A Course Material on

PROFESSIONAL ETHICS IN ENGINEERING

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UNIT-V GLOBAL ISSUES

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                                                        TOTAL :45 PERIODS

TEXT BOOKS
1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005.
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.

REFERENCES

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004.
5. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)

UNIT -1 (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.

Scope
The scopes of engineering ethics are twofold:
1. Ethics of the workplace which involves the co-workers and employees in an organization.
2. Ethics related to the product or work which involves the transportation, warehousing, and use, besides the safety of the end product and the environment outside the factory.

Approach
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.

1.1 SENSES OF ENGINEERING ETHICS:

There are two different senses (meanings) of engineering ethics, namely the Normative and the Descriptive senses. The normative sense includes:
(*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 an act, without justifying their beliefs or actions.

1.2 KOHLBERG AND GILLIGAN VIEWS:

Kohlberg Theory

These theories are based on the sorts of reasoning and motivation adopted by individuals with regard to moral questions.

Lawrence Kohlberg"s Theory

- ✓ According to Kohlberg, the people progressed in their moral reasoning through a series of stages. His theory is based on the foundation that morality is a form of reasoning that develops I structural stages.
- ✓ The three levels of moral development, suggested by Kohlberg, are:

1. Pre-conventional level;
2. Conventional level; and
3. Post –conventional level.

1. Pre- conventional level

- ✓ The pre-conventional level of moral development is based to derive benefits for oneself.
- ✓ In the first level, individual behave according to socially acceptable norms, which are taught mainly by parents and teachers.
- ✓ At this level, individuals are motivated mainly by their interest to avoid punishment, or by their desire to satisfy their own needs, or by the external power exerted on them.
- ✓ This is the level of development of all young children and some adults, who are unable to reach beyond a certain limit.

2. Conventional level

- ✓ In the second level, the moral thinking and behavior of the individual are determined by the standards of their family, community, and society. That is, the norms or customs of one's family/community/society are accepted and adopted as the ultimate standard of morality.
- ✓ At this level, individuals are motivated by the desire to please others and to meet the social units' expectations, without bothering much about their self-interest.
- ✓ Thus as per the second level, individuals give more importance to loyalty and close identification with others, than their own self-interest.
- ✓ Many studies of Kohlberg reveal that most adults are living at this level only.
- ✓ The second level of moral thinking is found in society generally. That's why it is named as ‗conventional' level of moral development

3. Post –Conventional level

- ✓ In the post-conventional level, the individuals are guided by strong principles and convictions, not by selfish needs or pressures from society.

✓ According to Kohlberg, these individuals are called as ‗autonomous', because they think for/by themselves and also they do not believe that customs are always right.

✓ The people at this level want to live by general principles that are universally applied to all people. They always desire to maintain their moral integrity, self Kohlberg felt that the majority of adults do not reach the post-conventional level.

Kohlberg Stages of Moral Development		
Approximate Age Range	Stage	Substages
Birth to 9	Preconventional	1) Avoid punishment 2) Gain Reward
Age 9 to 20	Conventional	3) Gain Approval & Avoid Disapproval 4) Duty & Guilt
Age 20+ maybe never	Postconventional	5) Agreed upon rights 6) Personal moral standards

Gilligan Theory

✓ Carol Gilligan, a former student and colleague of Kohlberg, has criticized Kohlberg's theory as male blased.

✓ She also charged Kohlberg that Kohlberg's studies were concluded with male samples only and also his approach is dominated by a typical preoccupation with general rules and rights.

✓ According to Gilligan, males have tendency to over-ride the importance of moral rules and convictions while resolving moral dilemmas; whereas females have tendency to try hard to preserve personal relationships with all people invlolved in a situation.

✓ Also Gilligan felt that men mostly focus their attention on content of the problem, whereas women focus their attention on the context i.e., situation of the problem.

✓ Gilligan refers her context-oriented emphasis on maintaining personal relationships as the ethics of care, and contrasts it with Kohlberg's ethics of rules and rights.

Gilligan‟s Levels Of Moral Development

1. Pre-conventional level

✓ This is almost the same as Kohlberg's first level.

✓ That is, in this level an individual is concerned with self-centered reasoning.

2. Conventional level

✓ This level differs from Kohlberg's second level.

✓ According to Gilligan, women will not hurt others and have a willingness to sacrifice their own interests in order to help others.

3. Post-conventional level

✓ This level also differs from Kohlberg's third level.

✓ In this level, the individual is able to maintain balance between his own needs with the needs of others.

✓ The balancing can be achieved through context-oriented reasoning i.e., examining all facts, people and circumstances involved, rather than by applying abstract rules ranked in a hierarchy of importance.

Gilligan's Stages of the Ethic of Care		
Approximate Age Range	**Stage**	**Goal**
not listed	Preconventional	Goal is individual survival
Transition is from selfishness -- to -- responsibility to others		
not listed	Conventional	Self sacrifice is goodness
Transition is from goodness -- to -- truth that she is a person too		
maybe never	Postconventional	Principle of nonviolence: do not hurt others or self

1.3 ACT AND RULE UTILITARIAN:

Theory of human rights ethics

✓ The rights ethicists emphasize that any action that violates any moral right is considered as ethically unacceptable.

✓ This theory holds that those actions are good that respect the rights of the individual.

✓ In other words, rights ethics holds that people have fundamental rights that other people have a duty to respect.

✓ Two versions of right ethics are:
1. Locke's version of rights ethics, and
2. Meldon's version of right ethics

Locke"s version of rights ethics

✓ John locke (163-1704) a famous rights ethicist, argued that humans have human rights to life, liberty, and the property generated by one's labor.

✓ His views human rights either were considered as highly individualistic.

✓ In locke's view, rights are claims that prevent other people from interfering in one's life. These rights are referred as _liberty rights' or _negative rights' that place duties on other people not to interfere with one's life.

Melden"s version of rights ethics

✓ Melden (1910-1991) considered human rights as intimately related to communities of people.

✓ According to Melden, moral rights require the capacity to show concern for other and to be accountable within a moral community.

✓ Melden also defined welfare rights as rights to community benefits needed living a minimum decent human life.

Similarities between duty ethics and rights ethics

✓ In fact, duty ethics and right ethics are like two different sides of the same coin.

✓ Both the theories focus and achieve the same end result. The end result is that individual persons must be respected, and actions are ethical that maintain this respect for the individual.

✓ As per duty ethics, people have duties, a primary one of which is to protect the rights of others.

✓ But according to right ethics, people have fundamental rights that others have duties to protect.

Difficulties in implementing duty and rights ethics theories
The two principal difficulties with the duty and rights ethics theories are:

✓ It is sometimes very difficult to prioritize the rights of individuals or groups. Because the basic rights of an individual or groups of individuals may conflict with the basic rights of another group.

✓ Since both the theories concern more about the good of an individual, therefore sometimes the overall good of society is not given much importance.

Tests for evaluating ethical theories

✓ Theory must be clear and logical. The concepts of theory should be formulated to enhance applicability.

✓ The theory should be consistent with its principles. The principles of the same theory should not contradict each other.

✓ The theory and its defense should rely only upon facts, truths, and correct information.

✓ The theory should be adequately complete so that to provide guidance for our required specific situations.

✓ The theory should be well- matched with moral convictions such as judgments, and intuitions about concrete situations.

What is meant by utility?
Utility can be defined as an overall balance between good and bad consequences of an action, taking into account the consequences for everyone affected.

Rule utilitarianism

✓ Rule utilitarianism differs from act utilitarianism in owning that moral rules are more important than an individual's action.

✓ Richard Brandt proposed this version of utilitarianism.

✓ According to Brandt, though sticking to general moral rules such as don't lie, don't steal, be honest, don't harm others, etc might not always maximize good in a particular situation, overall, sticking to moral rules will ultimately guide to the most good.

Act utilitarianism

✓ The act utilitarianism concept was developed by John Stuart Mill.(180-1873).

✓ The act utilitarianism focuses on individual actions rather than on general rules.

✓ It is understood that most of the common rules of morality such s don't lie, don't steal, be honest, don't harm others, keep promises etc are good guidelines to judge a human begin.

But according to Mill, a person's actions should be judged based on whether the greatest good was achieved in a given situation. He also emphasized that even the general rules should be broken, if necessary, to achieve the greatest good for the greatest number of people.

✓
Mill"s view about „goodness"
As we know, the standard of right action is maximizing goodness, according to Mill, the term _goodness' represents two things.
Intrinsic good: intrinsic good is something good in and of itself, or desirable for its own sake. He felt that happiness is the only intrinsic good.
Instrumental goods: instrumental goods are other good things that provide means for happiness.

✓
In Mill's view, the pleasures derived through intellectual inquiry, creative accomplishment, appreciation of beauty, friendship, and love are inherently better than the bodily pleasures derived from eating, sex, and exercise.

1.4 MORAL DILEMMA:

What are moral dilemmas?

✓
Moral dilemmas are situations in which two or more moral obligations, duties, rights, goods, or ideals come into conflict with each other.

✓
The crucial feature of a moral dilemma is that all the moral principles cannot be fully respected in a given situation.

✓
Also solving one moral principle can create two or more conflicting applications for a particular situation.

Causes Of Moral Dilemmas
Moral dilemmas are situations, mostly, due to the following three problems.
1. Problem of vagueness;
2. Problem of conflicting reasons; and
3. Problem of disagreement.

1. Problem of vagueness

✓
Vague means not clearly expressed or perceived; not specific or exact.

✓
For a given situation, sometimes it is unclear to the engineers to apply the most appropriate moral considerations or principles. They may not know how and which moral principles to be used in resolving a moral problem. This situation creates a typical moral dilemma.

✓
Example: consider an engineer, starting a new assignment as quality inspector checking the incoming raw materials/spare parts from the suppliers. Supplier offers (on behalf of some festival, say, Deepavali) him an expensive DVD player as a gift.
Now this situation is a moral dilemma. Because the engineer is unclear about: what to do?; whether to accept the gift or not?; whether the thing offered is a gift or a bribe?; will it create a conflict of interest?
Thus the problem of vagueness i.e., unclarity causes a moral dilemma.

2. Problem of conflicting reasons

✓
This is a situation where two or more moral problems conflicting each other, each of which seems to be correct.

✓
   In other words, this is a situation where two or more moral obligations, duties, rigthts or ideals come into conflict with each other; independently each one is good and correct. But when they come together it is very difficulty choice to choose the good one.
   This situation is another moral dilemma.

✓
   Example: let us examine the space shuttle challenger explosion, focusing on the dilemma faced by the engineering manager, bob lund. He had the following conflicts:

1. Launching the chelenger space shuttle despite there was an unknown probability that the shuttle would explode; which will kill all the persons on the board.

2. Postponing the launch, which may lead to loss of future contracts from NASA, the loss of job to many workers, etc.
   Now, the job of Bob Lund is to make the best choice out of these two conflicts. At last, he chose to risk the launching of shuttle.
   This situation is one of the good illustrations for the moral dilemma due to the problem of conflicting reasons.

3.Problem of disagreement

✓
   It is quite obvious that individuals and groups may have different views, suggestions, interpretations, and solutions on a moral problem in particular situations. This disagreement among individuals and groups on interpreting moral issues will create a situation of another moral dilemma.

✓
   Example: In most corporations, there are disagreements among managers regarding whether customer can be allowed to inspect their plants and procedures, as a confidence building measure.
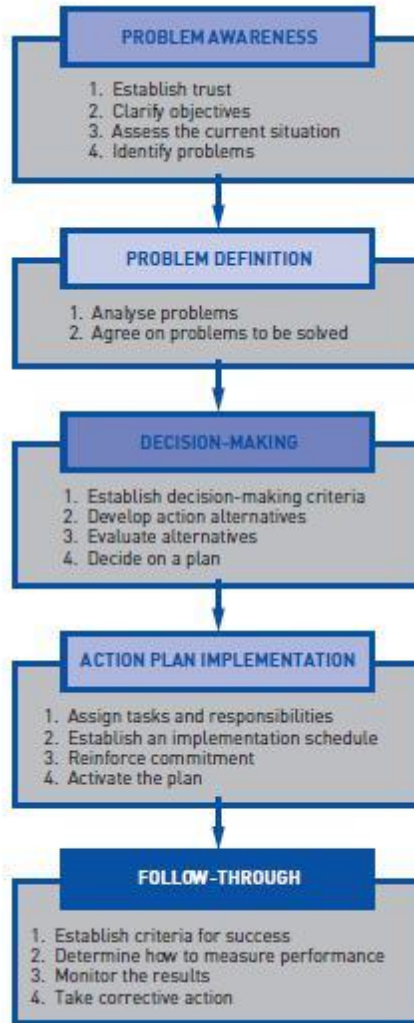
1.5 MORALITY AND MORAL ISSUES:

What is morality?

✓ The word morality is concerned with:
  - What morally ought or ought not to be given in a given situation;
  - What is morally right or wrong an out the handling of the situation; and/or
  - What is morally good or bad about the people, policies, and ideals involved in it?

✓ According to the Oxford dictionary, morality means principles concerning right and wrong or good and bad behavior.

✓ Moral reasons are required to support an act (or an ideal) to be called as morally right act (or an ideal is moral)

VARIETY OF MORAL ISSUES

Approaches to engineering ethics

There are two different approaches of engineering ethics.

1. **Micro-ethics:** this approach addresses typical, everyday problems that the engineers face in their professional life. In other words, micr-ethics describes ethical issues that may affect an engineer's professional and personal life.
2. **Macro-ethics:** this approach deals with all societal problems that engineers encounter during their career. In other words, macro-ethics discusses ethical issues concerning all societal problems that engineers might encounter.

