

Human Values:

1.1. Morals:

Moral values are relative values that protect life that are respectful of the dual life value and others. The great moral values such as truth, freedom, charity etc.

Examples:

- * Do not vandalize property
- * Do not cheat
- * Have courage
- * Keep your promises.
- * Treat others as you want to be treated.

1.2. values:

A value is defined as a principle that promotes well being or prevents harm. Another definition is values are our guidelines.

for our success. Personal values are defined as - Emotional beliefs in principles regarded as particularly favorable or important for the individual.

Values are the scales we use. Dr. Abraham Maslow illustrated this with his hierarchy of human needs. Survival has a higher priority than security, which has higher priority than social acceptance.

1.2.2. Types of values

The five core human values are

- (i) Right conduct
- (ii) peace
- (iii) Truth
- (iv) Love
- (v) Non violence.

⑤
Values related to Right conduct are
Values related to Right conduct are

- (a) Self help skills : Care of professions, diet, hygiene, modesty, posture
 - (b) Social skills: Good behaviour, good manner, good relationship, helpfulness
 - (c) Ethical skills: Code of conduct, language, dependability, duty, efficiency, punctuality
- Values related to peace are:

- (a) Attention
- (b) calmness
- (c) Concentration,
- (d) contentment
- (e) dignity,
- (a) discipline

Values related to Truth are:

Accuracy, Curiosity, discernment, fairness,
fearlessness, honesty, integrity

(A)

4. Values related to Love are:

- (i) Acceptance
- (ii) Affection,
- (iii) care
- (iv) Compassion
- (v) Consideration,
- (vi) dedication

Values related to Non violence are:

- (a) Psychological: Benevolence, compassion, concern for others, consideration, forbearance, forgiveness.
- (b) Social: Appreciation of other cultures and Religions, brotherhood, care of environment, citizenship, equality, humanness.

1.2.3. Evolution of human values:

- (1) The impact of norms of the society on the fulfillment of the individual needs or desires
- (2) Developed (or) modified by one's own awareness.

- (3) By the teaching and practice of preceptors,
* Fostered (or) modified by social leaders.

Types of values:

- * Right conduct
- * Truth
- * Peace
- * Love
- * Non violence

1.8. Ethics:

Ethics is the word that refers to morals, values, and beliefs of the individuals, family or the society.

A person who knows the difference between right and wrong and chooses right is moral. A person whose morality is reflected in his willingness to do the right thing, even if it is hard (or) dangerous.

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1.4 Integrity:

Integrity is defined as the unity of thought, word and deed and open mindedness. It includes the capacity to communicate the factual information so that others can make well informed decisions.

It yields the persons peace of mind and hence adds strength and consistency in character, decisions and actions.

It helps them to own the responsibility and earn self-respect and recognition by doing the job.

Moral integrity is a virtue, which reflects a consistency of ones attitudes, emotions and relation to justified moral values.

1.5 Work Ethics: ⑦

The work ethics is aimed at ensuring the economy, productivity, safety, health and hygiene, privacy, security, welfare.

1. The people desired to be recognized as individuals related with dignity as living human beings
2. Economic independence: work is the major instrumental good in life. It is the main source of providing the income needed to avoid economic dependence on others.
3. Pay as well as the pace of work should be in commensurate with the expertise required.
- A. Privacy of the employees, including women is to be protected.

5. Security of the job and upon retirement

6. Recognition to non work activities such as leisure, paid holiday on the day of visit of a social service and other development activities.

7. Hard work and Productivity: Hard work and productivity are the very essential for the success in the industry.

8. Employee alienation

9. A different view of work ethics:

Work is considered as the necessary evil. It is a thing one must do in order to avoid worse evils as dependency and poverty.

1.6. Service learning:

Service learning refers to the learning of the service policies, procedure

norms and conditions ^⑨ other than the technical trade practices.

Alternatively service learning may be defined as the nonpaid activity in which service is provided on voluntary basis to the public, non profitable institutions.

The service learning is the methodology falling under the category of experiential education. It is one of the forms of experiential learning and Community service.

1. Connection to curriculum: Integrating the learning into a service project is a key to Successful service learning
2. Learned voice:
3. Reflection: Structured opportunities are

Created to think, talk, write about the service experience. (10)

4. Partners in the Community: Partnerships with community agencies are used to identify genuine needs, provide mentorship and contribute input such as labor and expertise towards completing the project.

1.7. Virtues:

Virtues are positive and preferred values. Virtues are desirable attitudes or character traits, motives and emotions that enable us to be successful and to act in ways that develop the highest potential.

Virtues are ⁽ⁱⁱ⁾ tendencies which include solving problems through peaceful and constructive means and follow the path of golden mean between the extremes of excess and deficiency.

1.7.1. Civic Virtues:

The duties are

(i) To pay taxes as to the local government and state in time.

2. To keep the surrounding green and clean.

3. Not to pollute the water, land and air.

4. To follow the road safety rules

5. To vote the local and state government

6. To content in the elections to the local or the state government

7. To establish a green and safe green environment.

These virtues are ⁽¹²⁾ divided into four categories.

(1) Civic Knowledge:

citizens must understand what the Constitution says about how the government is working and what the government is supposed to do and what not to do.

2. Self Restraint:

— For citizens live in a free society with limited government, each citizen must be able to control and restrain himself.

3. Self Assertion:

— Self assertion means that the citizens must be proud of their rights and have the courage to stand up in public and defend their rights,

A. Self-Reliance: ⁽¹³⁾

Citizens who cannot for themselves will need a large government to take care of them. They do not need a large provider government, which has the potential to become an aggressive government.

1.8. Respect for Others:

This is a basic requirement for nurturing friendship, team work, and for the synergy it promotes and sustains.

* Recognize and accept the existence of other persons as human beings because they have right to love, just as you have

- * Respect other ⁽¹⁴⁾ ideas words and labors.
- * Show goodwill on others. Love others,
Allow others to grow. Basically the goodwill
reflects on the originator and multiplies
itself on everybody.

1.9 Living Peacefully:

→ To live peacefully one should
start install peace within. Charity begins
at home. Then one can spread peace to
family, organization where one works and
then to the world including the
environment

Nurture:

- * order in one's life
- * Creativity in ones hands
- * Beauty in ones heart

Goal:

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* Good health / body

Act:

* Help the needy with head heart and hands

* Not hurting and torturing others either physically verbally and mentally.

1.10 Caring:

Caring is the feeling for others. It is a process of which exhibits the interest and support for the welfare of the others. Caring is reflected in the activities such as various transactions in the family, fraternity, community and country in international councils.

In the present day constant caring for the environment has become necessity for survival.

1.11 Sharing: (16)

Sharing is primarily caring the process that describes the transfer of the knowledge, teaching, learning and information experiences, commodities and facilities with others. The transfer should be genuine legal positive, voluntary and without the expectation

In short sharing is charity

For the humanity sharing is culture

1.12. Honesty:

Honesty is a virtue and it is exhibited in two aspects

- (a) Trustfulness
- (b) Trustworthiness.

