstance or of selection based on tax advantages.

The benefits to U.S. companies of doing business in less economically developed countries are clear: inexpensive labour, availability of natural resources, favourable tax arrangements, and fresh markets for products. The benefits to the participants in developing countries are equally clear: new jobs, jobs with higher pay and greater challenge, transfer of advanced technology, and an array of social benefits from sharing wealth. Yet moral challenges arise, accompanying business and social complications. Who loses jobs at home when manufacturing is taken —offshore||? What does the host country lose in resources, control over its own trade, and political independence? And what are the moral responsibilities of corporations and individuals operating in less economically developed countries? Here we focus on the last question. Before doing so it will be helpful to introduce the concepts of technology transfer and appropriate technology.



Technology transfer is the process of moving technology to a novel setting and implementing it there. Technology includes both hardware (machines and installations) and technique (technical, organizational, and managerial skills and procedures). A novel setting is any situation containing at least one new variable relevant to the success or failure of a given technology.

The setting may be within a country where the technology is already used elsewhere, or a foreign country, which is our present interest. A variety of agents may conduct the transfer of technology: governments, universities, private volunteer organizations (such as Engineers Without Borders), consulting firms, and multinational corporations. In most instances, the transfer of technology from a familiar to a new environment is a complex process. The technology being transferred may be one that originally evolved over a period of time and is now being introduced as a ready-made, completely new entity into a different setting. Discerning how the new setting differs from familiar contexts requires the imaginative and cautious vision of cross-cultural social experimenters

Computer Ethics:

Computers have become the technological backbone of society. Their degree of complexity, range of applications, and sheer numbers continue to increase. Through telecommunication networks they span the globe. Yet electronic computers are still only a few decades old, and it is difficult to foresee all the moral issues that will eventually surround them. The present state of computers is sometimes compared to that of the automobile in the early part of this century. At that time the impact of cars on work and leisure patterns, pollution, energy consumption, and sexual mores was largely unimagined. If anything, it is more difficult to envisage the eventual impact of computers because they are not limited to any one primary area of use as is a car's function in transportation.

It is already clear, however, that computers raise a host of difficult moral issues, many of them connected with basic moral concerns such as free speech, privacy, respect for property, informed consent, and harm.¹ To evaluate and deal with these issues, a new area of applied ethics called computer ethics has sprung up. Computer ethics has special importance for the new groups of professionals emerging with computer technology, for example, designers of computers, programmers, systems analysts, and operators. To the extent that engineers design, manufacture, and apply computers, computer ethics is a branch of engineering ethics. But the many professionals who use and control computers share the responsibility for their applications.

Some of the issues in computer ethics concern shifts in power relationships resulting from the new capacities of computers. Other issues concern property, and still others are about invasions of privacy. All these issues may involve —computer abuse^{||}: unethical or illegal conduct in which computers play a central role (whether as instruments or objects).

The Internet and Free Speech:

The Internet has magnified all issues in computer ethics. The most powerful communication technology ever developed, and a technology used daily by hundreds of millions of people, the Internet gained widespread use only during the 1990s. Its modest beginning, or forerunner, came from a simple idea of J. C. R. Licklider.² Licklider was a psychologist who had wide interests in the newly emerging computer technology. In 1960 he conceived of a human-computer symbiosis in which the powers of humans and computers were mutually enhancing.³ The breadth of his vision, together with his administrative skills, led to his appointment a few years later as the director of the Advanced Research Projects Agency (ARPA) of the U.S. Department of Defence. He quickly saw that the variety of computer-involved military projects was becoming a Tower of Babel, and he wrote a revolutionary memo calling for a move toward a unified communication system. In 1969, ARPA funded projects in universities and corporations that created an ARPA network, or ARPANET.

In the 1980s, some universities developed their own communications networks, and their eventual merging with ARPANET became the Internet, which is now a global network of networks, initially using the infrastructure of the telephone system and now carried by many telecommunication systems by wire, fibre, or wireless systems. The World Wide Web (Web), which is a service run on the Internet, emerged from the Hypertext Mark-up Language and transfer protocol developed at the European particle physics lab and is used in a multimedia format of text, pictures, sound, and video. During the early 1990s, the Web was opened to business, e-mail, and other uses that continue to expand.

It is now clear to all that the Internet provides a wellspring of new ways to be in contact with other people and with sources of information. It has also created greater convenience in ordering consumer items, paying bills, and trading stocks and bonds. Like other major —social experiments,^{||} it also has raised a host of new issues. One set of issues centres on free speech, including control of obscene forms of pornography, hate speech, spam (unwanted commercial speech), and libel. In a wide sense, pornography is sexually explicit material intended primarily for sexual purposes (as distinct, say, from medical education). Obscene pornography is pornography that is immoral or illegal in many countries, and is not

protected in the United States by the First Amendment rights to free speech. U.S. laws define obscenity as sexually explicit materials that appeal to sexual interests, lack serious literary, artistic, scientific, or other value, and are offensive to reasonable persons as judged by a community's standards. Needless to say, there is considerable disagreement about what this means, and the definition is relative to communities that might have differing standards.