Where and how do moral problems arise in engineering? (contexts of professional disagreements faced by engineers)

Engineers carry out various activities and decision-making exercises involving technical, financial, managerial, environmental, and ethical issues. There are many situations and moral issues that cause professional disagreements among engineers. The varieties of moral issues are:

1. **Organization oriented issues**
   - ✓ Being an employee to firm, the engineer has to work towards the achievement of the objectives of his/her organization.
   - ✓ Engineers have to give higher priority to the benefits of the organization than one's own benefits.
   - ✓ Engineers should be able to work collectively with colleagues and other members in order to achieve firm's goals.

2. **Clients or customers oriented issues**
   - ✓ As we know, the purpose of any business is to reach and satisfy the end users. Therefore the customers' requirements should be met.
   - ✓ In this regard, engineers have a major role to play in identifying the _customer voice', and incorporating the voice of the customer into the product design and manufacture.
   - ✓ Apart from engineering technicality issues, engineers also should face other moral and ethical issues with clients/customers.

3. **Competitors oriented issues**
   - ✓ In order to withstand in a market, engineers should produce things better than their competitors by all means.
   - ✓ But engineers should not practice cut-throat competition. They should follow certain professional behavior while facing their competitors.
   - ✓ Thus engineers should hold paramount the safety, health and welfare of the customers in the performance of their professional duties.

4. **Law, government and public agencies oriented issues**
   - ✓ The engineers should obey and voluntarily comply with all the governmental rules and regulations related to them.
   - ✓ They should also respect and honestly practice all other similar laws, policies, and regulations.

   Professional societies oriented issues
   - ✓ The engineers should follow strictly the various codes of ethics by various professional societies such as National Society of Professional Engineers (NSPE), the Institute of Electrical and Electronics Engineers (IEEE), and American Society of Mechanical Engineers (ASME), in order to perform standard professional behavior.

✓ Professional codes of ethics reflect basic _norms' of conduct that exist within a particular professional and provide general guidance relating to a variety of issues.

5. **Social and environmental oriented issues**

✓ Since the works of engineers have a direct and vital impact on the quality of life for all people, the engineers should be dedicate to the protection of the public health, safety and welfare.

✓ Also engineers need to be aware their role as agents of experimenters. They should have a united commitment in protecting the environment. They should not involve in any unethical environmental issues such as misusing scarce resources, and fouling environment.

6. **Family oriented issues**

✓ As a human being and the member of a family, the engineers do have family obligations to take care the needs of their family members. But they should not take any decisions for their own benefits at the cost of public, clients, or employers.

✓ Thus the above discussion explains how the ethical problems often arise in the engineering profession.

1.6 MORAL AUTONOMY:

What is meant by moral autonomy?

✓ As already discussed, the practical aim in studying and teaching this engineering ethics course is to foster the moral autonomy of future engineers.

✓ Autonomy means _self-determining' or _independent'.

✓ Moral autonomy is the ability to think critically and independently about moral issues and apply this normal thinking to situations that arise during the professional engineering practice.

✓ In other words, moral autonomy means the skill and habit of thinking rationally on ethical issues based on moral concern.

✓ That is, it is concerned with the independent attitude of an individual related to ethical issues.

✓ It is the ability to arrive at reasoned moral views based on the responsiveness to human values.

Steps in confronting moral dilemmas

In order to face/overcome the above said moral dilemmas, one can follow one or more of the following steps.

Step 1: Identifying the pertinent moral factors and reasons. It involves addressing solutions for conflicting responsibilities, opposing rights, and incompatible ideals involved.

Step 2: Collecting all the available moral considerations, which are relevant to the moral factors involved.

Step 3: Ranking the above collected moral considerations on the basis of importance as applicable to the particular situation.

Step 4: Making factual inquires. In other words, finding alternative courses of actions to resolve the moral dilemmas and following the complete implications of each.

Step 5: Inviting discussions, suggestions from colleagues, friends, and other involved persons to critically examine the moral dilemmas.

Step 6: Taking the final decision. That, is selecting the more reasonable solution by weighing all the relevant moral factors and reasons.

In practice, exercising the above skill to face moral dilemmas is very difficult. The study of engineering ethics helps the engineers to develop and strengthen the skills in resolving various moral dilemmas.

1.7 CONSENSUS AND CONTROVERSY:

Models of professional roles (Professional roles to be played by an engineer)

It is understood that an engineer has to play many roles while exercising his professional obligations. Some of the professional roles or models are given below:

1. **Engineers as Saviors**
   - ✓ It is believed that engineers hold the key for any improvements in society through technological developments.
   - ✓ Thus some people consider engineer as a savior because they redeem society from poverty, inefficiency, waste and the hardships drudgery of manual labor.

2. **Engineers as Guardians**
   - ✓ Engineers know the direction in which technology should develop and the speed at which it should move. Thus many people agree the role of engineers as guardians, as engineers guard the best interests of society.

3. **Engineers as Bureaucratic Servants**
   - ✓ The engineers' role in the management is to be the servant who receives and translates the directives of management into solid accomplishments.
   - ✓ Thus the engineers act as a bureaucratic servants i.e., loyal organizations set by the management.

4. **Engineers as Social Servants**
   - ✓ As we know, engineers have to play the role of social servants to receive society's directives and to satisfy society's desires.

5. **Engineers as Social Enablers and Catalysts**
   - ✓ Besides merely practicising the management's directives, the engineers have to play arole of creating a better society. Also they should act as catalysts for making social changes.
   - ✓ Sometimes engineers have to help the management and the society to understand their needs and to make decisions about desirable technological development.

6. **Engineers as Game Players**
   - ✓ In actual practice, engineers are neither servants nor masters of anyone. In fact, they play the economic game rules, which may be effective at a given time.
   - ✓ Like managers, the engineers' aim is also to play successfully within the organization and moving ahead in a competitive world.
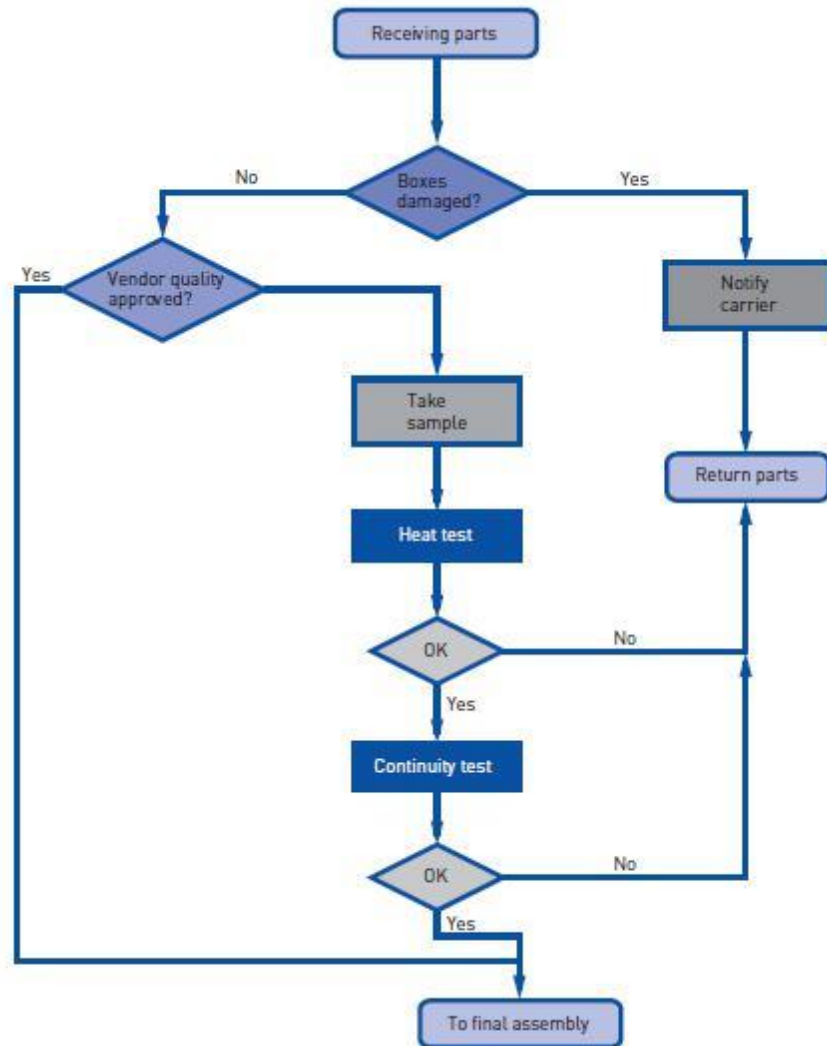
Consensus and Controversy

✓
Literally, consensus means _agreement', and controversy means _disagreement'.

✓
When an individual exercise moral autonomy, he may not be able to attain the same results as other people obtain in practicing their moral autonomy. Here there might be some differences in the practical application of moral autonomy. This kind of controversies i.e., disagreements are inevitable.

✓
Since exercising moral autonomy is not as precise and clear-cut as arithmetic, therefore the moral disagreements are natural and common. So in order to allow scope for disagreement, the tolerance is required among individuals with autonomous, reasonable and responsible thinking.

✓
According to the principle of tolerance, the objective of teaching and studying engineering ethics is to discover ways of promoting tolerance in the exercise of moral autonomy by engineers.

✓
Thus the goal of teaching engineering ethics is not merely producing always a unanimous moral conformity; it is about finding the proper ways and means for promoting tolerance in the practical applications of moral autonomy by engineers.

✓ In a way, the goal of courses on engineering ethics and goals of responsible engineering have some similarities. Both situations require the need for some consensus regarding the role of authority.

✓ Relationship between autonomy and authority

1. Moral autonomy and respect for authority are compatible with each other. Exercising moral autonomy is based on the moral concern for other people and recognition of good moral reasons. Also moral autonomy emphasizes the capabilities and responsibilities of people. Authority provides the framework through which learning attitudes are encouraged.

2. Sometimes, conflicts will arise between individuals' need for autonomy and the need for consensus about authority. This situation can be rescued by having open and frank discussion regarding a moral issue with the help of authority.

✓ **Illustration:** Consider the relationship between autonomy and authority, with reference to a classroom. In the classroom, the teachers have authority over students. Authority of the teachers helps in maintaining the dignity and decorum of academic climate in a institution; also in restoring the confidence and respect between teachers and students.

As per the first point, there should be the acceptance of authority of authority by both the teachers and students, in order to conduct the classes in orderly ways.

When the authority is misused, conflicts may arise between autonomy and authority. As per the second point, allowing open discussions between teachers and students can reduce the unhealthy academic atmosphere.

1.8 MODELS OF PROFESSIONAL ROLES:

Promotion of public good is the primary concern of the professional engineers. There are several role models to whom the engineers are attracted. These models provoke their thinking, attitudes and actions.

1. Savior
The engineer as a savior, save the society from poverty, illiteracy, wastage, inefficiency, ill health, human (labor) dignity and lead it to prosperity, through technological development and social planning.
For example, R.L. Stevenson.

2. Guardian
He guards the interests of the poor and general public. As one who is conversant with technology development, is given the authority befitting his expertise to determine what is best suited to the society. For example, Lawrence of Arabia (an engineer).

3. Bureaucratic Servant
He serves the organization and the employers. The management of an enterprise fixes its goals and assigns the job of problem solving to the engineer, who accepts the challenge and shapes them into concrete achievements. For example, Jamshedji Tata.

4. Social Servant
It is one who exhibits social responsibility. The engineer translates the interest and aspirations of the society into a reality, remembering that his true master is the society at large. For example, Sir M.Viswesvarayya.

5. Social Enabler and Catalyst

One who changes the society through technology. The engineer must assist the management and the society to understand their needs and make informed decisions on the desirable technological development and minimize the negative effects of technology on people and their living environment. Thus, he shines as a social enabler and a catalyst for further growth. For example, Sri Sundarlal Bahuguna.

6. Game Player

He is neither a servant nor master. An engineer is an assertive player, not a passive player who may carry out his master's voice. He plays a unique role successfully within the organization, enjoying the excitement of the profession and having the satisfaction of surging ahead in a competitive world. For example, Narayanamurthy, Infosys and Dr. Kasthurirangan, ISRO.