Trustfulness is free to respond to selling the truth

Honesty is mirrored ⁽¹⁷⁾ in many ways

- (a) Beliefs
- (b) Communication
- (c) decision
- (d) Actions
- (e) Intentioned and unintentional details.

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

1. Lying
2. Deliberate deception
3. withholding the information
4. Not seeking the truth
5. Not maintaining confidentiality

1.13 Courage:

Courage is the tendency is to accept the face risks and difficult tasks in rational ways. Self confidence is the

basic requirement to ⁽¹⁸⁾ nurture courage. Courage is classified into three types namely

(a) physical courage

(b) social courage

(c) Intellectual courage

In physical courage the trust is on the adequacy of the physical strength including the muscle power and armaments.

The social courage involves the decisions and actions to change the order based on the conviction for or against certain social behaviours.

The Intellectual courage is instilled in people through acquired knowledge, experience, games, tactics, education and training.

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The courageous people war and show the following characteristics

- (a) perseverance
- (b) Experimentation
- (c) Involvement
- (d) Commitment.

1.14 Valuing time:

Time is rare resource. Once it is spent it is lost forever. It cannot be either stored or recovered. Hence time is the most valuable resource too. This resource is continuously spent whether any decision or action is taken or not.

To realize the value of one year ask the student who has failed in the examination.

1.15 Cooperation: (20)

It is the team spirit with every individual engaged in engineering

Cooperation is activity between two persons or sectors that person of either party, further working together ensures coherence.

Willingness to understand others think and act together and putting this into practice is cooperation. Cooperation promotes collinearity, coherence, coordination and the synergy. The whole is more than the sum of individuals. It helps to minimize the input resources and maximize the output.

1.16 Commitment:

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* Commitment means alignment to goals and adherence to ethical principles during the activities. First of all one must believe in ones action performed and the expected end results. It means one should have the conviction without an iota of doubt that one will succeed.

* This is the basic requirement of any profession. For example a design engineer shall exhibit a sense of commitment to make this product or project designed a beneficial contribution to the society.

1.17 Empathy:

Empathy is a social radar. Sensing what others feel about without separation their feel is the essence of empathy.

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To practice Empathy a leader must have develop in him the following characteristics

1. Understanding others
2. Service orientation
3. Developing others.

Communication = 22% reading and writing

+ 23% speaking + 55% listening.

4. Leveraging diversity
5. Political awareness

The benefits of empathy include

1. Good customer relations
2. Harmonious labour relation
3. Good vendor producer relations.

1.18 Self Confidence:

- * Certainty in ones own capabilities, values and goals is the self confidence. These peoples are usually positive thinking flexible.
- * self confidence is positive attitude.
- * They are not influenced by the threats or challenges and are prepared to face them and the natural or unexpected consequences.
- * The self confidence in a persons develops a sense of partnership respect and accountability.

Characteristics:

1. Self assumed standing.
2. willing to listen to learn from others adopt
3. Frank to speak to truth
4. Respect for others.

The factors that ⁽²⁴⁾ shape self confidence are

1. Heredity
2. Friendship
3. Influence of superior
4. Training in the organization

1.19 characters:

The biggest workplace challenge is said to be the employees work ethics, showing up to work on time, taking pride in the quality of their work, commitment to the job, and getting along with the others.

Types of characters:

- (a) the sensitive
- (b) the active
- (c) the apathetic
- (d) The intelligent.

Building character in the workplace:

1. Employee hiring, Training, Promotion

The six pillars of character are the ethical values are

(a) trustworthiness

(b) respect

(c) responsibility

(d) fairness

(e) caring

(f) citizenship.

Responsibility is

(a) being accountable for ones actions

(b) being dependable in carrying out obligations

(c) being reliable and consistent in word and word and action

(d) committed to community development.

2. Internal Communication:



- (a) internal newsletters
- (b) workplace parties in canteens
- (c) mailers and
- (d) E mail.

3. External Communication:



- (a) advertise and market honoring
- (b) more of your products and service quality.
- (c) Include positive message about voluntarism & celebrity

1.20 Spirituality:



Spirituality is a way of living that empowers the constant awareness and recognition of the spiritual dimension.

Sometimes spirituality overrides the faith or belief in supernatural power/god regarding the worldly events.

Spirituality in the workplace:

- 1. Verbally respect the individuals as human and recognize their values.
- 2. State your personal ethics and your beliefs clearly
- 3. Support causes outside the business.
- 4. Encourage leaders to use value based discretion in making decisions.

Spirituality for Corporate excellence:

- 1. Self awareness.
- 2. Being visionary and value based
- 3. Holism.
- 4. Compassion

5. Respect for diversity

6. Moral autonomy.

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

Benefits of Yoga meditation:

- * Strength increases
- * Endurance increases
- * Energy level increases
- * Weight normalizes
- * Sleep improves
- * Pain decreases.
- * Blood pressure control.

Unit - II

Engineering Ethics

2.1 Senses of Engineering Ethics

The word Ethics has different meanings but they are correspondingly related to each other.

In connection with that, Engineering ethics has also various senses which are related to one another.

Engineering ethics is a study of the moral issues and decisions confronting individuals and organisations engaged in engineering/profession.

It is a study of related questions about the moral ideas,

Character, policies and relationships
of people and corporations involved
in technological activity. Moral
Standards / values and System of
Morals.

Need to study Ethics:

- * To responsibly confront moral issues raised by technological activity.
- * To recognize and resolve moral dilemma.
- * To achieve moral autonomy.

Ethics

- * Involves defining, analyzing, evaluating and resolving moral problems and developing moral criteria to guide human behaviour.
- * Refers only to professional behaviour.

2.2 Variety of ^③ Moral issues:

The term 'morality' concerns with

* what ought or ought not be done in a given situation.

* what is right or wrong in handling it

* what is good or bad about the persons, policies and principles involved in it.

If an action is said to be morally right or a principle is said to be morally good; then they are said to be had some moral reasons in supporting it.

Moral reasons include respecting others and ourselves, respecting the rights of others, keeping promises,

avoiding unnecessary problems to others and avoiding cheating and dishonesty, showing gratitude to others and encourage them to work.

There are so many Engineering disasters which are greater/heavier than the level of acceptable or tolerable risk.

Example

* Nuclear plant accident at Chernobyl (Russia), Chemical plant at Bhopal (India) where a big disaster of gas leakage, occurred in 1980, which caused many fatal accidents.

* In the same way, oil spills from some oil extraction plants, hazardous waste, pollution and

2.3. Types of Inquiry

Inquiry means an investigation. Like general Ethics, Engineering Ethics also involves investigations into values, meaning and facts. The inquiries in the field of Engineering Ethics are of three types

- ① Normative Inquiries
- ② Conceptual Inquiries
- ③ Factual or Descriptive Inquiries.

① Normative Inquiries!

These inquiries are mostly helpful to identify the values which guide the individuals and groups in taking a decision.

These are meant for identifying and justifying some

norms and standards of morally desirable nature for guiding individuals as well as groups.