At the same time, there is wide agreement that child pornography and extremely violent and degrading portrayals of women are obscene, and most local communities have attempted to control them. The Internet has made such control extremely difficult, as images and texts can be transmitted easily from international sources to a child's home computer. There are now hundreds of thousands of pornographic Web sites, with hundreds more created each day, many of which contain obscene material. Hate speech, unlike obscenity, is not forbidden constitutionally. Not surprisingly, then, the Internet has become a powerful resource for racist and anti-Semitic groups to spread their messages. Those messages were heard, for example, by Eric Harris and Dylan Klebold, who massacred their fellow students at Columbine High School in 1999. And there is no question that this most powerful medium makes it much easier for hate groups to organize and expand.

Power Relationships:-

Some of the issues in computer ethics concern shifts in power relationships resulting from the new capacities of computers. Below to list a few examples: • Job elimination, Customer relations, Biased software, Stock trading, Unrealistic experimentation, Political power, Military weapons.

Property :-

The most troublesome issues about property and computers fall under two headings. The first is the use of computers in embezzlement and other forms of stealing money of financial assets. The second set of issues concerns the theft of software and information. Here the issues are more complex. Privacy Storage, retrieval, and transmission of information using computers as data processors have revolutionized communication. By making more data available to more people with more ease, computers make privacy more difficult to protect. Yet this very benefit poses moral threats to the right to privacy. Inappropriate access Data bank errors Hackers Legal responses

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 that he fights a war on terrorism and thereby contributes 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:

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.

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. A Textbook on Professional Ethics and Human Values

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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!

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.

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 organisations, 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

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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.

Expert Witnesses and Advisors

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 Table

Eye-witness	Expert-witness
1. Eye-witness gives evidence on only what has been seen or heard actually (perceived facts)	<ol style="list-style-type: none"> 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 own 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.

Duties

1. The expert-witness is required to exhibit the responsibility of confidentiality just as they do in the consulting roles. They can not divulge the findings of the investigation to the opposite side, unless it is required by the court of law.
2. More important is that as witness they are not required to volunteer evidence favorable to the opponent. They must answer questions truthfully, need not elaborate, and remain neutral until the details are asked for further.
3. They should be objective to discover the truth and communicate them honestly.
4. The stand of the experts depends on the shared understanding created within the society. The legal system should be respected and at the same time, they should act in conformance with the professional standards as obtained from the code of ethics.
5. The experts should earnestly be impartial in identifying and interpreting the observed data, recorded data, and the industrial standards. They should not distort the truth, even under pressure. Although they are hired by the lawyers, they do not serve the lawyers or their clients. They serve the justice. Many a time, their objective judgments will help the lawyer to put up the best defense for their clients.

Corporate Social Responsibility

Senses

There are different senses of responsibility, such as:

1. Characteristic Quality

Primarily responsibility implies duty with care and efforts.

2. Obligations

These are one's moral responsibility i.e., duty to act right and in moral ways. The obligations such as honesty, fairness, and decency are incumbent on every one. In addition to this, we have role responsibilities assigned by taking up various roles, such as parents, inspectors, and employees. For example, a Safety Engineer has a responsibility to make regular inspections in a factory shops.

3. General Moral Capacity

One has the general capacity for moral agency, including the understanding and action on moral reasons.

4. Liability and Accountability

Liability and Accountability for actions. It means that one is liable (with a legal sense) to meet the obligations in better ways. The person is likely to respond legally, if necessary.

Accountable means that one is willing to justify or defend the decisions, actions or means and outcomes. It could include offering a reasonable excuse or accepting the shame for not having met the end results or accepting the guilt for harming others. One is also answerable to the assessment by others on one's actions (means) or outcomes.

5. Praiseworthiness/Blameworthiness

When accountability for wrong actions or results is at issue, responsibility means blameworthy. When the right conduct or successful result is at issue, responsible is synonymous with praiseworthy.

Corporate organizations have social responsibility to all of their 'stakeholders'. This includes the well-being of the employees and their unions, socially responsible investors, customers, dealers, suppliers, local communities, governments, non-governmental organizations, and the business owners and managers.

Besides showing concern with employee relations and other internal organizational matters, the organization is concerned with

(a) how the product/project is marketed, used or misused, how it fails, and how it is disposed or discarded. The ways in which the used battery cells and computers are discarded have been debated in the engineers' forums.

(b) protecting the work environment during manufacture as well as the external environment during transport or use

(c) training the disadvantaged or physically-challenged workers

(d) subcontracting and hiring practices, and

(e) contribution to local communities to enrich their cultural, social, and civic life. It may be even compensatory against the harm to environment (e.g., planting trees).

Obligation

The safety and other obligations of professional engineers are justifiable based on the following aspects.

1. Moral obligations through laws and enforced codes of conduct
2. Through membership of professional society
3. Contractual agreement with the employers
4. By entry into career as engineer upon graduation from Engineering institutions and
5. By special employment agreements or agreement with professional societies.

The paramount obligation means, giving importance to the safety, health, and welfare of the public in performing the professional duties.