1.9 ETHICAL THEORIES:

Independently propounded ethical theories are many and are very diverse in nature.
Philosophical point of view of ethical theories
Deontology

Deontological ethics or deontology (from Greek δέον, deon, "obligation, duty"; and -λογία, -logia) is an approach to ethics that determines goodness or rightness from examining acts, or the rules and duties that the person doing the act strove to fulfill. This is in contrast to consequentialism, in which rightness is based on the consequences of an act, and not the act by itself. In deontology, an act may be considered right even if the act produces a bad consequence, if it follows the rule that "one should do unto others as they would have done unto them", and even if the person who does the act lacks virtue and had a bad intention in doing the act. According to deontology, we have a duty to act in a way that does those things that are inherently good as acts ("truth-telling" for example), or follow an objectively obligatory rule (as in rule utilitarianism). For deontologists, the ends or consequences of our actions are not important in and of themselves, and our intentions are not important in and of themselves. Immanuel Kant's theory of ethics is considered deontological for several different reasons. First, Kant argues that to act in the morally right way, people must act from duty (deon). Second, Kant argued that it was not the consequences of actions that make them right or wrong but the motives (maxime) of the person who carries out the action. Kant's argument that to act in the morally right way, one must act from duty, begins with an argument that the highest good must be both good in itself, and good without qualification. Something is 'good in itself' when it is intrinsically good , and 'good without qualification' when the addition of that thing never makes a situation ethically worse. Kant then argues that those things that are usually thought to be good, such as intelligence, perseverance and pleasure, fail to be either intrinsically good or good without qualification. Pleasure, for example, appears to not be good without qualification, because when people take pleasure in watching someone suffering, this seems to make the situation ethically worse. He concludes that there is only one thing that is truly good:

Nothing in the world—indeed nothing even beyond the world—can possibly be conceived which could be called good without qualification except a good will.
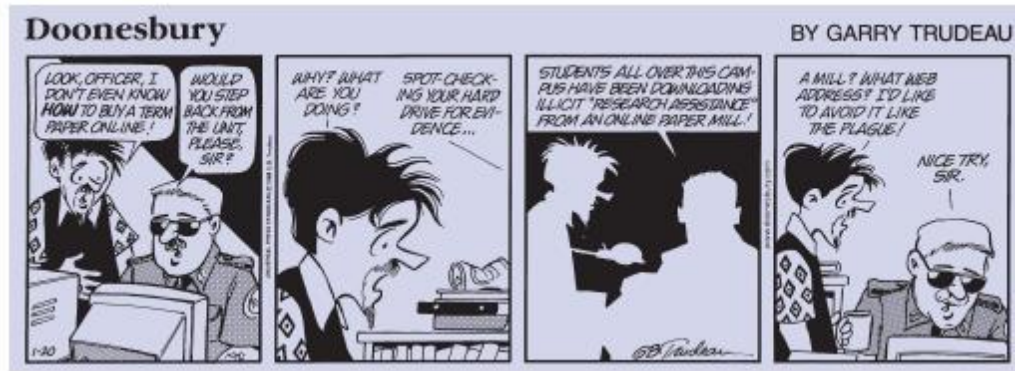
Kantian ethics:

Kantian ethics are deontological, revolving entirely around duty rather than emotions or end goals. All actions are performed in accordance with some underlying maxim or principle, which are deeply different from each other; it is according to this that the moral worth of any action is judged. Kant's ethics are founded on his view of rationality as the ultimate good and his belief that all people are fundamentally rational beings. This led to the most important part of Kant's ethics, the formulation of the categorical imperative, which is the criterion for whether a maxim is good or bad. Simply put, this criterion amounts to a thought experiment: to attempt to universalize the maxim (by imagining a world where all people necessarily acted in this way in the relevant circumstances) and then see if the maxim and its associated action would still be conceivable in such a world. For instance, holding the maxim kill anyone who annoys you and applying it universally would result in a world which would soon be devoid of people and without anyone left to kill. Thus holding this maxim is irrational as it ends up being impossible to hold it. Universalizing a maxim (statement) leads to it being valid, or to one of two contradictions — a contradiction in conception (where the maxim, when universalized, is no longer a viable means to the end) or a contradiction in will (where the will of a person contradicts what the universalization of the maxim implies).
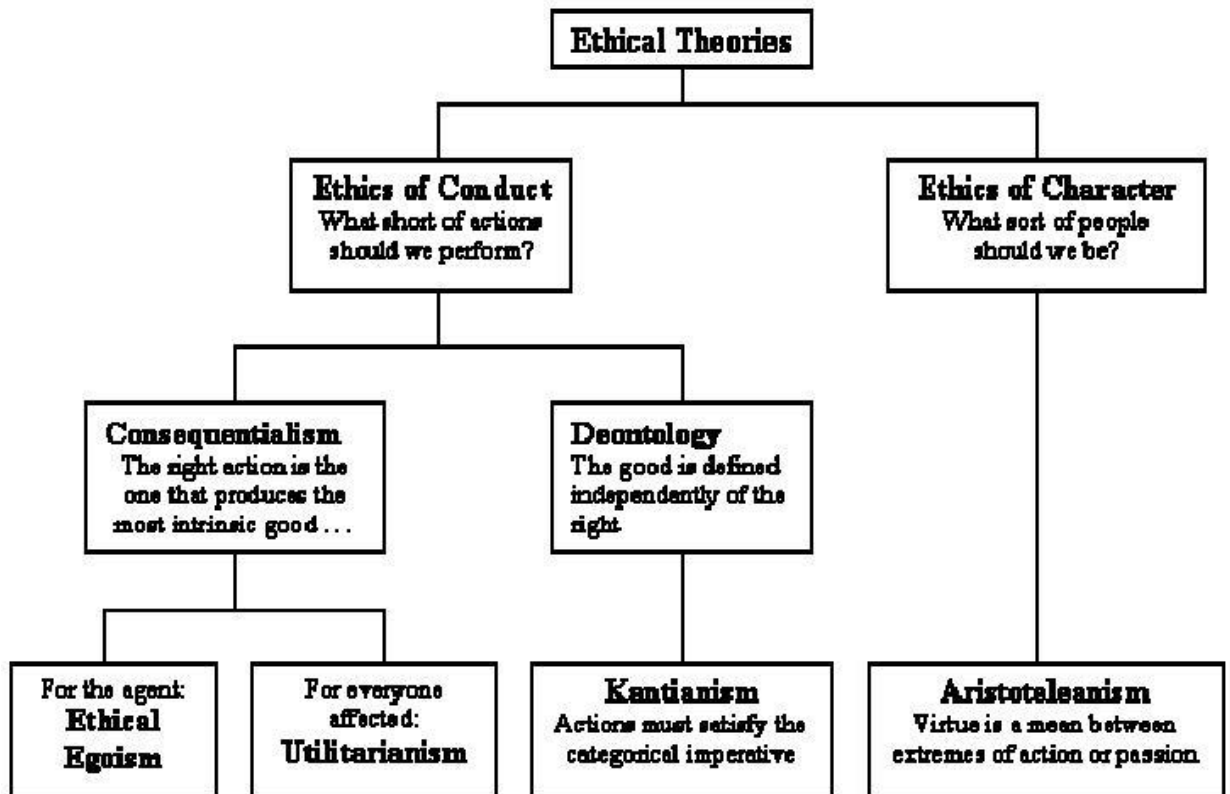
The first type leads to a "perfect duty", and the second leads to an "imperfect duty." Kant's ethics focus then only on the maxim that underlies actions and judges these to be good or bad solely on how they conform to reason. Kant showed that many of our common sense views of what is good or bad conform to his system but denied that any action performed for reasons other than rational actions can be good (saving someone who is drowning simply out of a great pity for them is not a morally good act). Kant also denied that the consequences of an act in any way contribute to the moral worth of that act, his reasoning being (highly simplified for brevity) that the physical world is outside our full control and thus we cannot be held accountable for the events that occur in it.

Virtue ethics

Virtue ethics describes the character of a moral agent as a driving force for ethical behavior, and is used to describe the ethics of Socrates, Aristotle, and other early Greek philosophers. Socrates (469 BC – 399 BC) was one of the first Greek philosophers to encourage both scholars and the common citizen to turn their attention from the outside world to the condition of humankind. In this view, knowledge having a bearing on human life was placed highest, all other knowledge being secondary. Self-knowledge was considered necessary for success and inherently an essential good. A self-aware person will act completely within his capabilities to his pinnacle, while an ignorant person will flounder and encounter difficulty. To Socrates, a person must become aware of every fact (and its context) relevant to his existence, if

he wishes to attain self-knowledge. He posited that people will naturally do what is good, if they know what is right. Evil or bad actions are the result of ignorance. If a criminal was truly aware of the mental and spiritual consequences of his actions, he would neither commit nor even consider committing those actions. Any person who knows what is truly right will automatically do it, according to Socrates. While he correlated knowledge with virtue, he similarly equated virtue with happiness. The truly wise man will know what is right, do what is good, and therefore be happy.

	Consequentialism	Deontology	Virtue Theory
example	Mill's utilitarianism	Kantian ethics	Aristotle's moral theory
abstract description	An action is right if it promotes the best consequences.	An action is right if it is in accordance with a moral rule or principle.	An action is right if it is what a virtuous agent would do in the circumstances.
more concrete specification	The best consequences are those in which happiness is maximized.	A moral rule is one that is required by rationality.	A virtuous agent is one who acts virtuously, that is, one who has and exercises the virtues. A virtue is a character trait a human being needs to flourish or live well.

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                        ┌─────────────────────┐
                        │  Ethical Theories   │
                        └─────────────────────┘
                 ┌────────────────┴─────────────────────┐
        ┌──────────────────────┐            ┌──────────────────────┐
        │  Ethics of Conduct   │            │ Ethics of Character  │
        │  What short of actions│           │  What sort of people │
        │   should we perform? │            │    should we be?     │
        └──────────────────────┘            └──────────────────────┘
          ┌────────────┴────────────┐                    │
  ┌──────────────────┐   ┌──────────────────┐   ┌──────────────────────┐
  │ Consequentialism │   │   Deontology     │   │                      │
  │ The right action │   │ The good is      │   │                      │
  │ is the one that  │   │ defined          │   │                      │
  │ produces the most│   │ independently of │   │                      │
  │ intrinsic good...│   │ the right        │   │                      │
  └──────────────────┘   └──────────────────┘   │                      │
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│For the   │ │For       │ │  Kantianism  │ │   Aristoteleanism    │
│agent:    │ │everyone  │ │ Actions must │ │ Virtue is a mean     │
│Ethical   │ │affected: │ │ satisfy the  │ │ between extremes of  │
│Egoism    │ │Utilitar- │ │ categorical  │ │ action or passion    │
│          │ │ianism    │ │ imperative   │ │                      │
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Philosophers have found ethical theories useful because they help us decide why various actions are right and wrong. If it is generally wrong to punch someone then it is wrong to kick them for the same reason.

We can then generalize that it is wrong to —harm‖ people to help understand why punching and kicking tend to both be wrong, which helps us decide whether or not various other actions and institutions are wrong, such as capital punishment, abortion, homosexuality, atheism, and so forth. All of the ethical theories have various strengths and it is possible that more than one of them is true (or at least accurate). Not all moral theories are necessarily incompatible. Imagine that utilitarianism, the categorical imperative, and Stoic virtue ethics are all true. In that case true evaluative beliefs (e.g. human life is preferable) would tell us which values to promote (e.g. human life), and we would be more likely to have an emotional response that would motivate us to actually promote the value. We would feel more satisfied about human life being promoted (e.g. through a cure to cancer) and dissatisfied about human life being destroyed (e.g. through war). Finally, what is right for one person would be right for everyone else in a sufficiently similar situation because the same reasons will justify the same actions.

UNIT-2 (ENGINEERING AS SOCIAL EXPERIMENTATION)

2.1 ETHICS AND POSITIVE ROLES OF CODE OF ETHICS:

Introduction:

One of the trade marks of contemporary professions is code of ethics. Codes of ethics are propagated by various professional society. These codes of ethics are guidelines for specific group of professionalism to help them perform their roles; to know how to conduct themselves; and to know how to resolve around various ethical issues. These codes convey the rights, duties, and obligation of the members of the profession.

What is code of ethics?

- The primary aspects of codes of ethics are to provide the basic framework for ethical judgment for a professional.

- The codes of ethics are also referred to as the codes of conduct, express the commitment to ethical conduct shared by members of a profession.

- It expresses the ethical principles and standards in a coherent, comprehensive and accessible manner.

- It also defines the role and responsibility of profession.

- It helps the professionals to apply moral and ethical principles to the specific situations encountered in professional practice.

- These codes are based on five canons i.e., principle of ethics-integrity, competence, individual responsibility, professional responsibility, and human concerns.

- It also be noted that ethical codes do not establish new ethical principles. They use only those principles that are already well established and widely accepted in society.

- Thus the code of ethics creates an environment within a profession where ethical behavior is norm.

Positive Roles of Code of Ethics

The code of ethics propagated by professional societies play a vital role. They are,

1. Inspiration
2. Guidance
3. Support for responsible conduct
4. Deterring and disciplining unethical professional conduct
5. Educational and promotion of mutual understanding
6. Contributing to positive public image of profession
7. Protecting the status quo suppressing dissent within the profession and
8. Promoting business interest through restraint of trade.

Limitation of codes:

The four major limitations of codes of ethics are as follows:
1. Codes of ethics are broad guidelines, restricted to general and vague wordings/phrases. The codes cannot be applied directly to all situations. Also it is impossible to predict all aspects of moral problems that can arise in a complex, dynamic engineering profession.
2. Engineering codes often have internal conflicts, which may result in moral dilemmas. That is, several entries in codes overlap with each other, so there are internal conflicts. But the code doesn't provide a method for resolving these conflicts.
3. The codes cannot serves as the final moral authority for professional conduct.
4. The proliferation of codes of ethics for different of engineering gives a feeling that ethical code is relative.

2.2 ENGINEERING EXPERIMENTS WITH STANDARD EXPERIMENTS:

There are many similarities and differences between engineering experiments and other standard experiments.

Similarity to Standard Experiments:

There are many aspects of engineering that make it appropriate to view engineering projects as experiments. The three important aspects are as follows:

1. Engineering projects , like the standard experiments, are carried out in partial

   uncertainties. The uncertainties may include in the,

   ✓ Design calculation
   ✓ Exact properties of raw materials used
   ✓ Constancies of material processing and fabrication
   ✓ Nature of working of final products

2. The final outcomes of engineering projects are also generally uncertain like those of other experiments For example, a nuclear reactor may reveal unexpected problems that endangered the surrounding people.
3. Similar to standard experiments, engineering experiments also requires thorough knowledge about the products at the pre-production and post-production stages. Thus engineering, like any other experimentation, requires constant monitoring, alertness, and vigil on the part of the engineers at every stage of the project.

Contrast with standard experiments:

The study of knowing differences between engineering and other standard experiments is helpful to the engineers to realize their special and moral responsibility. Some aspects of these differences are given bellow:

   1. Experimental control:
      ✓ Experimental control is the most important difference between engineering and other standard experiments.
      ✓ In standard experiments, experimental control involves selecting members for two different groups randomly. The first group members are given the special, experimental treatment, whereas the members of other group are not given that

special treatment. Even both the groups are subjected to same environment ; the group that was not given the special treatment is called _**control group**".