② Conceptual Inquiries :

These are meant for describing the meaning of concepts, principles and issues related to Engineering Ethics.

These inquiries also explain whether the concepts and ideas are expressed by single word or by phrases.

③ Factual / Descriptive Inquiries.

These help to provide facts for understanding and finding solutions to value based issues.

The engineer has to conduct factual inquiries by using scientific techniques.

and other related services, natural disasters like floods, earthquake and dangers from using asbestos and plastics are some more cases for engineering disasters. These fields should be given awareness of Engineering Ethics.

Approaches to Engineering Ethics

- ① Micro Ethics
- ② Macro Ethics.

① Micro Ethics :

This approach stresses more about some typical and everybody problems which play an important role in the field of engineering and in the profession of an engineer.

② Macro - Ethics

This approach deals with all

the social ^⑧ problems which are unknown and suddenly burst out on a regional or national level.

Where and How do Moral problems arise in Engineering

Any product or project has to undergo various stages such as planning, idea, design and manufacturing which is followed by testing, sales and services.

This has to be done by Engineers of various branches like civil, Mechanical, Electrical, Chemical etc.

These Engineers may be grouped together as a team or they may be separated from each other with an interconnection or coordination.

2.4 Moral Dilemmas ⁽⁹⁾

Dilemmas are certain kind of situations in which difficult choice has to be made.

Moral dilemmas can also be called moral problems. Moral dilemmas have two or more foldings - moral obligations, duties, rights, goods or ideals come into disagreement with each other.

One moral principle can have two or more conflicting applications for a particular given situation.

Moral dilemmas can be occurred in so many ways.

Example

Suppose one gives a promise to his friend that he will meet

him on the ⁽¹⁰⁾ evening of a particular day, but unfortunately on the same day his brother has met with an accident and he has to take him to hospital.

The dilemma here consists of a conflict between the duty to keep promises and obligations to his brother.

In this situation, to solve his moral problem, he can make a phone call to his friend and make apology for his inability to come.

So, from the above it is clear that the duty to keep promise always has two different and conflicting applications.

2.5 Moral Autonomy (11)

2.5.1 Meaning and causes

Autonomy means self-governing or self determining. ie act independently.

Moral Autonomy means the right or the wrong conduct which is of independent on ethical issues.

It deals with the improvement of an individual's moral thoughts which make high to adopt good habits.

2.5.2 The need for Moral autonomy in the field of Engineering Ethics :

The objectives of engineering ethics are not related to implanting particular moral beliefs on engineers.

The structural objective of engineering ethics is to be enable the individuals to understand the moral responsibilities in a clear and careful manner.

So the main aim of studying engineering ethics is to increase the moral autonomy within him.

2.5.3. skills for Improving Moral autonomy

* They must have the imaginative skill to view the problems from all view points and also be able to suggest a proper alternative solution.

* They must have some better knowledge in understanding about the use of ethical language.

* They must have to tolerate while giving Moral judgments.

* They must understand, importance of maintaining moral honesty.

2.6. Kohlberg's theory:

Moral Aut^{no}onomy is based on the Psychology of moral development.

The first psychological theory was developed by Jean Piaget.

On the basis of Piaget's theory Lawrence Kohlberg developed three main levels of moral development.

① The pre conventional level.

② The Conventional level.

③ The post conventional level.

2.6.1. The pre conventional level.

It is nothing but self-centered attitude.

In this level, right conduct is very essential for an individual which directly benefits him.

This level is ⁽¹¹⁾ related to the moral development of children and some adults who never want to go beyond a certain limit.

2.6.2. The conventional level

The level ideas deal with the respect for conventional rules and authority.

As per this level the rules and norms of one's family or group or society has been accepted as the final standard of morality.

Loyalty and close identification with others have been given much importance.

No adult tries to go beyond this level.

2.6.3. The post conventional level

This level is said to be

attained when ⁽¹⁵⁾ an individual recognizes the right and wrong on the basis of a set of principles which governing rights and the general good which are not based on self interest.

2.7. Gilligan's theory

2.7.1. Gilligan's argument

Carol Carol Gilligan was one of the students of Kohlberg. She criticizes Kohlberg's theory on the basis of approach made by both male and female towards morality.

On the basis of her studies and researches, she criticizes Kohlberg's theory which is only based on male bias and his studies are of typically male preoccupation with general rules and rights.

2.7.2. levels of ⁽¹⁶⁾ Moral Development.

Gilligan recasts Kohlberg's three levels of moral development on the basis of her own studies of women as follows.

- ① Pre conventional level.
- ② The conventional level
- ③ The post conventional level.

① Pre conventional level

Right conduct is a selfish thing as solely one what is good for oneself.

② The conventional level

According to her, women don't want to hurt others and want to help others.

③ The post conventional level

In this level, individuals want to balance between caring about other people and their interests.

Q.8. Consensus and controversy ⁽¹⁷⁾

* consensus means 'agreement' and 'controversy' means 'disagreement'.

* The consensus and the controversies are playing the vital roles while considering the moral autonomy.

* Both the goals of engineering ethics and goals of engineering courses have some similarities.

Example

In the classroom, the teachers are having the authority over students. and in work place; the managers are having the authority over engineers.

* There are two general points regarding the relationship b/w 'autonomy and authority with reference to the classroom.

① Moral autonomy⁽¹⁸⁾ and respect for the authority cannot be differentiated or separated from each other. Moral autonomy is exercised on the basis of moral concern for other people and also recognition of good moral reasons.

② Generally, a tension may arise among the individuals regarding the need for consensus about authority and need for autonomy.

-- for example, in small classes, the students are having the authority to express their own views. But when the professor doesn't allow them to do so, he misuses his authority. This will create some moral problems b/w students and the faculty.

2.9 Models of Professional Roles : (19)

A professional is a member of a profession. The term also describes the standards of education and training that prepare members of the profession with the particular knowledge and skills necessary to perform the role of that profession.

Definition of a Profession

"A profession is a disciplined group of individuals who adhere to ethical standards and who hold themselves out as and are accepted by the public as possessing special knowledge and skills in a widely recognized body of learning from research education and training at a high level.

Elements of profession:

1. Scientific methods
2. Field of work and market reputation
3. Professional standards
4. Occupational classifications
5. Educational systems.
6. Communication channels.
7. Language.
8. Professional association
9. Professional ethics.
10. History.

Specialized knowledge:

First and foremost professionals are known for their specialized knowledge they have made a deep personal commitment to develop and improve their skills.

2.11 Theories about ⁽²⁾ right action:

There are four types of theories on ethics.

(1) Golden mean ethics: The best solution is achieved through reason and logic and is to compromise between the extremes of excess and deficiency.

2. Rights based Ethics:

The rights based ethics are Every person is free and equal has the right to life health and liberty.

3. Duty based Ethics:

Each person have a duty to follow a course of action to the universally acceptable for everyone to follow without exception.

4. Utilitarian:

The best choice is that which produces the maximum benefit for the greatest number of people.