✓ In engineering experiments, usually there is no control group. Sometimes the control group is used only when the project is limited to laboratory experiments.

Because the engineering experiments involve human beings are experimental subjects. In fact, clients and customers have more control, as they own the authority of that project. So here the experimental subjects say clients or end user's are out of experimenter's control. In this type, it is not possible to select the member from various group randomly. Instead the engineers should work with the available historical and fair data about various groups randomly. Instead, the engineering should work the available historical and fair data about various groups that uses the end product.

The above discussion also justifies the view of engineering as a social experimentation.

2. Informed consent:

✓ It is know that there is always a strong human interface in the use of the engineering experiments' result; and also the beneficiaries are invariably humans. Therefore engineering experiments are also viewed at par the medical experiments.

✓ When a medicine or an engineering product is to be tested on a person, then the moral and legal rights is to get _informed consent' for him.Informed consent consists of two main elements:

1. Knowledge: The human subjects should be given all the information to make a reasonable decision.
2. Voluntariness: The human subjects should show their willingness to be a human model voluntarily. The person should not be forced, deceived, fraud, etc.

✓ The manufacturer of the should give all the information about the potential risks and benefits of their products to their customers and users.

✓ The characteristics of a _valid consent'

The informed consent is called as _valid consent' when the following three conditions are met:

1. The consent should be given voluntarily and not by force.
2. The consent should be based on all information needed for the rational person to make reasonable decision.
3. The consentient should be physically and mentally fit; then he should be major i.e., above 18 years.

2.3 ENGINEERS AS RESPONSIBLE EXPERIMENTERS:

General responsibility of engineering as society:

- Engineers are primarily considered as technical enablers or facilitators, rather than being the sole experimenters.
- Engineers' responsibility is shared with management, the public and others.
- The other unique responsibility of engineers include monitoring projects, identifying risks, providing customers and clients the required information to make reasonable decisions.

- While exercising engineering duties, the engineers should display the virtue of being morally responsible person.

General features of moral responsible engineers:

1. Conscientiousness
2. Relevant information
3. Moral Autonomy
4. Accountability

Conscientiousness:

- Conscientiousness means commitment to live according to certain values. It implies conscientiousness.
- Engineers have to be sensitive to a range of moral values and responsibilities, which are relevant in a given situation.
- Also engineers should have the willing to develop the skill and apply the effort needed to reach the best balance possible among various considerations.
- _Open eyes, open s and an open mind' are required to evaluate a given situation, its implication and to determine who are involved or affected.
- The primary duty of morally responsible engineers is to protect the safety of human beings and respect their rights of consent.

Relevant information:

- Conscientiousness is impossible without relevant factual information.
- Engineers have to show the commitment to obtain and properly gauge all the information related to meeting one's moral obligations.
- The two general ways of losing perspective on the context of one's work are given below.

   1. To grasp the context of one's work, one should be aware of implication of that work.
   2. To shifts the responsibility and blames the others in the organization.

Thus, conceiving engineering as social experimentation, it is important that engineers act as **responsible agents.** The responsible agents require

- Imaginative forecasting of possible bad side effects
- The development of an attitude of _defensive engineering' and _preventive technology'
- Careful monitoring of projects and
- Respect for people rights to give informed consent

Moral autonomy:

   ✓
     The moral autonomy is the ability to think critically and independently about moral issues and apply this moral thinking to situations that arise during the professional engineering practice.

✓ It is understood that an individual personality depends on the integration of his moral benefits and attitude.

✓ When one's labor and skills are sold, then it is an illusion to think that the person is not morally autonomous.

✓ As an experimenter, an engineer has to undergo an extensive and updated training to form his identity as a professional.

✓ There will be a personal involvement in one's work.

✓ The magnitude of moral autonomy to be experienced by engineering is highly influenced by the attitude of company's managements.

✓ Where there is a treat for engineers' moral autonomy, then engineers can look for moral support from their professional societies and outside organization.

Accountability:

✓ The term _accountability' means being responsible, liable, answerable or obligated.

✓ In proper terms, the accountability refers to the general tendency of being willing to submit ones action to any type of moral scrutiny and be responsive to others assessment.

✓ It involves a willingness to present morally convincing reason for ones action and conduct.

✓ Morally responsible people are expected to accept morally responsibility for their action.

✓ According to Stanely Milgram, people are not willing to accept personal accountability when placed under authority.

✓ There exist a lot of difference and separation between casual influence and moral accountability in all professions including engineering.

✓ Because of modern engineering practices, the complication in accepting one's moral accountability further worsened. Some of these situations are explained below:

1. Modern engineering projects involve teamwork, in which each members contributes a small of personal accountability.
2. The modern organization are based on the principle of _division of work'. Due to this division of work, the personal accountability also stretched within hierarchies of authority.
3. A preoccupation with legalities in a time of proliferating malpractice lawsuits.

UNIT-3 (ENGINEER"S RESPONSIBILITY FOR SAFETY)

3.1 SAFETY AND RISK:
Imagine you are a fresh graduate.
- You get a job as an engineer in a large atomic power plant.
- Would you take it or not?
- Under what conditions would you take it?
- Under what conditions would you not?
- Why?

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

What is safe to Entrepreneurs, may not be so to Engineers. e.g., Pilots: "Indian Airports are not safe; Low Vision in Fog—. What is safe to Engineers, may not be so to Public. e.g., Top loading Washing Machine Typically several groups of people are involved in safety matters but have their own interests at stake. Each group may differ in what is safe and what is not.

1. —A ship in harbour is safe, but that is not what ships are built for‖ – John A. Shed
2.„A thing is safe if its risks are judged to be acceptable" - William W. Lawrence

- We buy an ill-designed Iron box in a sale-> Underestimating risk
- We judge fluoride in water can kill lots of people -> Overestimating risk
- We hire a taxi, without thinking about its safety -> Not estimating risk
- How does a judge pass a judgement on safety in these 3 cases?

….So, this definition won't do in real life.
Then, what is acceptable also depends upon the individual or group's value judgment. Hence a better, working definition of concept of safety could be, —A thing is safe (to a certain degree) with respect to a given person or group at a given time if, were they fully aware of its risks and expressing their most settled values, they would judge those risks to be acceptable (to that certain degree).‖ -
Mike Martin and Roland Schinzinger
A thing is NOT SAFE if it exposes us to unacceptable danger or hazard. RISK is the potential that something unwanted and harmful may occur. We take a risk when we undertake something or use a product that is not safe. Risk in technology could include dangers of
bodily harm, economic loss, or environmental degradation. Some may assume that —safety‖ is a concrete concept, while —risk‖ is a vague, hypothetical concept
- In fact, its the other way around
- Risks always exist. But true safety never exists, except in hypothetical situations
- So, risk is reality, safety is fantasy

What degree of risk is acceptable?

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

Perspectives differ.

To this extent, it is subjective.

So, Safety is 'acceptable risk'.

Acceptable Risk

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

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

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

3.2 RISK ASSESMENT:

The manner in which information necessary for decision making is presented can greatly influence how risks are perceived. Consider this example: In a particular case of disaster management, the only options available are provided in 2 different ways to the public for one to be chosen (where lives of 600 people are at stake).

Alternate 1

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

Response

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

Alternate 2

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

Response

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

Conclusion:

1. The option perceived as yielding firm gain will tend to be preferred over those from which gains are perceived as risky or only probable.

2. Option emphasizing firm losses will tend to be avoided in favour of those whose chances of success are perceived as probable.

Secondary Costs of Products

- Cost of products is High, if designed unsafely
- Returns and Warranty Expenses
- Loss of Customer Goodwill
- Cost of litigation
- Loss of Customers due to injuries in using it
- Cost of rework, lost time in attending to design problems

- To help reduce secondary costs

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

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

3.3 RISK BENEFIT ANALYSIS:

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

- Heavy discounting of future because the very low present values of cost/benefits do not give a true picture of future sufferings.
- Both have related uncertainties but difficult to arrive at expected values
- What if benefits accrue to one party and risks to another?
- Can we express risks & benefits in a common set of units?
- Risks can be expressed in one set of units (deaths on the highway) and benefits in another (speed of travel)?

Many projects, which are highly beneficial to the public, have to be safe also. Hence these projects can be justified using RISK-BENEFIT analysis. In these studies, one should find out.
i) What are the risks involved?
ii) What are the benefits that would accrue?
iii) When would benefits be derived and when risks have to be faced?
iv) Who are the ones to be benefited and who are the ones subjected to risk-are they the same set of people or different. The issue here is not, say, cost-effective design but it is only cost of risk taking Vs benefit analysis. Engineers should first recommend the project feasibility based on risk-benefit analysis and once it is justified, then they may get into cost-effectiveness without increasing the risk visualized. In all this, engineers should ask themselves this ethical question: Under what conditions, is someone in society entitled to impose a risk on someone else on behalf of a supposed benefit to others."

3.4 BHOPAL GAS TRAGEDY:

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

Risks taken:
- Storage tank of Methyl Isocyanate gas was filled to more than 75% capacity as against Union Carbide's spec. that it should never be more than 60% full.
- The company's West Virginia plant was controlling the safety systems and detected leakages thro" computers but the Bhopal plant only used manual labour for control and leak detection.
- The Methyl Isocyanate gas, being highly concentrated, burns parts of body with which it comes into contact, even blinding eyes and destroying lungs.

• Three protective systems out of service
• Plant was understaffed due to costs.
• Very high inventory of MIC, an extremely toxic material.
• The accident occurred in the early morning.
• Most of the people killed lived in a shanty (poorly built) town located very close to the plant fence.
Workers made the following attempts to save the plant:
• They tried to turn on the plant refrigeration system to cool down the environment and slow the reaction. (The refrigeration system had been drained of coolant weeks before and never refilled -- it cost too much.)
• They tried to route expanding gases to a neighbouring tank. (The tank's pressure gauge was broken and indicated the tank was full when it was really empty.)
• They tried to purge the gases through a scrubber. (The scrubber was designed for flow rates, temperatures and pressures that were a fraction of what was by this time escaping from the tank. The scrubber was as a result ineffective.)
• They tried to route the gases through a flare tower -- to burn them away. (The supply line to the flare tower was broken and hadn't been replaced.)
• They tried to spray water on the gases and have them settle to the ground, by this time the chemical reaction was nearly completed. (The gases were escaping at a point 120 feet above ground; the hoses were designed to shoot water up to 100 feet into the air.) In just 2 hours the chemicals escaped to form a deadly cloud over hundreds of thousands of people incl. poor migrant labourers who stayed close to the plant.

3.5 DIFFICULTIES IN ESTABLISHING SAFEGUARDS:

Difficulties in establishing Safeguards:
- Incomplete knowledge of the engineering subject
- Refusal to face hard questions caused by lack of knowledge
- False sense of security
- e.g. Nuclear waste disposal problem

- Caution in stating probabilities of rare events
- Varying understanding of risk based on presentation of facts
- Risk assessments based on incorrect/unacceptable assumptions/data
- Only a few persons/groups participate in the exercise
- Some of the ways by which engineers may try to reduce risks.
- In all the areas of works, engineers should give top priority for product safety.
- They should believe that accidents are caused by dangerous conditions that can be corrected. Negligence and operator errors are not the principal causes of accidents.
- If a product is made safe, the initial costs need not be high if safety is built into a product from the beginning. It is the design changes done at a later date that are costly. Even then life cycle costs can be made lower for the redesigned or retrofitted product (for safety).
- If safety is not built into the original design, people can be hurt during testing stage itself.
- They should get out of the thinking that warnings about hazards are adequate and that insurance coverage is cheaper than planning for safety.
- All it takes to make a product safe is to have different perspective on the design problem with emphasis on safety.
- Examples of Improved Safety
- Magnetic door catch introduced on refrigerators
- Prevent death by asphyxiation of children accidentally trapped inside
- The catch now permits the door to opened from inside easily
- Cheaper than older types of latches
- Dead-man Handle for Drivers in trains
- Semaphore signalling
- Volkswagen's car safety belt
- Attachment on the door so that belt automatically goes in place on Entry

UNIT-4 (RESPONSIBILITIES AND RIGHTS)

4.1 COLLEGIALITY AND LOYALTY:

Collegiality is a kind of connectedness grounded in respect for professional expertise and in a commitment to the goals and values of the profession and as such, collegiality includes a disposition to support and co-operate with one's colleagues".- Craig Ihara. The central elements of collegiality are respect, commitment, connectedness and cooperation.

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

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

Connectedness: Aware of being part of a co-operative undertaking created by shared commitments and expertise. Collegiality, like most virtues, can be misused and distorted. It should not be reduced to „group interest" but should be a shared devotion for public good. It is not defaming colleagues, but it does not close the eyes to unethical practices of the co-professionals, either.

Classifications of Loyalty
- Agency-Loyalty
- Fulfill one's contractual duties to an employer.
- Duties are particular tasks for which one is paid
- Co-operating with colleagues
- Following legitimate authority within the organization.
- Identification-Loyalty:
- It has to do with attitudes, emotions and a sense of personal identity.
- Seeks to meet one's moral duties with personal attachment and affirmation.
- It is against detesting their employers and companies, and do work reluctantly and horribly (this is construed as disloyalty)

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

- Agency-Loyalty
- Engineers are hired to do their duties.
- Hence obligated to employers within proper limits
- Identification-Loyalty
- Obligatory on two conditions;

1. When some important goals are met by and through a group in which the engineers participate
2. When employees are treated fairly, receiving the share of benefits and burdens.
But clearly, identification-loyalty is a virtue and not strictly an obligation.

4.2 COLLECTIVE BARGAINING AND OCCUPATIONAL CRIME:

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

But every instance of such conduct need not be unethical.