Competency:

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Professionals get a job done.

They are reliable and they keep their promises.

If circumstances arise that prevent them from delivering on their promises, they manage expectations up front and they do their best to make situation right.

Honesty & Integrity:

Professionals exhibit qualities such as

honesty and integrity. They keep their word and

they can be trusted implicitly because of it.

They never compromise their values and

will do the right thing.

Accountability:

Professionals hold themselves

accountable for their thoughts, word and action and when they do a mistake.

2.12: Self Interest ⁽²³⁾ customs and religion:

Moral justification and principles form a distinct category of value, which are different from other category of value. This can be more clear by relating and contrasting moral values to the three other types of values namely self interest customs and religion.

Focus must be made in each case how we can reduce morality to these type of value. Self interest and Ethical Egoism self interest is nothing but one personal good. It refers to the goodness of oneself in the long run. Each of the ethical theories recognizes the importance of self respect.

Utilitarian considers one own good as well as good to others. Duty ethics stresses duties to ourselves and for how well being,

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Ethicists of right emphasize our rights to pursue our own good. Each of these theories insists that the pursuit of self interest must be balanced and kept under control by moral responsibilities to other people.

2.13 Uses of Ethical theories:

As a theory is kind of explanation an ethical theory is an attempt to explain moral values. To provide a single and criterion statement about value, one that is true through out all the differences and conflicts and in moral value.

Some goals of ethical analysis:

1. Exploring an issue: Just exploring & learning about it what it involves. Just want to satisfy our curiosity and maybe even learn from them.

2. Overriding pass conflict: ⁽²⁵⁾

Resolve a dispute get yourself and others unstuck by looking for multiple options, reframe problems, discover common ground.

3. Making a case:

Take a side on moral debate and defend it. Make an argument. Persuade others the value and correctness of your position and to do so eloquently, showing awareness of the concerns of others and that "these are not serious drawbacks."

4. Deciding for Yourself:

To resolve problems of which you feel a personal urgency a need to have an answer to take a stand. To settle an issue for yourself at least for now.

Simply Ethical theories have many cases.

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1. Understanding moral dilemmas
2. Justifying professional obligation and ideas
3. Relating ordinary and professional morality

Engineering as Social Experimentation:

Engineering as Experimentation:

- * During the course of an engineer's career he is frequently involved in research, experimentation or the testing of new products. Especially during the design phase, one needs to apply various experimental procedures which is called experimentation.
- * In Engineering each and every stage of product or process development, experiments are conducted. There may be many uncertainties at each stage. But engineers cannot afford to delay projects until all the information is received.
- * Therefore one can view each engineering work/project activity as an experiment.

Similarity between Engineering experiment & Standard Experi

- (i) Engineering projects like standard experiments, are carried out in partial uncertainties.

②

The uncertainties may include

(a) design calculations

(b) exact properties of raw materials used

(c) constraints of material processing and fabrication

(d) nature of working of final product

(ii) The final outcomes of engineering projects are also generally uncertain like those of other experiments.

Contrast with standard experiments:

(i) Experimental Control.

In standard experiments, experimental control is possible. But in the case of Engineering as the projects are human being experimental control by the experimenter is not possible.

(ii) Informed Consent:

In standard experiments the question of consent does not arise as the experiment is performed on objects. But in the case of viewing engineering as an experiment on society, human beings.

(a) Knowledge:

The subject should be provided with all the necessary information that will enable them to take a reasonable decision.

(b) Voluntariness:

The human subjects should show their willingness to be a human model voluntarily. The person should not be forced, deceived, or coerced.

Characteristics of a valid consent:

The informed consent can be called as valid consent when the following three conditions are met.

(a) The consent was given voluntarily

(b) The consent was based on the following

* Requested information is an understandable form

* All information a rational person would need, in an understandable form.

(c) The consenter was a competent person to

process the information and make rational

decisions.

(iii) knowledge gained: ⁽⁴⁾

* Standard experiments are conducted with an objective of gaining more and new knowledge.

But engineering projects are executed not with an objective of gaining new knowledge.

* When engineering projects are viewed as experiments, their outcomes are highly unexpected.

The objective will be to confirm that actions are right (or) wrong.

Engineers as responsible experimenters:

General responsibilities of Engineers to society:

* Engineers are primarily considered as technical enablers (or) facilitator rather than being the sole experimenters.

* Engineers responsibility is shared with management public and others.

* The other unique responsibilities of engineers include Monitoring projects, identifying risks, Providing customer and client to make decisions.

⑤
* while exercising engineering duties, the engineers should display the virtue of being morally responsible persons.

General features of morally responsible engineers:

(i) Conscientiousness:

* It means commitment to live according to certain values. It implies consciousness.

* Engineers have to be sensitive to a range of moral values and responsibilities which are relevant in a given situation.

* Engineers should have willingness to develop the skill and apply the effort needed to reach the best balance possible among various considerations.

* Open eyes, open ears and an open mind are required to evaluate a given situation its' implication and to determine who are involved (or) affected.

* The engineering as social experimentation, the role of engineers as guardians of the public interest. Engineers have to guard the welfare

and safety of those ^(b) affected by engineering projects.
* Thus the engineering social experimentation should be restricted by the participant's consent - voluntary and informed consent.

(ii) Relevant information:

* Consciousness is impossible without relevant factual information.

* Engineers have to show the commitment to obtain and properly gauge the information related to meeting one's moral obligations.

* The two general ways of losing perspective on the context and the nature of one's work are given below.

(a) To grasp the context of one's work, one should aware the moral implication of that work.

(b) To shift the responsibilities and blames to others to others in an organization.

In this circumstance the design engineers throw the blame on the production (or) sales department.

The above two cases illustrate the situation of lack of moral concern.

- * Conceiving engineering as social experimentation.
- * Imaginative forecasting of possible bad side effects.
- * Carefull monitoring of projects.
- * The development of an attitude of defensive engineering and preventive technology.
- * Respect for people right give informed Consent.

Moral autonomy:

- * Moral autonomy is the ability to think critically and independently about moral issues and apply this moral thiericy to situation that arise during the professional engrnary practice.
- * It is understood that individuals personality depends on the intigration of his moral values and attitudes.
- * As an experimenter an engineer has to undergo an extensive and updated training to form his identity as professional

* Regarding engineering as social-experimentation can help to restore a sense of autonomous participation and sense of personal involvement with one's work.

* Now a days the magnitude of moral autonomy to be experienced by engineers is highly influenced by the attitude of company management.

(iv) Accountability:

* Accountability means being responsible, liable, answerable (or) obligated

* It involves a willingness to present morally convincing reasons for ones action and conduct.

* Morally responsible people are expected to accept moral responsibility for their actions.

* According to Stanley Milgram people are not willing to accept personal accountability.

* The complications in accepting one's moral accountability fuses worsened because of

some situations are as follows.

⑨
* Modern engineering projects involved teamwork, each member contributes a small portion of the project. So this practice has narrowed the sense of personal accountability.