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

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

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

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

Occupational Crime:
- Occupational crimes are illegal acts made possible through one"s lawful employment.
- It is the secretive violation of laws regulating work activities.
- When committed by office workers or professionals, occupational crime is called „white collar crime".
- People Committing Occupational Crimes
- Usually have high standard of education
- From a non-criminal family background
- Middle class male around 27 years of age (70% of the time) with no previous
- History
- No involvement in drug or alcohol abuse
- Those who had troublesome life experience in the childhood (Blum)
- People without firm principles (Spencer)

- Firms with declining profitability (Coleman, 1994)
- Firms in highly regulated areas and volatile market -pharmaceutical,
- petroleum industry.(Albanese, 1995)

4.3 INTELLECTUAL PROPERTY RIGHTS:

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

Patent, Design & Trademark together with Copyright form TOTAL INTELLECTUAL PROPERTY:

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

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

Design
- Meant for beautifying an industrial product to attract the consumer public
- Shaping, Configuration or Ornamentation of a vendible Industrial product
- Exclusive „Design Rights" to the originator for a limited term
- Patents & design embrace the production stage of an industrial activity
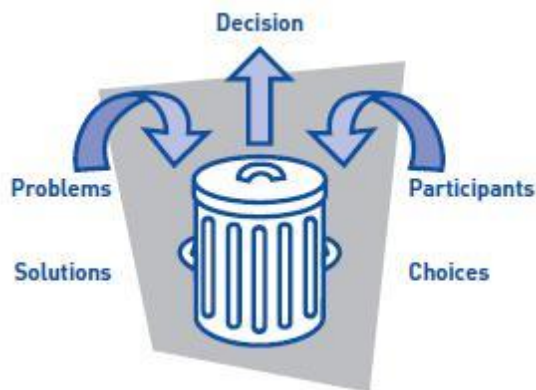
Trade Mark
- Trade Mark is a name or symbol adopted for identifying goods
- Public can identify from the Trade Mark from whom the product is emanating
- Trade Marks protection is given for an industrial product by the Government
- Examples: Channel No.5"s smell, Jacque Villeneuve"s face!

COPY RIGHTS
- The right to original literary and artistic works
- Literary, written material
- Dramatic, musical or artistic works
- Films and audio-visual materials
- Sound recordings
- Computer Programmes/software
- SOME databases
- Example: Picasso˝s Guernica, Microsoft code, Lord of the Rings

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

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

4.4 EMPLOYEE RIGHTS:
- Employee rights are any rights, moral or legal, that involve the status of being an employee.

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

4.5 THE EMPLOYEE ROLE OF CONFIDENTIALITY:

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

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

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

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

1. Based on ordinary moral considerations:
I. Respect for autonomy:
- Recognizing the legitimate control over private information (individuals or corporations).
- This control is required to maintain their privacy and protect their self-interest.

- Respecting promises in terms of employment contracts not to divulge certain information considered sensitive by the employer
III. Regard for public well being:
- Only when there is a confidence that the physician will not reveal information, the patient will have the trust to confide in him.
- Similarly only when companies maintain some degree of confidentiality concerning their products, the benefits of competitiveness within a free market are promoted.
2. Based on Major Ethical Theories:
- All theories profess that employers have moral and institutional rights to decide what information about their organization should be released publicly.
- They acquire these rights as part of their responsibility to protect the interest of the organization.
- All the theories, rights ethics, duty ethics and utilitarianism justify this confidentiality but in different ways.
Effect of Change of Job on Confidentiality:

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

UNIT-5 (GLOBAL ISSUES)

5.1 MULTINATIONAL CORPORATIONS WITH NEAT EXAMPLE:

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.
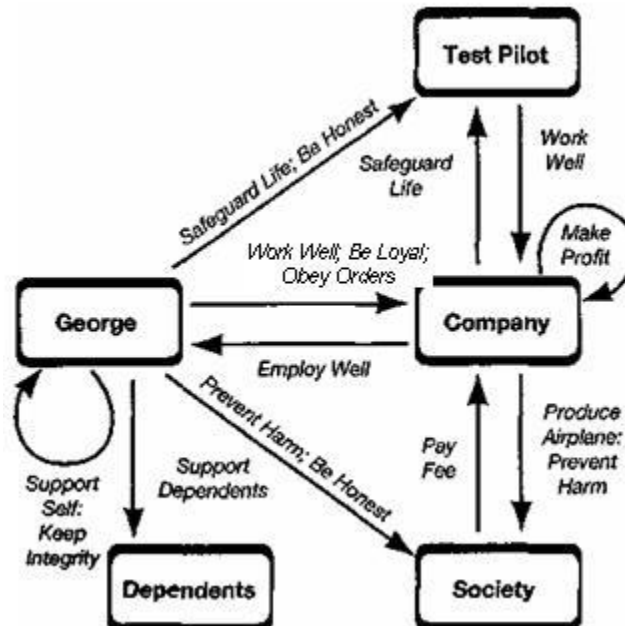
Technology Transfer and Appropriate Technology:

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.‖ The expression appropriate technology is widely used, but with a variety of meanings.

We use it in a generic sense to refer to identification, transfer, and implementation of the most suitable technology for a new set of conditions. Typically the conditions include social factors that go beyond routine economic and technical engineering constraints. Identifying them requires attention to an array of human values and needs that may influence how a technology affects the novel situation. Thus, in the words of Peter Heller, ―appropriateness may be scrutinized in terms of scale, technical and managerial skills, materials/energy (assured availability of supply at reasonable cost), physical environment (temperature, humidity, atmosphere, salinity, water availability, etc.), capital opportunity costs (to be commensurate with benefits), but especially human values (acceptability of the end-product by the intended users in light of their institutions, traditions, beliefs, taboos, and what they consider the good life).‖5 Examples include the introduction of agricultural machines and long-distance telephones.

A country with many poor farmers can make better immediate use of small, single- or two-wheeled tractors that can serve as motorized ploughs, to pull wagons or to drive pumps, than it can of huge diesel tractors that require collectivized or agribusiness-style farming. Conversely, the same country can benefit more from the latest in wireless communication technology to spread its telephone service to more people and over long distances than it can from old-fashioned transmission by wire. Appropriate technology also implies that the technology should contribute to and not detract from sustainable development of the host country by providing for careful stewardship of its natural resources and not degrading the environment beyond its carrying capacity. Nor should technology be used to replace large numbers of individually tended small fields by large plantations to grow crops for export, leaving most of the erstwhile farmers jobless and without a source of home grown food.

The word appropriate is vague until we answer the questions, appropriate to what, and in what way?6 Answering those questions immediately invokes values about human needs and environmental protection, as well as facts about situations, making it obvious that appropriate is a value-laden term. In this broader sense, the appropriate technology might sometimes be small-, intermediate-, or large-scale technology. Appropriate technology is a generic concept that applies to all attempts to emphasize wider social factors when transferring technologies. As such, it reinforces and amplifies our view of engineering as social experimentation. With these distinctions in mind, let us turn to a classic case study illustrating the complexities of engineering within multinational settings.

5.2 COMPUTER ETHICS IS THE TECHNOLOGICAL BACKGROUND OF THE SOCIETY:

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.

5.3 ENVIRONMENTAL ETHICS THROUGH ENGINEERING ECOLOGY AND ECONOMICS:

In addition to global warming, environmental challenges confront us at every turn, including myriad forms of pollution, human-population growth, extinction of species, destruction of ecosystems, depletion of natural resources, and nuclear waste. Today there is a wide consensus that we need concerted environmental responses that combine economic realism with ecological awareness. For their part, many engineers are now showing leadership in advancing ecological awareness. In this chapter, we discuss some ways in which this responsibility for the environment is shared by engineers, industry, government, and the public. We also introduce some perspectives developed in the new field of environmental ethics that enter into engineers' personal commitments and ideals.
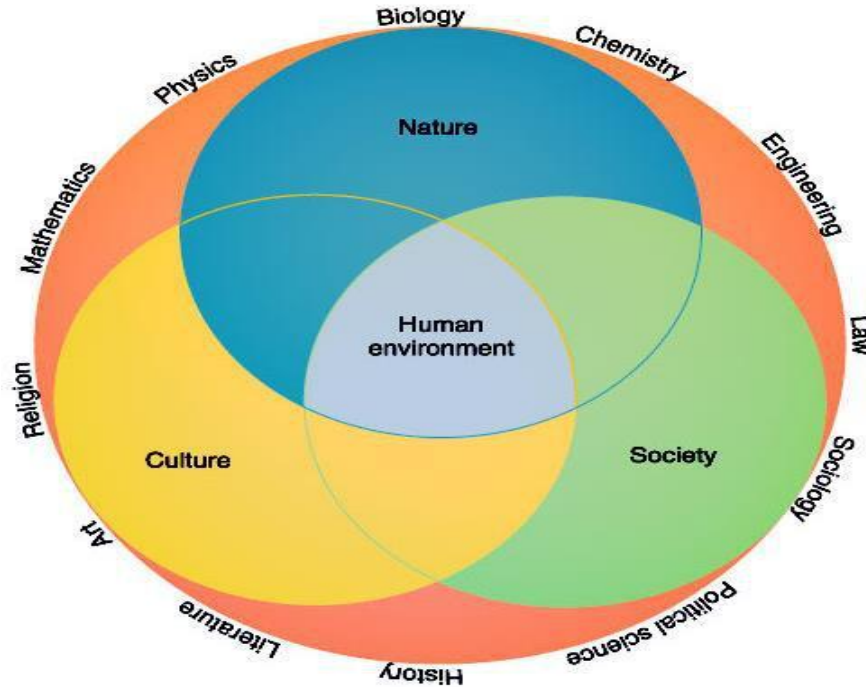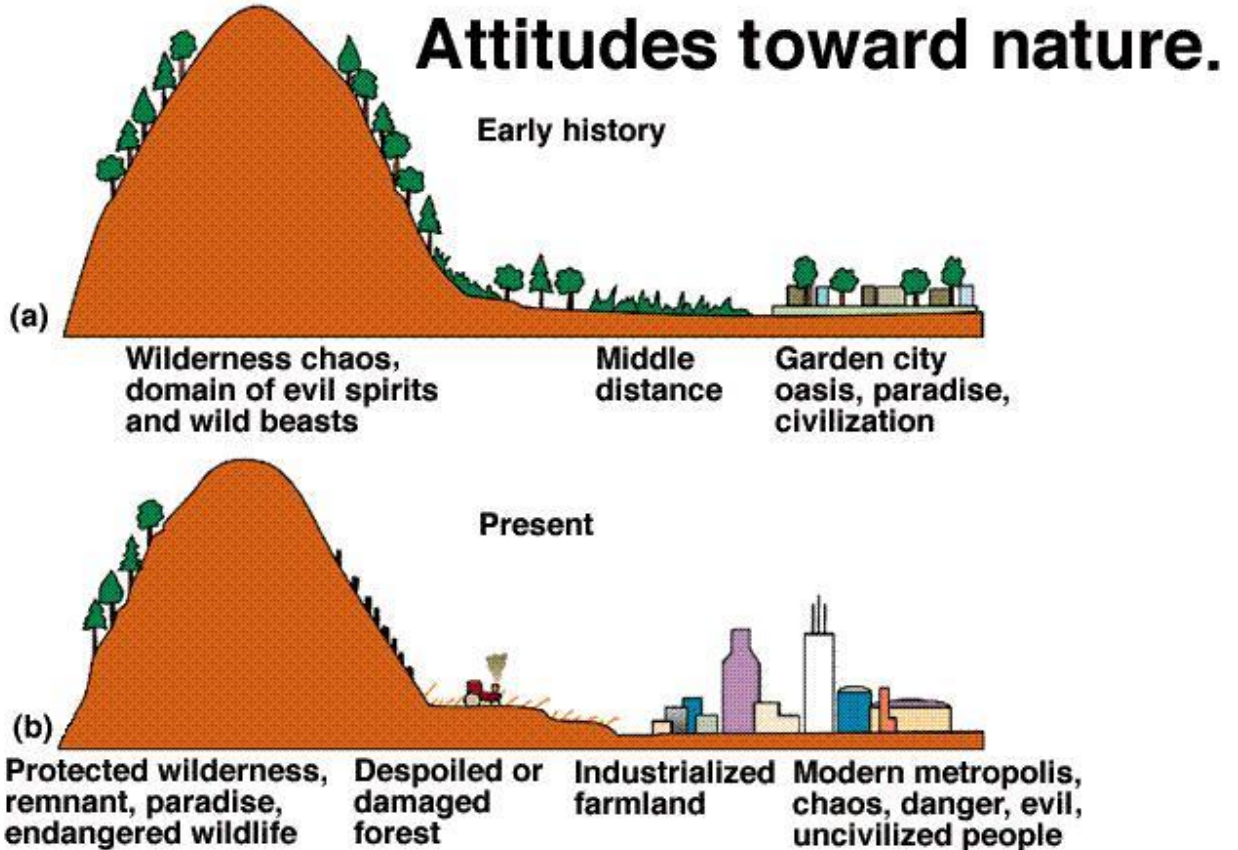
Engineering ecology and economics:

Two powerful metaphors have dominated thinking about the environment: the invisible hand and the tragedy of the commons. Both metaphors are used to highlight unintentional impacts of the marketplace on the environment, but one is optimistic and the other is cautionary about those impacts. Each contains a large part of the truth, and they need to be reconciled and balanced. The first metaphor was set forth by Adam Smith in 1776 in The Wealth of Nations, the founding text of modern economics. Smith conceived of an invisible (and divine) hand governing the Market place in a seemingly paradoxical manner. According to Smith, businesspersons think only of their own self-interest: ―It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest. Yet, although ―he intends only his own gain,‖ he is ―led by an invisible hand to promote an end which was no part of his intention. By pursuing his own interest he frequently promotes that of the society more effactually than when he really intends to promote it. I have never known much good done by those who affected to trade for the public good.

In fact, professionals and many businesspersons do profess to ―trade for the public good,‖ claiming a commitment to hold paramount the safety, health, and welfare of the public. Although they are predominantly motivated by self-interest, they also have genuine moral concern for others.3 Nevertheless, Smith‗s metaphor of the invisible hand contains a large element of truth. By pursuing self-interest, the businessperson, as entrepreneur, creates new companies that provide goods and services for consumers. Moreover, competition pressures corporations to continually improve the quality of their products and to lower prices, again benefiting consumers. In addition, new jobs are created for employees and suppliers, and the wealth generated benefits the wider community through consumerism, taxes, and philanthropy.

Despite its large element of truth, the invisible hand metaphor does not adequately take account of damage to the environment. Writing in the eighteenth century, with its seemingly infinite natural resources, Adam Smith could not have foreseen the cumulative impact of expanding populations, unregulated capitalism, and market ―externalities‖—that is, economic impacts not included in the cost of products. Regarding the environment, most of these are negative externalities—pollution, destruction of natural habitats, depletion of shared resources, and other unintended and often unappreciated damage to ―common‖ resources. This damage is the topic of the second metaphor, which is rooted in Aristotle‗s observation that we tend to be thoughtless about things we do not own individually and which seem to be in unlimited supply. William Foster Lloyd was also an astute observer of this phenomenon.

Attitudes toward nature.

Early history

(a)

Wilderness chaos, domain of evil spirits and wild beasts

Middle distance

Garden city oasis, paradise, civilization

Present

(b)

Protected wilderness, remnant, paradise, endangered wildlife

Despoiled or damaged forest

Industrialized farmland

Modern metropolis, chaos, danger, evil, uncivilized people

In 1833 he described what the ecologist Garrett Hardin would later call ―the tragedy of the commons. Lloyd observed that cattle in the common pasture of a village were more stunted than those kept on private land. The common fields were themselves more worn than private pastures. His explanation began with the premise that individual farmers are understandably motivated by self-interest to enlarge their common-pasture herd by one or two cows, especially given that each act taken by itself does negligible damage. Yet, when all the farmers behave this way, in the absence of laws constraining them, the result is the tragedy of overgrazing that harms everyone.

5.4 HUMAN-CENTERED ETHICS:

Human-centered, or anthropocentric, environmental ethics focuses exclusively on the benefits of the natural environment to humans and the threats to human beings presented by the destruction of nature. In their classic formulations, all of them assume that, among the creatures on earth, only human beings have inherent moral worth and hence deserve to be taken into account in making moral decisions concerning the environment (or anything else). Other creatures and ecosystems have at most ―instrumental value‖—as means to promoting human interests.

Utilitarians enjoin us to maximize good consequences for human beings. In developing an environmental ethic, the relevant goods consist of human interests and goods linked to nature. Many of those pleasures and interests concern engineered products made from natural resources.

In addition, we have aesthetic interests, as in the beauty of plants, waterfalls, and mountain ranges, and recreational interests, as in hiking and backpacking in wilderness areas. We have scientific interests, especially in the study of —natural labs‖ of ecological preserves, such as the rain forests. And most basic, we have survival interests, which are linked directly to conserving resources and preserving the natural environment.

The typical argument of rights ethics is that the basic rights to life and to liberty entail a right to a livable environment. The right to a livable environment did not generally enter into people‗s thinking until the end of the twentieth century, at the time when pollution and resource depletion reached alarming proportions. Nevertheless, it is directly implied by the rights to life and liberty, given that these basic rights cannot be exercised without a supportive natural environment. A right to a livable environment is implied by rights to life and to liberty, and it —imposes upon everyone a correlative moral obligation to respect.

In duty ethics, which makes duties rather than rights fundamental, respect for human life implies far greater concern for nature than has been traditionally recognized. Kant believed that we owe duties only to rational beings, which in his view excluded all nonhuman animals, although of course he did not have access to recent scientific studies showing striking parallels between humans and other primates. Nevertheless, he condemned callousness and cruelty toward conscious animals because he saw the danger that such attitudes would foster inhumane treatment of persons. In any case, a duty-centered ethics would emphasize the need for conserving the environment because doing so is implied by respect for human beings who depend on it for their very existence.

Finally, virtue ethics draws attention to such virtues as prudence, humility, appreciation of beauty, and gratitude toward the natural world that makes life possible, and also the virtue of stewardship over resources that are needed for further generations. Thomas E. Hill, Jr., offers an anecdote: —A wealthy eccentric bought a house in a neighbourhood I know. The house was surrounded by a beautiful display of grass, plants, and flowers, and it was shaded by a huge old avocado tree. But the grass required cutting, the flowers needed tending, and the man wanted more sun. So he cut the whole lot down and covered the yard with asphalt. The man‗s attitudes, suggests Hill, are comparable to the callousness shown in strip mining, the cutting of redwood forests, and other destruction of ecosystems with blinkered visions of usefulness. All these human-centered ethics permit and indeed require a long-term view of conserving the environment, especially because the human beings who have inherent worth will include future generations. Not everything of importance within a human-centered ethics fits neatly into cost-benefit analyses with limited time horizons; much must be accounted for by means of constraints or limits that cannot necessarily be assigned dollar signs.

Yet, some have argued that all versions of human-centered ethics are flawed and that we should widen the circle of things that have inherent worth, that is, value in themselves, independent of human desires and appraisals. Especially since 1979, when the journal Environmental Ethics was founded, philosophers have explored a wide range of nature-centered ethics that, for example, affirm the inherent worth of all conscious animals, of all living organisms, or of ecosystems. Let us consider each of these approaches.

5.5 INVOLVEMENT IN WEAPONS WORK:

Historically, a quick death in battle by sword was considered acceptable, whereas the use of remote weapons (from bow and arrow to firearms) was frequently decried as cowardly, devoid of valour, and tantamount to plain murder.16 As modern weapons of war progressed through catapults, cannons, machine guns, and bombs released from airplanes and missiles to reach further and further, the soldiers firing them were less likely to see the individual human beings— soldiers as well as civilians—they had as their general target. The continuing automation of the battle scene tends to conceal the horrors of war and thus makes military activity seem less threatening and high-tech wars more appealing. How might the men and women who design weapons, manufacture them, and use them feel about their work? For some engineers, involvement in weapons development conflicts with personal conscience; for others, it is an expression of conscientious participation in national defence. The following cases illustrate the kinds of moral issues involved in deciding whether to engage in military work.

1. Bob's employer manufactures antipersonnel bombs. By clustering 665 guava-size bomblets and letting them explode above ground, an area covering the equivalent of 10 football fields is subjected to a shower of sharp fragments. Alternatively, the bombs can be timed to explode hours apart after delivery.

Originally the fragments were made of steel, and thus they were often removable with magnets; now plastic materials are sometimes used, making the treatment of wounds, including the location and removal of the fragments, more time-consuming for the surgeon. Recently another innovation was introduced: By coating the bomb lets with phosphorus, the fragments could inflict internal burns as well. Thus, the antipersonnel bomb does its job quite well without necessarily killing in that it ties up much of the enemy's resources just in treating the wounded who have survived. Bob himself does not handle the bombs in any way, but as an industrial engineer he enables the factory to run efficiently. He does not like to be involved in making weapons, but then he tells himself that someone has to produce them. If he does not do his job, someone else will, so nothing would change. Furthermore, with the cost of living being what it is, he owes his family a steady income.

2. Mary is a chemical engineer. A promotion has gotten her into napalm manufacturing. She knows it is nasty stuff, having heard that the Nobel laureate, Professor Wald of Harvard University, was said to have berated the chemical industry for producing this ―most brutal and destructive weapon that has ever been

created.‖ She saw a scary old photograph from the Vietnam War period, depicting a badly burned peasant girl running from a village in flames. But the locals were said to take forever in leaving a fighting zone and then there were complaints about them being hurt or killed. She abhors war like most human beings, but she feels that the government knows more than she does about international dangers and that the present use of napalm by U.S. forces in Iraq may be unavoidable. Regarding her own future, Mary knows that if she continues to do well on her job she will be promoted, and one of these days she may well be in the position to steer the company into the production of peaceful products. Will Mary use a higher position in the way she hopes to do, or will she instead wait until she becomes the CEO?

3. Ron is a specialist in missile control and guidance. He is proud to be able to help his country through his efforts in the defence industry, especially as part of the ―war on terrorism.‖ The missiles he works on will carry single or multiple warheads with the kind of dreadful firepower

which, in his estimation, has kept any potential enemy in check since 1945. At least there has not been another world war—the result of mutual deterrence, he believes.

4. Marco's foremost love is physical electronics. He works in one of the finest laser laboratories. Some of his colleagues do exciting research in particle beams. That the laboratory is interested in developing something akin to the —death ray‖ described by science fiction writers of his youth is of secondary importance. More bothersome is the secrecy that prevents him from freely exchanging ideas with experts across the world. But why change jobs if he will never find facilities like those he has now?

5. Joanne is an electronics engineer whose work assignment includes avionics for fighter planes that are mostly sold abroad. She has no qualms about such planes going to what she considers friendly countries, but she draws the line at their sale to potentially hostile nations. Joanne realizes that she has no leverage within the company, so she occasionally alerts journalist friends with news she feels all citizens should have. —Let the voters direct the country at election time‖—that is her motto.

6. Ted's background and advanced degrees in engineering physics gave him a ready entry into nuclear bomb development. As a well-informed citizen he is seriously concerned with the dangers of the ever-growing nuclear arsenal. He is also aware of the possibilities of an accidental nuclear exchange. In the meantime he is working hard to reduce the risk of accidents such as the 32 —broken arrows‖ (incidents when missile launchings may have occurred erroneously) that had been reported by the Pentagon during the height of the Cold War, or the many others that he knows have occurred worldwide. Ted continues in his work because he believes that only specialists, with firsthand experience of what modern weapons can do, can eventually turn around the suicidal trend represented by their development. Who else can engage in meaningful arms control negotiations?

5.6 HONESTY:

Honesty means expressing your true feelings. To be able to be emotionally honest we must first be emotionally aware. This emotional awareness is related to our emotional intelligence. It is our emotional intelligence, which gives us the ability to accurately identify our feelings.

Emotional intelligence may also give us the ability to decide when it is in our best interest to be emotionally honest by sharing our real feelings. We would be better off individually and as a society if we would be more honest.

If we are more honest with ourselves we will get to know our —true selves‖ on a deeper level. This could help us become more self-accepting. It could also help us make better choices about how to spend out time and who to spend it with.

If we are honest with other, it may encourage them to be more emotionally honest. When we are emotionally honest we are more likely not to be asked or pressured to do things which we do not want to do. We will also find out sooner who respects our feelings.

How society discourages honesty?

It takes awareness, self-confidence, even courage to be emotionally honest. This is because, in many ways, society teaches us to ignore, repress, deny and lie about our feelings. For example, when asked how we feel, most of us will reply ―fine‖ or ―good‖, even if that is not true. Often, people will also say that they are not angry or not defensive, when it is obvious that they are.

Children start out emotionally honest. They express their true feelings freely and spontaneously. But the training to be emotionally dishonest begins at an early age. Parents and teachers frequently encourage or even demand that children speak or act in ways which are inconsistent with the child's true feelings. The child is told to smile when actually she is sad. She is told to apologize when she feels no regret. She is told to say ―thank you‖, when she feels no appreciation. She is told to ―stop complaining‖ when she feels mistreated. She may be told to kiss people good night when she would never do so voluntarily. She may be told it is ―rude‖ and ―selfish‖ to protest being forced to act in ways which go against her feelings.

As children become adolescents they begin to think more for themselves. They begin to speak out more, ―talk back‖ more and challenge the adults around them. If these adults feel threatened they are likely to defend themselves by invalidating the adolescent's feelings and perceptions. There is also peer pressure to conform to the group norms.

Through all of this the child and adolescent learns they can't be honest with their feelings. They gradually stop being emotionally honest with their parents, their teachers, their friends and even themselves. They learn it just doesn't pay to be express one's true feelings.

A Few More Thoughts On Emotional Honesty

✓ Dishonesty requires more energy than emotional honesty.

✓ When we are emotionally dishonest we lose out on the value of our natural feelings.

✓
When we are emotionally dishonest we are going against the forces of evolution rather than in harmony with them.

✓
It takes energy to oppose reality, nature and evolution.

✓
Emotional dishonesty, in authenticity and falseness create distrust and tension in society.

Comment: Honesty is one of the prized values of mankind. Honesty is an insurance against failure and defame. An honest man is a big asset to the family, to the organization and to the society in general. The honest person may not earn riches but he will certainly earn name and satisfaction of living a good life.

TWO MARKS

UNIT-1(ENGINEERING ETHICS)

1. Define Ethics? (May-08,09,Dec-10)
- Study of right or wrong.
- Good and evil.
- Obligations & rights.
- Justice.
- Social & Political deals.

2. Define Engineering Ethics? (Dec-10)
- Study of the moral issues and decisions confronting individuals and organizations engaged in engineering / profession.
- Study of related questions about the moral ideals, character, policies and relationships of people and corporations involved in technological activity.
- Moral standards / values and system of morals.

3. Differentiate Moral and Ethics?(May-08,Dec-08)

- Refers only to personal behaviour.
- Refers to any aspect of human action.
- Social conventions about right or wrong conduct.

ETHICS:
- Involves defining, analyzing, evaluating and resolving moral problems and developing moral criteria to guide human behaviour.
- Critical reflection on what one does and why one does it.
- Refers only to professional behaviour.

4. What is the method used to solve an Ethical problem?
- Recognizing a problem or its need.
- Gathering information and defining the problem to be solved or goal to be achieved.
- Generating alternative solutions or methods to achieve the goal.
- Evaluate benefits and costs of alternate solutions.
- Decision making & optimization.
- Implementing the best solution.