* The modern organisations are based on the principle of division of work.

* Mostly there is a pressure to move on to new project completing the current one. This practice also lessens the sense of personal accountability of the project.

* Finally the preoccupation with legalities in a time of proliferating malpractising lawsuits.

Research Ethics:

It involves the application of fundamental ethical principles to a variety of topics involved in scientific research.

* It includes the design and implementation of research involving human experimentation, animal experimentation, various aspects of academic scandal, scientific misconduct,

* Research ethics is ⁽¹⁰⁾ most developed as a concept in medical research.

* Research in the social sciences presents a different set of issues than those in medical research.

* The scientific research enterprise is built on the foundation of trust. Scientist trust that the results reported by others are valid.

* Society trust that the result of research reflect an honest attempt by scientists to describe the world accurately without bias.

* But this trust will erode only if the scientific community devotes itself to explicitly and transmit the values associated with ethical scientific conduct.

* There are many ethical issues to be taken into serious consideration for research. Sociologists need to be aware of having the responsibility to secure the actual permission & interest of all those involved in the study.

* There is a duty of protect the rights of people in the study as well as their

privacy and sensitivity. ①

Codes of Ethics:

The primary aspects of code of ethics is to provide the basic framework for ethical judgement for a profession.

* The code of ethics also referred as the Code of Conduct, express the commitment to ethical conduct shown by members of profession.

* The code of ethics express the ethical principle and standards in a coherent, comprehensive and accessible manner.

* The code of ethics also define the roles & responsibilities of profession.

Positive roles & function of code of ethics:

(i) Inspiration:

• Ethical codes provide positive inspiration for the professional to exercise their obligations effectively.

• These codes inspires the engineers to apply moral principles under various conflicting situations.

(ii) Guidance:

- * The ethical codes provide guideline for achieving the obligation of professionals
- * These codes also provide specific guidelines which tell how to apply the code of unique situation.

(iii) Support:

- * The ethical codes offer positive and potential support for engineers to perform their duties in ethical manner.
- * At times the codes can serve as legal support for those engineers who are targeted in professional obligation & conflicts.

(iv) Deterrence and Discipline:

- * The ethical codes can be used for deterrence and discipline unethical professional conduct.
- * These codes are also considered as the formal basis for investigating unethical conduct.

(v) Education and mutual understanding:

- * These codes can be used in educational institution and other places for the importance of moral values.

(vi) Contributing to the profession's public image:

- * The ethical codes can confer a positive image to the public of an ethically committed profession.
- * The codes enable the engineers to serve the public more effectively.

(vii) Protecting the status quo:

- * The codes constitute ethical conventions. These conventions can promote a minimum, acceptable level of ethical conduct.
- * The codes can also suppress the dispute with this profession.

(viii) Promoting business interests:

- * The codes of ethics promote business interest through restraint of trade.
- * They help in facilitating morally feasible business dealings to the professionals.

Limitations of Code of ethics:

(i) Codes of ethics are broad guidelines, restricted to general and vague phrases. The codes cannot

be applied directly ⁽¹⁴⁾ to all situations. Also it's impossible to practice all aspects of moral problems that can arise as complex dynamic engineering profession.

(ii) 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.

(iii) The codes cannot serve as the final moral authority for professional conduct.

(iv) The proliferation of code of ethics for different branches of engineering gives a feeling that ethical codes are relative.

Codes and the Experimental nature of Engineering:

* The supportive function of engineering codes is viewed as the primary important function. This function enable the engineers to express their views freely, about safety those affected by engineering projects.

* The disciplinary function of engineering codes is recognized as the secondary important function because this function is essential in engineering as it ensures all clear and enforceable rules.

* The Guidance, inspirational and educational functions of engineering codes are also important because they promote mutual understanding among those affected by them.

Proposal for promoting ethics:

- (i) Engineering societies should act as the forum for debating what should be in a professional Code of ethics.
- (ii) Engineering societies could promote ethics by establishing awards for engineers and employees who exhibit commendable ethical conduct.
- (iii) Engineering societies should assist and protect engineers who have been discharge because they stick on high ethical standards.
- (iv) Engineering societies could investigate charges of wrong doing by members of malice.

(16) (a) false informations.

Industrial Standards:

Standardization is a process of defining and applying conditions required to ensure that a given range of requirements can be easily met with minimum changes in the economical and reproducible manner by the latest technique.

Standards facilitate

(i) Interchangeability.

(ii) Accuracy in measurement

(iii) Easy of handling

(iv) prevention of losses.

(v) Decreased production cost

(vi) Quality products etc.

Type of Standards:

(a) uniformity of physical properties & function

(b) Safety and reliability.

(c) Quality of product

(d) Quality of personal and service

(v) used of accepted ⁽¹⁷⁾ procedures.

(vi) separability.

Benefits of standards:

Standards help the manufacturers, the clients & public

* standards maintain a steady and balanced competition among industries by reducing down the demands for certain popular name brands.

* standards ensure a measure of quality and hence facilitate more realistic trade off decisions.

Negative aspects of standards:

* standards may reduce choice for customers because of reduce variety.

* Excess standardization of operation and procedure may reduce the initiative and interest of workers.

* some times manufactures, trade unions, exporters and importers impose unnecessary changes in the

provision on standards for achieving their self goals.

A Balanced outlook on law:

Babylons Building code:

- * Builder build a house and if the house falls & house holder dies, builders will be put to death.
- * House holder son dies, builder son shall be put to death.
- * house holder slave dies, builder give one slave to house holder.
- * If house damaged or destroyed builder shall reconstruct the house.
- * If the walls of the house bulge, builder shall rectify it at his own cost.

The united states steam boat code:

- ✓ In united states alone between the year 1816 - 1847 233 boilers on steam boats exploded resulting in killing around 2550 people and injuring around 8000 people. Rule was passed for inspecting the safety of ships and boilers.
- In 1865 another river boat boiler exploded resulting in 1500 deaths.

(19)
* The laws can provide a self interested motive for most of the people and corporations to comply.

The challenge case study:

Introduction:

The space shuttle was a complicated vehicle to be constructed. It was the first attempt to produce reusable spacecraft in order to reduce engineering and hardware cost.

(i) Reusable transportation system, the space shuttle

(ii) Manned orbiting space station

(iii) Exploration of Mars from space station,

Factors that affected the launch decision:

* From the beginning the space shuttle project was being exaggerated expectations, funding inconsistencies and political pressure.

* One more motive was to prove US superiority over Russia.

* The fever in space mission generated press interest

The launch chronology:

(i) Monday January 27, 1986

Attempt to place challenger in orbit was affected due to technical problems like stripped bolt, high winds and a malfunctioning microsensor.

(ii) Tuesday January 28, 1986:

As the SRB ignited the O-Rings got vaporized and a temporary seal of Aluminium oxide from propellant was formed in its place. Flames came out of joint and struck in the tank and ignited the hydrogen fuel. The challenger exploded in less than 2 minutes from its time of launch.

* Most of the crew survived the explosion, but high speed impact with the water of the ocean as it fell was the cause of death of all the crew. No one survived in this

tragic incident.

(21)

A. regulated Society:

what is a law?

* Law is the body of rules of action prescribed by a controlling legal authority and having binding legal force

* It is a solemn expression of the will of a Supreme power of authority.

Relationship between law and ethics:

* Ethics can be defined as knowing the difference between what one has a right to do and what is the right thing to do.

* Law dictates the minimum standard of behavior required of an individual by a given society, whereas ethics go beyond what is required.

Laws with respect to social experimentation:

Laws are necessary because

- (i) people are not fully responsible
- (ii) the corporation / companies are not encourage

To have moral initiative because of competitive nature in the society.

Problems with the law in Engineering:

- * Day by day it is seen that the legal regulation in the field of engineering is becoming more specific.
- * whenever there is a law we see engineers adopting the strategies of minimum compliance.
- * It is very difficult to keep on bringing out laws to match with the rapidly changing technology. Hence there will always be a gap between what is required.

* One more problem with the law of engineering is that when the government and powerful people violate it with a clear cut intention of understating lengthy and costly court proceedings.

The proper role of law in engineering:

* The law can authoritatively establish reasonable minimal standards of professional conduct

Unit IV

Engineers Responsibility for safety. & RIGHTS.

Safety and its concept:

* Safety means the state of being safe. safe

means protected from danger and harm.

* May be safe for one person may not be safe for another person. It is because different persons have different perceptions about what is safe.

William Lorraine defined safety as "A thing is safe if its risk are judged to be acceptable". It means a thing is safe for a person if the perceived risk is less.

Draw facts of initial version of Definition:

(a) under estimation of risks:

A unsafe product may be considered to be safe, because of faulty view and misjudgement of a person. Buying improperly designed coil type water heater, which eventually ends up with electric shock

(b) Overestimation of risk:

A product whose risk are comparatively less may be considered unsafe because of over safety concern of a person.

(c) No estimation of risk:

For the person who does not judge about the risk the product may be either safe (or) unsafe.

Modified definition:

A thing is safe with respect to a given person (or) group at a given time. If its risks were fully known those risks would be judged acceptable, in light of settled value principles.

Concept of Relative safety:

The relative safety expresses the safety of a thing in comparison with safety of similar things.

Criteria to ensure safe design:

(i) A design should comply with the local standards for product safety and other applicable laws.

(ii) An acceptable design should meet the standard of accepted engineering practice.

(iii) Alternative designs that are potentially safer should be explored.

(iv) While designing any product all possible misuses of the product by the consumer should be identified and the identified problems should be avoided by the engineers.

(v) Finally the designed product should be tested using prototypes to determine (i) whether the product meets the specification (ii) whether the product is safe to use.

Designing for safety:

(i) Define the Problem

(ii) Generate multiple alternate design solutions

(iii) Analyse each design solution

(iv) Test the solution

(v) Select the best solution.

(vi) Implement the chosen solution.

Risk and its Concept:

* A risk is the potential that something unwanted and harmful may occur.

* Risk is synonymously used with adverse effect (or) harm. Harm may be defined as the invasion (or) limitation of a persons freedom (or) well being.

* The most important types of well being are physical being. It is experienced that engineering risk affect mostly physical and economical well being.

Effects of Risk:

It includes dangers of bodily harm.

Cause of Risk:

Risk (or) harm are caused by delayed job completion faulty products (or) systems are economically (or) environmentally injury solution to technological problems.

$Risk = Probability \text{ of harm} \times \text{Consequence of harm.}$

Natural hazards & disaster:

Natural hazards such as floods, earthquakes, droughts, volcanoes etc. greatly threaten and damage the longliveness

* Disaster is a serious disruptive event coincide with a state of insufficient preparation.

Factors influencing risk:

(i) Voluntary vs Involuntary risk:

* If a person knowingly takes any risk then he feels it safe.

* The voluntary risk are considered as safe and the involuntary risk are considered as unsafe.

(ii) short term vs long term consequences:

A thing which causes a short lived illness or disability, seems safer than a thing that will result in permanent disability.

Delayed Vs Immediate Risk.

An activity whose harm is delayed for many years will seem much less risky than something with an immediate effect.

(iv) Expected Probability:

* Relatively slight harm having more probability of occurring seems to be a greater risk than a relatively a severe harm having lesser probability of occurring.

(v) Reversible effects:

Something will seem less risky if the bad effects are ultimately reversible.

(vi) Threshold level for risk:

Some thing that is risky only at fairly high exposures will seem safer than something with a uniform exposure to risk.

Acceptability of risk:

A risk is acceptable when

those affected are generally no longer about it.

Elements of Risk perception:

(i) Voluntarism and control:

* If people take risk knowingly, then their involvement of risk is known as voluntary risk.

* Many people consider safer if they knowingly take on the risk. Also the people believes that they have good control over their actions.

* Controlled risk: If the risk taken is within the control limit, which can be controlled by any means, then the risk is known as controlled risk.

(ii) Effect of information on risk assessments:

* The information about a harm should be presented in a systematic and appropriate manner. Because the manner in which the required information for decisionmaking is presented has a great influence on how risk

are perceived

* Many case studies and experiments have proved that the manner in which information about a danger is presented can lead to undesirable and wrong perceptions about danger.

* The threshold limit of individuals for information varies from person to person. Some would be comfortable only when they have information of deeper depth and quality.

(ii) Job Related Risk:

* The exposure of risk depends on the person's job and his work place.

* The nature of the job and the working environment will determine the risk level of a person.

* Because of high competition for survival the employees don't have any options other than undertaking high risk jobs.

* unions and occupational and safety regulation should regulate and enforce the employers to facilitate the standard working environment.

* Most importantly, engineers who design and equip workstations must take into account the various safety issues and the workers' complaints regarding their workplace.

(iv) Magnitude & Proximity:

* Our reaction to risk is affected by the magnification and the personal identification or relationship we have with victims.

* For instance we feel very bad if one of our close relatives (or) friends are subjected to great harm by some accident than it might affect so strangers,

Lesson for the Engineers,

not refer perform as expected (or) the device may not perform well under all circumstances.
* Engineers should have the knowledge and experience to anticipate will possible engineered failure during the design stage itself.

(ii) Systematic Accidents:

* Systematic accidents are difficult to understand and difficult to control.

* They are characterized of very complex technologies and the complex organization that are required to operate them.

Risk - Benefit value function:

* The risk and benefits are based on the perception of probable gain and probable loss.

* That risk benefit value function drops sharply on the loss portion that it occurs on the gain's portion.

* One can see that the threshold is added on both gain and loss sides of the function.

* The threshold on the loss side is to account for human habit of ignoring smaller risks in order to avoid anxiety overload.

Assessment of safety and Risk:

- (i) High safety and High risk
- (ii) Low safety and high risk
- (iii) high safety and low risk.
- (iv) Low safety and low risk.