5. What are the Senses of Engineering Ethics?(Dec-09)
- An activity and area of inquiry.
- Ethical problems, issues and controversies.
- Particular set of beliefs, attitudes and habits.
- Morally correct.

6. Differentiate Micro-ethics and Macro-ethics?
Micro-ethics : Deals about some typical and everyday problems which play an important role in the field of engineering and in the profession of an engineer.
Macro-ethics : Deals with all the societal problems which are unknown and suddenly burst out on a regional or national level.

7. Define Moral Autonomy?(Dec-10)
- Self-determining
- Independent
- Personal Involvement
- Exercised based on the moral concern for other people and recognition of good moral reasons

8. Give the importance of Lawrence Kohlberg"s and Carol Gilligan"stheory?(Dec-08)
Kohlberg gives greater emphasis to recognizing rights and abstract universal rules. Gilligan stresses the importance of maintaining personal relationships based on mutual caring.

9. Differentiate Self-respect and Self-esteem?
Self-respect: It is a moral concept; refers to the virtue properly valuing oneself. **Self-esteem**: It is a psychological concept; means having a positive attitude toward oneself, even if the attitude is excessive or otherwise unwarranted.

10. What are the senses of Responsibility?(May-11)
- A virtue
- Obligations
- General moral capacities of people
- Liabilities and accountability for actions
- Blameworthiness or praiseworthiness

11. What are the types of Theories about Morality?
- Virtue ethics – Virtues and vices
- Utilitarianism – Most good for the most people
- Duty ethics – Duties to respect people
- Rights ethics – Human rights

12. Differentiate Hypothetical imperatives and Moral imperatives?
Hypothetical imperatives are based on some conditions whereas Moral imperatives wont based on some condition.

13. State Rawl"s principles?(Dec-12)
• Each person is entitled to the most extensive amount of liberty compatible with an equal amount for others.
• Differences in social power and economic benefits are justified only when they are likely to benefit everyone, including members of the most disadvantaged groups.

14. Give the drawbacks of Utilitarianism?
• Sometimes what is best for the community as a whole is bad for certain individuals in the community.
• It is often impossible to know in advance which decision will lead to the most good.

15. Give the drawback of Duty Ethics?
Duty ethics does not always lead to a solution which maximizes the public good.

16. Differentiate Ethical Relativism and Ethical Egoism?(Dec-11)
Ethical egoism – the view that right action consist in producing one's own good.
Ethical relativism – the view that right action is merely what the law and customs of one's society require.

17. Define Ethical Pluralism?
Ethical pluralism is the view that there may be alternative moral perspectives that are reasonable, but no one of which must be accepted completely by all rational and morally concerned persons.

18. What do you mean by normative ethics?
Normative ethics deals with the professional codes of ethics that specify role norms or obligations that professions attempt to enforce. It is the recommendations of standards and guidelines for morally right or good behaviour.

19. What do you mean by ethical subjectivism?
Ethical subjectivism argues that what is ethically right or wrong for the individual depends on the ethical principles he/she has chosen. In other words, for people who subscribe to ethical subjectivism what is ethically right or wrong is entirely a personnel matter.

20. What is tacit-ethic and Meta -ethics?
• Tacit ethic deals with the unsaid or unspoken rule of practice.
• Meta-ethics deals with theories about ethics.

PART-B

1. Explain three levels of moral development with respect to Kohlberg and Gilligan views. (Understanding)(Dec-2010, 2011) (May/June 2012) (May/June 2009) (May/June 2013)

2. Discuss briefly on Ethical Theory of Right Action. Differentiate Act and Rule Utilitarian. (Creating)(Dec-2010)

3. What is Moral Dilemma? Explain the various causes of moral dilemma. (Remembering) (Nov/Dec 2013)

4. Define Morality. Explain the various moral issues. (Remembering)

5. Define moral Autonomy. Explain the steps that confronting moral dilemma with its causes. (Remembering)

6.   Discuss different models of professional roles and explain about the consensus and controversy. (Creating)

7.   Define spirituality and discuss the role of spirituality in commercial organizations. (Remembering) (Nov/Dec 2011)

8. Discuss the models of professional roles. (Creating)(May/June 2009) (Dec 2014)

9. Explain the scopes of engineering ethics. (Understanding) (May/June 2013)

10.   Discuss the importance of duty ethics and virtues in engineering profession. (Creating)(May/June 2013)

11. Detail about the senses or dimension of engineering ethics.

12. Summarize the types of inquiries. (Understanding) (Dec 2014)

13. What is consensus and controversy? Brief the importance of consensus while considering moral autonomy in engineering ethics. Bring out the relationship between moral autonomy and respect for autonomy. (Remembering)

14. Explain in detail about profession and professionalism. (Understanding)

15.   Explain the various types of specific virtues. Write notes on professional ideals. (Understanding)

16.   How did Gilligan view the three levels of moral development initiated by Kohlberg? (Remembering) (Dec 2014)

17. What are the uses of ethical theories? (Remembering)

18. Explain the skills needed to handle problems about moral issues in engineering ethics.
(Understanding) (Dec 2014)

UNIT-2 (ENGINEERING AS SOCIAL EXPERIMENTATION)

PART-A

1. What are the conditions required to define a valid consent?
• The consent was given voluntarily.
• The consent was based on the information that rational person would want, together with any other information requested, presented to them in understandable form.
• The consenter was competent to process the information and make rational decisions.

2.   What are the two main elements which are included to understand informed consent?(May-08)
Informed Consent is understood as including two main elements:
• Knowledge [Subjects should be given not only the information they request, but all the information needed to make a reasonable decision].
• Voluntariness [Subjects must enter into the experiment without being subjected to force, fraud, or deception].

3. What are the general features of morally responsible engineers?(May-10,11)
>   • Conscientiousness.
>   • Comprehensive perspective.
>   • Autonomy.
>   • Accountability.

4. What is the purpose of various types of standards?
>   • Accuracy in measurement, inter changeability, ease of handling.
>   • Prevention of injury, death and loss of income or property.
>   • Fair value of price.
>   • Competence in carrying out tasks.
>   • Sound design, ease of communications.
>   • Freedom from interference.

5. Define Code?

6. Enumerate the roles of codes?(Dec-12)
• Inspiration and Guidance
• Support
• Deterrence and Discipline
• Education and Mutual Understanding
• Contributing to the Profession's Public Image
• Protecting the Status Quo
• Promoting Business Interests

7. Give the limitations of codes?
*   Á Codes are restricted to general and vague wording.
*   Á Codes can't give a solution or method for solving the internal conflicts.
*   Á Codes cannot serve as the final moral authority for professional conduct.
*   Á Codes can be reproduced in a very rapid manner.

8. What are the problems with the law in engineering?
• Minimal compliance
• Many laws are without enforceable sanctions.

9. What is the need to view engineering projects as experiments?

• Any project is carried out in partial ignorance.
• The final outcomes of engineering projects, like those of experiments, are generally uncertain.
• Effective engineering relies upon knowledge gained about products before and after they leave the factory – knowledge needed for improving current products and creating better ones.

10. Differentiate scientific experiments and engineering projects?
Scientific experiments are conducted to gain new knowledge, while —engineering projects are experiments that are not necessarily designed to produce very much knowledge‖.

11. What are the uncertainties occur in the model designs?
• Model used for the design calculations.
• Exact characteristics of the materials purchased.
• Constancies of materials used for processing and fabrication.
• Nature of the pressure, the finished product will encounter.

12. Comment on the importance of learning from the past, using Titanic disaster, as an example?
The Titanic lacked a sufficient number of lifeboats.

13. Comment on the importance of learning from the past, using the nuclear reactor accident at Three Mile Island, as an example?
Values are notorious for being among the least reliable components of hydraulic systems. It was a pressure relief valve, and lack of definitive information regarding its open or shut state. Similar Malfunctions had occurred with the identical values on nuclear reactors because of the same reasons at other locations, but no attention had been given to them

14. Give any two prominent features of contemporary engineering practice that differentiate casual influence and moral accountability in engineering?(Dec-11)
• Large-scale engineering projects involve fragmentation of work.
• Due to the fragmentation of the work, the accountability will spread widely within an organization.
• There is frequently pressure to move on to a new project before the current one has been operating long enough to be observed carefully.
• The contagion of malpractice suits currently afflicting the medical profession is carryingover into engineering.

15. Are SRBs inherently too dangerous to use on manned spacecraft? If so, why are they part of the design?
Yes, since they have the disadvantage that once the fuel is lit, there is no way to turn the booster off or even to control the amount of thrust produced. SRBs were used instead of safer liquid fuelled boosters because they required a much smaller research-and-development effort. Numerous other design changes were made to reduce the level of research and development required.

16. Under what conditions would you say it is safe to launch a shuttle without an escape mechanism for the crew?
• Design specifications 310F
• Have given valid consent
• Instead of rubber, steel billets for O-rings
• Liquid fuelled boosters instead of Solid rocket boosters

17. In your opinion, was the „Right for informed consent" of the astronauts of Space Shuttle Challenger respected?

No.

18. Define Ethical Conventionalism?

Ethical conventionalism is the view that a particular set of conventions, customs, or laws is self-certifying and not to be questioned as long as it is the set in force at a given time or for a given place.

19. State Babylon‟s Building Code?

If a builder has built a house for a man and has not made his work sound, and the house which he has built has fallen down and so caused the death of the householder, that builder shall be put to death. If it causes the death of the householder‗s son, they shall put the builder‗s son to death. If it causes the death of the householder‗s slave, he shall give slave for slave to the house holder. If it destroys property he shall replace anything it has destroyed; and because he has not made sound the house which he has built and it has fallen down, he shall rebuild the house which has fallen down from his own property. If a builder has built a house for a man and does not make this work perfect and the wall bulges, that builder shall put that wall into sound condition at his own cost.

20. Mention some universally accepted ethical principles.(May-09,Dec-10)

• Honesty
• Integrity
• Fulfilling commitments
• Abiding by agreements in both letter and spirit
• Willing to admit mistakes
• Being caring and compassionate
• Having respect for human dignity

PART-B

1. What are the moral and ethical lessons learnt from the space shuttle challenger study. (May/June 2012), (Nov/Dec 2013) (Remembering)

2. Explain the role of engineering projects as the experiments. (Understanding)

3. What is code of ethics? What are the positive roles of code of ethics and specify its limitation. (Dec-2010) (Remembering)

4. Compare and contrast engineering experiments with standard experiments. (Dec 2014)(Evaluating)

5. Discuss engineers as responsible experimenters. (Dec-2010) (May/June 2013)(Creating)

6. Explain how moral leadership and ethical work culture influence the ethical behavior of commercial organizations (Nov/Dec 2011) (Understanding)

7. Explain as to how far there is congruence between the professional and environmental ethics. (Nov/Dec 2011) (Understanding)

8. Describe the internal and external responsibility of engineers. (May/June 2012) (Understanding)

9. Discuss the limitations of codes from engineering experimentation point of view. (Nov/Dec 2013) (Creating)

10. Compare and contrast moral values. What are the three types of values? State and explain the various attempts to reduce morality to those types of values with examples. (May/June 2009) (Analyzing)

11. What are the greater details applied to engineer project as conceived as social experiment? Given the codes play all the roles which function are the most valuable and which should be emphasized and encouraged. Why? (May/June 2009)

12. Given an account of the challenger disaster and examine how the principal actors in this tragedy behaved as responsible experimenters within the framework of the engineering as experimentation model. (May/June 2009) (Dec 2014) (Remembering)

13. Write on industrial standards. (May/June 2013) (Remembering)

14. ―The moral responsibility of engineers should go beyond merely following the laws‖. Discuss. (Analyzing)

15. Discuss on the roles played by the codes of ethics set by professional societies. (Dec 2014) (Creating)

UNIT-3 (ENGINEER"S RESPONSIBILITY FOR SAFETY)

PART-A

1. Define Risk?(May-09)
A risk is the potential that something unwanted and harmful may occur.
        Risk = Probability X Consequences.

2. What are the factors for safety and risk?Dec-08,10,11
• Voluntary and Involuntary risk
• Short-term and Long-term risk
• Expected probability
• Reversible effects
• Threshold levels to risk
• Delayed or Immediate risk etc

3. What are the drawbacks in the definition of Lawrence?(May-09)
• Underestimation of risks
• Overestimation of risks
• No estimation of risks

4. Give the categories of Risk?
• Low consequence, Low probability (which can be ignored)
• Low consequence, High probability
• High consequence, Low probability
• High consequence, High probability

5.What are the factors that affect Risk Acceptability?(May-12)
• Voluntarism and control
• Effect of information on risk assessment
• Job related pressures
• Magnitude and proximity of the people facing risk

6. What is the knowledge required to assess the risk?
• Data in design
• Uncertainties in design
• Testing for safety
• Analytical testing
• Risk-benefit analysis

7. What are the analytical methods?May(08)
• Scenario analysis
• Failure modes & effect analysis
• Fault tree analysis
• Event tree analysis etc.

8. What are the three conditions referred as safe exit?
• Assure when a product fails it will fail safely.
• Assure that the product can be abandoned safely.
• Assure that the user can safely escape the product.

9. How will an engineer assess the safety?
• The risks connected to a project or product must be identified.
• The purposes of the project or product must be identified and ranked in importance.
• Costs of reducing risks must be estimated.

• The costs must be weighed against both organizational goals and degrees of acceptability of risks to clients and the public.

• The project or product must be tested and then either carried outor manufactured.

10. What are the reasons for Risk-Benefit Analysis?

1. Risk-benefit analysis is concerned with the advisability of undertaking a project.

2. It helps in deciding which design has greater advantages.

3. It assists the engineers to identify a particular design scores higher with that of the another one.

11. Are the engineers responsible to educate the public for safe operation of the equipment? How?

Yes, as per the engineers are concerned with they should have their duty as to protect for the safety and well being of the general public. Analyzing the risk and safety aspects of their designs can do this.