A product cost may have two elements

- (i) primary cost of product
- (ii) secondary cost of product

* The primary cost of product includes the production cost and cost of safety measures involved

* The secondary cost of product include cost associated with warranty expenses, losses of customer good will, litigation, possible downtime in the manufacturing process,

* A stress on low risk and high safety leads to high primary cost and lower secondary cost.

* The total cost is the sum of primary and secondary cost of product.

* The total cost is minimum at point M, where the slopes of the primary and secondary cost curves are equal in magnitude but opposite in direction.

Determination of risk:

(i) Knowledge of risk:

* To assess of risk an engineer must first identify it. To identify a risk an engineer must first know the information about the state of standard products.

* Though past experience and historical data provide good information about the safety of standard products. It is insufficient completely assesses the risk of product.

* The past experience and historical data are inadequate to assess the risk, because of reasons

* The information is not freely shared among firms

* They are always new applications of old techy that makes the available information less useful.

(ii) Uncertainties in design:

* While designing a product, the design engineer must deal with many uncertainties. Many of the risk can be expressed as probabilities and as educated guesses.

* The uncertainties are in the form of application of the product, materials used for producing the product, changing economic condition, Unfavourable environment conditions etc.

* A product is said to be safe if its capability exceeds its duty.

(iii) Testing for safety:

Once the product is designed, both prototypes and finished devices must be thoroughly tested

* The testing is not just to determine whether the product meets the specification. It should also involve testing to if the product is safe.
* It is essential that in any engineering design, all safety systems be tested to ensure that they work as planned.

Different approaches for testing:

(i) Scenario analysis:

This test starts from a given event, and then studies the different consequences that might develop from it.

(ii) Failure modes and effect analysis:

This approach systematically examines the failure modes of each component without focusing on causes (or) relationship among the elements of a complex system.

(iii) Fault tree analysis:

This approach proposes a system failure and then traces the event back to possible causes.

(1v) Event tree analysis:

This is the reverse of the fault tree analysis. This analysis is very useful in identifying a potentially hazardous situation in the plant.

Risk - Benefit analysis:

* Risk benefit analysis is a technique, similar to cost benefit analysis, used to analyze the risks in a project and to determine whether the project should be carried out or not.

(i) what are the benefits of the project

(ii) Is the project worth the risk connected.

(iii) Do benefits outweigh the risks.

Conceptual difficulties in risk benefit analysis:

* In risk benefit analysis both risk and benefits are very difficult to quantify

* It should be noticed that who takes the risks and who enjoys the benefits.

* It is mostly difficult to express both risk and benefits in common set of units.

Ethical implication on risk benefit analysis:

- (a) Under what condition someone in society is entitled to impose a risk on someone else on behalf of a supposed benefit to others
- (b) How can we consider the worst case scenario of persons exposed to maximum risk while they are also reaping only maximum benefits.

Personal Risk:

- (i) Voluntary personal risk
 - (ii) involuntary personal risk.
- (i) Voluntary Personal risk:

It means sufficient information is given and then the concern are asked to take part in a risky activity. This type of risk is usually qualified by a life insurance.

- (ii) involuntary personal risk.

Public risk and public acceptance:

* In Comparison with determining personal risk and benefits, determining public risk and benefits is much easier.

Accounting publicity for benefit and risks:

* An expert (or) even group of experts cannot be expected to know everything. Hence the public processes suffer from incomplete engineering knowledge.

* The uncertainty produced by scientist and regulators also impact the risk regulation.

* Since the conception of risk vary dependently on how the facts are presented, therefore special caution should be given when stating probabilities of rare events.

Role of Engineers to safeguard the public from risk

* The engineers can provide back ground material to prove faculty positions.

* Engineers should actively participate in the debates related to safety & risk.

* Engineers should always insist of meaningful numbers and figures when assessing safety & risk.

* Engineers should not be influenced by any influential lobby (or) trade organisation.

Reducing Risk:

It is impossible to design and manufacture anything to be completely risk free. However it is the responsibility of the engineers to explore all the possible ways to reduce the risks under the financial time constraints.

Risk Management:

It is defined may be defined as the eradication or minimization of the adverse effects of the pure risk to which an organization is exposed.

Elements of risk management:

- (i) Risk identification
- (ii) Risk evaluation
- (iii) Risk control.

1. Risk identification:

Risk can be identified by various techniques such as physical inspection, safety audit, job safety analysis and data analysis.

2. Risk evaluation:

It can be measured on the basis of economic social (or) legal consideration.

3. Risk control:

Risk control consist four ways.

(i) Risk avoidance:

It refers to the conscious decision by the management to avoid a risk by discontinuing the operation of producing the risk.

(ii) Risk retention:

It refers to retaining a particular risk for which may consequent loss in the organization.

(iii) Risk Transfer:

It refers to the legal assignment of the cost of certain potential losses from one party to another.

(iv) Risk Reduction:

It refers to the reduction or elimination of all aspect of accidental loss that lead to a wastage of organization.

Facilities Assignment and realities:

(i) Causes of all accidents are operator error and negligence.

(ii) Producing a safe product always increase the cost.

(iii) Warning about harm are sufficient. Insurance coverage is cheaper than planning for safety.

(iv) learn about safety after a product has been completed and tested.

The Chernobyl Nuclear disaster case study:

Explosions in succession:

(a) The accident:

Steam in the core began to increase uncontrollably and reactor power and temperature rose sharply.

* Fission reaction increased and reactor power rose to a peak of about 100 times to a related value.

* This resulted in a large steam explosion.

* Fuel pellets started to shatter, reacted with the cooling water and second explosion occurred

as a result of expansion of fuel power.

* The radioactive plume was driven sky high

* This was the world's worst civilian atomic disaster

The causes of accident:

* Safety violation - The emergency core cooling system was isolated in order to reduce the power consumption during the test.

* Carelessness: A mistake occurred when the controller was reprogrammed.

* The operator switched off many reactor safety systems.

Chernobyl - after the explosion:

The reactor was encased in concrete sarcophagus. But this is not an effective permanent enclosure for the destroyed reactor. Tunnels were dug and liquid nitrogen pipes installed for cooling.

The Three Mile Island case study:

It is a nuclear generating station beautifying the river in Pennsylvania. The loss of

Coolant accident that occurred in Unit 2 of TMI on March 28, 1979 proved itself to be serious economic and public disaster.

The causes of accident:

(a) Human error:

- * Lack of notice that backup valves were closed.
- * Control room light indicated that the PORV was closed, but those light and maintenance tag, indicating that they were not functioning properly.
- * The hydrogen explosion resulted by instruments in the control room was thought to be a spillage caused due to electrical malfunction.

(b) Insufficient training:

- * Two pumps were shut off without knowing that the shalce was due to excess steam

(c) Bad operating procedures:

* It was the elog during maintenance work which initiated the accident

(d) Unforeseen equipment failure:

* Automatic shutting off the two pumps

Consequences of the accident:

* The clean up operation swallowed A/2 years & 976 million and the work of 400 people. It had been observed from the accident that the tendency of the core to melt down sooner and the ability of the reactor to withstand pressure and temperature.