12. Define Safety?(Dec-10)

In the definition stated by William W. Lawrence safety is defined, as a thing is safe if its risks are acceptable. A thing is safe with respect to a given person or group, at a given time, if its risk is fully known, if those risks would be judged acceptable, in light of settled value principles. In the view of objective, safety is a matter of how people would find risks acceptable or unacceptable.

13. What is the definition of risks?(May-11)

A risk is the potential that something unwanted and harmful may occur. Risk is the possibility of suffering harm or loss. It is also defined as the probability of a specified level of hazardous consequences, being realized. Hence Risk (R) is the product of Probability (P) and consequence(C) (i.e) $R = P * C$

14. Define Acceptability of risks?

A risk is acceptable when those affected are generally no longer apprehensive about it.
Doubtfulness depends mainly on how the people take the risk or how people perceive it.

15. What are the positive uncertainties in determining

risks? There are three positive uncertainties. They are:

a. Purpose of designing

b. Application of the product

c. Materials and the skill used for producing the product.

16. Define Risk-Benefit Analysis?(Dec-08)

Risk benefit analysis is a method that helps the engineers to analyze the risk in a project and to determine whether a project should be implemented or not. In risk benefit analysis, the risks and benefits of a product are allotted to money amounts, and the most benefitiable ratio between risks and benefits is calculated.

17. What does Strict Liability mean?

Strict liability means if the sold product is defective; the manufacturer concerned is liable for any harm that results to users. Negligible is not at all an issue based.

18. What is the main barrier to educational attempts?

An important barrier to educational attempt is that people belief change slow and are extra ordinarily resistant to new information.

19. What happens to the products that are not safe?
Products that are not safe incur secondary costs to the manufacturer beyond the primary costs that must also be taken into account costs associated with warranty expenses, loss of customer will and even loss of customers and so.

20. What was the problem in the Chernobyl
reactor? The problem was that,
i. The output was maintained to satisfy an unexpected demand.
ii. The control device was not properly reprogrammed to maintain power at the required level. iii. Instead of leaving fifteen control rods as required, the operators raised almost all control rods because at the low power level, the fuel had become poisoned.

PART-B

1. Explain Risk Benefit analysis and Risk Management. (Dec-2010) (Dec 2014) (Understanding)

2. What are the factors that caused Chernobyl accident and discuss the concept of safety exist in the chernobyl case studies. (May/June 2013) (Dec 2014) (Remembering)

3. Give a detailed discussion on safety and risk, cost and price. (Remembering)

4. What are the factors that cause the nuclear accident of Three Mile Island? (Remembering)

5. Explain the role of corporate culture in ethical decision making (Nov/Dec 2011) (Understanding)

6. Explain the role of ethics and values in developing software (Nov/Dec 2011) (Understanding)

7. When no judgments about Risks are made? Explain the assessment of Risk and Safety method. (May/June 2012) (May/June 2013) (Analyzing)

8. Explain the personal risk and public risk with examples. Suggest suitable safety precautions based on the three miles case study. (May/June 2009) (Understanding)

9. How shall be the government regulator's approach to risk? (May/June 2013) (Remembering)

10. Explain in detail the effect of information on risk assessment with an example. (Dec 2014) (Understanding)

11. Discuss in detail about the Bhopal disaster case study. (Analyzing)

UNIT-4 (RESPONSIBILITIES AND RIGHTS)
PART-A

1. Define Collegiality.(Dec-10,11)
Collegiality is a kind of connectedness grounded in respect for professional expertise and in a commitment to the goals and values of the profession and collegiality includes a disposition to support and cooperate with one's colleagues.

2. What are the central elements of collegiality? i. Respect
ii. Commitment
iii. Connectedness
iv. Cooperation

3. What are the two senses of Loyalty?(Dec-09)
i. Agency Loyalty – Acting to fulfill one's contractual duties to an employer. It's a matter of actions, whatever its motives.
ii. Identification Loyalty – Has as much as to do with attitudes, emotions, and a sense of personal identity as it does with actions.

4. When may an Identification Loyalty be said as obligatory?
i. Employees must see some of their own important goals as met by and through a group in which they participate.
ii. Employees must be treated fairly, each receiving his or her share of benefits and burdens.

5. What is the relationship between the Loyalty to the company and Professional responsibility to the public?
i. Acting on professional commitments to the public can be a more effective way to serve a company than a mere willingness to follow company orders.
ii. Loyalty to companies or their current owners should not be equated with merely obeying one's immediate supervisor.
iii. An engineer might have professional obligations to both an employer and to the public that reinforce rather than contradict each other.

6. Define Institutional Authority?(May-08)
Institutional Authority is acquired, exercised and defined within organizations. It may be defined as the institutional right given to a person to exercise power based on the resources of the institution.

7. Define Expert Authority?
Expert authority is the possession of special knowledge, skill or competence to perform task or give sound advice.

8. What is the basic moral task of salaried engineers?
The basic moral task of salaried engineers is to be aware of their obligations to obey employers on one hand and to protect and serve the public and clients of the other.

9. What are the guidelines to reach an agreement?
i. Attack problem and not people.
ii. Build trust.
iii. Start with a discussion and analysis of interests, concerns, needs. It begin with interests, not positions or solutions.

iv. Listen.

v. Brainstorm; suggesting an idea does not mean one aggress with it. Develop multiple options.

vi. Use objective criteria whenever possible. Agree on how something will be measured.

10. What are the essential elements of IPR?

i. Patents

ii. Copyrights

iii. Trademarks

iv. Trade secrets

11. What are the criteria for identifying that information is "labelled" confidential at the workplace?

i. Engineers shall treat information coming to them in the course of their as confidential.

ii. Identify any information which if it became known would cause harm to the corporation or client.

iii. Confidential information is any information that the employer or client would like to have kept secret in order to compete effectively against business rivals.

12. What are the terms associated with Confidentiality?(Dec-12)

i. Privileged Information

ii. Proprietary Information

iii. Patents

iv. Trade secrets

13. How will you justify the obligation of confidentiality?

The obligation of confidentiality can be justified at two

levels. FIRST Level : Moral Considerations

        Respect for autonomy

        Respect for promises Regard

        for public well-being

SECOND Level : Major Ethical Theories

        Rights Ethicists

        Duty Ethicists

        Rule-utilitarians

        Act-utilitarians

14. Define Conflicts of Interest?(May-10)

Conflict of interests is a situation in which two or more interests are not simultaneously realizable. It is the disagreement between public obligation and self-interest of an official.

15. Why does a conflict of interests

arise? a. Financial Investments

b. Insider

Trading c. Bribe

d. Gifts

e. Kickbacks

16. What is a Bribe?

A Bribe is a substantial amount of money or goods offered beyond a stated business contract with the aim of winning an advantage in gaining or keeping the contract.

17. What is called „White-collar crime"?

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

18. What is called Kickbacks?

Prearranged payments made by contractors to companies or their representatives in exchange for contracts actually granted are called kickbacks.

19. What are the types of Conflicts of interest? i. Actual conflict of interest

ii. Potential conflict of interest

iii. Apparent conflict of interest

20. How will you solve the Conflict problems?

i. Finding the creative middle way.

ii. Employing Lower-level considerations.

iii. Making the hard choice.

PART-B

1. Discuss on collegiality and loyalty. (Dec 2014)(Understanding)
2. What is meant by loyalty? What are the two senses of loyalty? Is loyalty obligatory? Explain the relationship between professional responsibility and loyalty to employers(May/June2012) (Remembering)
3. Discuss human rights and professional rights in an engineering field. (Dec 2014)(Analyzing)
4. Explain with case studies the four widely applicable principles of conflict resolution. (Nov/Dec 2013)
5. How far the respect for authority be recognized by salaried professionals as being morally justified? Discuss. (Nov/Dec 2013) (Remembering)
6. Explain the collective bargaining with its roles and occupational crime. (Dec-2010) (May/June 2013) (Dec 2014)(Understanding)
7. How will you apply confidentiality for avoiding harmful conflicts of interests in work place? (May/June 2013) (Remembering)
8. Summarize on IPR. (May/June 2013) (Understanding)
9. What is a conflict of interest? Explain the different types of conflicts of interest with suitable examples. (Remembering) (Remembering)
10. What is meant by respect for authority? Describe in detail how institutional authority differs from expert authority. (Remembering)
11. What is meant by discrimination? Discuss your experience of some situation where you are discriminated. (Remembering)
12. Discuss in detail the various basic rights of an engineer. (Remembering)
13. Write in detail about the employee rights. (Remembering)
14. What is Intellectual Property Rights? Explain various elements of IPR in detail. (Dec 2014) (Remembering)

UNIT-5 (GLOBAL ISSUES)

PART-A

1.What are global issues?(May-08,09)

The social and environment aspects of engineer's profession and also the international context of engineering is called global issues. The global issues involve engineers as social experimenters.

2.What are the three versions of Relativism?

i . Ethical Relativism ii . Descriptive Relativism iii . Moral Relativism

3. Differentiate between technology transfer and appropriate technology.

The process by which technology is shifted to a novel setting and its subsequent implementation is called technology transfer. Whereas the process by which the suitable technology is properly identified, transferred and implemented in a new set of an environment is called appropriate technology.

4. Give any ten International rights suggested by Donaldson?(Dec-10)

- The right to freedom of physical movement.
- The right to ownership of property.
- The right to freedom from torture.
- The right to a fair trial.
- The right to non-discriminatory treatment.
- The right to physical security.
- The right to freedom of speech and association.
- The right to minimal education.
- The right to political participation.

5. What are the reasons for the disaster at Bhopal?(Dec-10)

- The tanks used to store Methyl Iso-cyanate were overloaded to a tune of 75%.
- The emergency plant was al so filled with a large amount of chemicals.
- The entire refrigeration unit had been shutdown as a measure to reduce the cost and this led to increase of temperatures to a higher level.
- One of the disappointed workers unscrewed a pressure gauge on a tank and inserted a hosepipe into i t, knowing that i t would cause damage, but not to this extent.
- Scrubber has also been shut down.
- Flare tower was al so not in an operating condition.
- Unfortunately there were no emergency drills or evacuation plants available.

6.What is the important concept of environmental ethics?

The new branch of applied ethics which is associated with the restoration of natural environment in a balanced state by not harming the human society through vast industrialization is called environmental ethics.

7.What are the characteristic features of human-centered environmental ethics?

The conservation of natural resources for the benefit of present and future generations and the strong emphasis on the human awareness on the destruction of nature are the characteristic features of human-centered environmental ethics.

8. What is embezzlement?(Dec-10)

   The process of committing computer crimes such as stealing or cheating clients and consumers and conspiracy in the fraudulent uses of computer networks is called embezzlement.

9.How engineers justify their involvements in weapons works?

   A steady and constant source of income for the livelihood of their families, better job promotional avenues with an enhanced salary and compulsive reservations in mental attitude are the primary factors with which engineers justify and compromise themselves to work defence industries.

10. What are the problems of Defence industry?

 a) Problem of waste and huge cost in implementing and maintaining a weapons system.

 b) Problem of Technology creep.

 c) Problems in maintaining secrecy.

 d) Every country allocates large amount of its resources to defence sector [India spent ¼ of i ts resource for defence]

11. What is an ethical climate?(May-11)

   The favourable and workable atmosphere that is essential for the responsible conduct of an engineer is called ethical climate. This ethical climate enables engineers to contribute their maximum best to their corporate companies.

12. What are the special features of an ethical corporate climate?

- Ethical values are widely appreciated by managers and employees.
- A corporate code of ethics is emphasized for using ethical language.
- Moral tone is set up in policies by management by providing suitable guidelines for professional codes of ethics..
- Proper methods and procedures for conflict resolution are suitably evolved.

PART-B

1. Explain the code of ethics specified by IEEE and ASCE. (May/June 2013)(Understanding)

2. Discuss on computer, business and environmental ethics? (Dec-2010) (Dec 2014) (Creating)

3. Discuss an engineer's involvement in weapons work. (May/June 2013) (Dec 2014) (Creating)

4. Explain the code of ethics specified by ASME and IETE. (Understanding)

5. Explain the process of creating an ethical organization.(Nov/Dec 2011) (Understanding)

6. Discuss the role of media in promoting ethical practices among business. (Nov/Dec 2011) (Creating)

7. Define Technology transfer. Why engineers to study computer ethics? Explain the customer relation to computer ethics and the importance of computer ethics. (May/June 2012) (Understanding)

8. Define the following concepts. i) Biocentric ethics ii) eucentric ethics iii) sentient centre ethics. (May/June 2012) (Remembering)

9. State an illustrative case study that touches upon some fundamental issues in environmental ethics. (Nov/Dec 2013) (Remembering)

10. Do engineers have a moral right to carry out what they consider to be unethical activity? Explain in detail with a case study. (Nov/Dec 2013) (Analyzing)

11. What do environmental ethics deal with? Discuss the holistic approach of environmental ethics. Write a note on acid rain. (May/June 2009) (Remembering)

12. What are the reasons for selecting engineers as managers? How to maintain the ethical climate in organization? List the principles for conflict resolution and how to solve the conflicts through the managerial approach. (May/June 2009) (Dec 2014) (Remembering)

13. Discuss the ethical issues related to computer and internet. (May/June 2013) (Dec 2014) (Creating)

14. Differentiate honesty and moral leadership. (May/June 2013)

15. Discuss the different forms of relativism with respect to MNCs. (Creating)

16. Explain the role of engineers as consultant. (Understanding)

17. Discuss the role of engineers as expert witness and advisors. (Dec 2014) (Creating)