* Though scientists claimed that does at Three mile Island was insignificant, concern persisted that some areas near TMI had been exposed to high radiation levels only the accident.

Employee Rights:

- (i) Contractual Employee rights
- (ii) Non contractual employee rights.

(i) Contractual employee rights:

* These employee rights are institutional rights that arise only due to specific agreement in the employee-employer contract.

Ex: Right to receive a salary.

* Right to receive other company benefits

(ii) Non Contractual Employee rights:

* These are the rights existing even if not formally recognized in the specific contracts or company

policies.

Example:

Right to choose outside activity

Right to due process from employer.

Right to privacy & employer confidentiality.

Collective bargaining:

It is possible for engineers to be professional dedicated to the highest ethical standard of professional loyal to their companies while simultaneously being members and supporters of an union.

& Lacking this information, a definite answer is not possible.

Process of collective bargaining:

& presenting the character demand by the union or behalf of consistent elements

& Negotiations at the bargaining table

& Reaching an agreement.

Confidentiality:

keeping confidence is one of the most central and widely acknowledged duties of any professional.

Defence lawyer must keep clients information Confidential, doctors and counsellors must keep information on their patients and teachers must keep their students Confidential.

"Confidential information is information deemed desirable to be kept as secret".

In case of some government organizations such as CBI, FBI, CIA highly elaborate systems for classifying information have been developed to identify individual & Groups.

Conflict of Interest:

Professional conflicts of interest are situations where professional have an interest which is placed might keep them from meeting their obligation to their clients.

Swing Conflict Problems:

Conflict problems can be solved in three ways. For example productivity the health of a safety of public is more than your duty to your employees.

* A second solution is an attempt of some kind of compromise that will work everyone.

* Frequently you must rely on gut feelings for which path is the correct one.

* The conflict of interest is refined by saying that they typically arise when two conditions met.

Occupational Crime:

* Occupational crime are illegal act of made possible through one's lawful employer

* It is the sensitive violation of laws regulating work activities.

* when committed by office workers or

White collar crime:

* It takes place mostly at workplaces and involve activities related to otherwise legitimate occupation.

* Theft by white collar employee ranges from taking office supplies for personal use to the theft of product, intended for sale.

* At the highest level, it typically involves manipulation of accounting records or legal documents for personal gain.

Embezzlement and Fraud:

* It is committed by either Commission (or) Omission.

* An act of Commission involves lying or making some form of material representation (or) an act of omission to any failure of significant fact.

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Professional Rights:

* Engineers also have rights that go along with these responsibilities. Not all of these rights come about due to the professional status of Engg.

* The most fundamental right of an engineers is the right professional Conscience.

* For example one of these aspects may be referred to as the right of Conscience Refusal. This is the right to refuse to engage in unethical behaviour.

Intellectual Property Rights:

* Intellectual property is a class of property emanating primarily from the activity of human intellect.

* Any property, movable (or) immovable is legally protected to prevent from being stole

* Similarly the rights in an intellectual property created also to be protected to prevent infringement.

Patents:

There are legal rights granted for new inventions, employing scientific & technical knowledge.

Industrial design:

A design is an idea (or) conception as to features of shape, configuration, pattern, ornament (or) composition color applied to any article two (or) more dimensional, both of industrial effect.

Trademark:

A trademark is a visual symbol in the form word service (or) label applied to an article of a manufacture or view of industry origin to goods.

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Discrimination:

Discrimination indicates identity goods as originating the territory of a country an origin of locality that specific quality, reputation (or) other characteristics of goods is essentially attributed to their geographical origin.

Unit - V ^①

Global Issues:

Multinational Corporations - Environmental Ethics -
Computer Ethics - Weapon development - Engineers as
Managers - Consulting Engineers - Engineers as
Expert witness & Advisors - Moral leadership -
Code of Conduct - Corporate social Responsibility

Multinational Corporations:

* Large corporations having investments and business
in a number of countries is known as multinational
or transnational corporations.

* A corporation can be called as MNC, only
when the 5 criteria are met.

(i) operations are spread in many countries.

(ii) Its local subsidiaries are managed by

nationals.

(iii) It maintains industrial organization
including R&D

- (iv) It has a multinational central management.
- (v) It has a multinational stock ownership.

Benefits to MNC of doing their business in underdeveloped or developed countries.

- (i) cheap labour
- (ii) Availability of natural resources
- (iii) flexible & favourable tax arrangements
- (iv) New markets for their products.

Three senses of Relative values:

1. Ethical relativism:

Ethical relativism states that actions are morally right when they are approved by law & custom, they are wrong when they violate laws & customs.

This view is considerable false because it implies absurdities. Also it justifies genocide and other ridiculous behavior.

②

2. Descriptive relativism:

* It states that beliefs about values differ from culture to culture.

* This view is obviously true, but it does not establish the various differences b/w the moral beliefs and attitudes of various cultures.

3. Moral Relationalism:

* Moral relationalism views that moral judgement should be made in relation to factors that may vary from case to case. Because formulating single and absolute rules in volving moral judgement is impossible.

* This view is also seriously free of emphasis that the customs of cultures require us to adjust moral judgement &

current.

4. Ethical pluralism:

According to this view, there may be alternative moral perspective that are reasonable.

* But no one of which must be accepted completely by all rational and morally concerned persons.

* Therefore it is equivalent that relativism is essential in law, as law involves, requires different cultural conventions.

International Rights:

Some international rights, according to Thomas Donald.

- (i) The right to freedom of physical movement
- (ii) The right to ownership property.
- (iii) The right to freedom from torture
- (iv) The right to a fair trial.
- (v) The right to non discriminatory treatment

(3)
ways of promoting morally just measures:

Some of the ways to promote morally justifiable measure are given below.

* MNC's should respect the basic rights of people of the host countries.

* The MNC should help the host countries overall economy and their employees.

* The MNC should respect the laws and culture of the host countries without violating the basic moral rights.

Technology Transfer & Appropriate Technology

* Technology is the transfer in process of moving technology to a quite new set of conditions and implement it here.

* Technology consists both hardware

such as machines & installations and

technique such as technical organizational

& managerial skills & procedures.

Appropriate Technology:

* Appropriate technology is a generic concept that applies under social aspects when transferring technologies.

* Appropriate technology also refers to the transfer & implementation of new suitable technology.

Intermediate Technology:

Intermediate technology is typically appropriate technology, which is formed in between advanced and primitive technology.

Environmental Ethics:

* Most of us are aware the importance of the environment for our own well being.

* The short listed character of their approach is now becoming inescapably obvious.

* Acid rain is beginning to have devastating

(A)

impact on forests, agriculture and water resources.

In the following section, we shall discuss

various issues in environmental ethics and the role of engineering (concern environment).

What is meant by Environmental Ethics?

* Literally environmental ethics means

conscious efforts to protect an environment and to maintain its stability from the hazardous threats.

What can environmental ethics can do for us?

What ever ethics can do for us when applied to non environmental concerns, environmental ethics can do for you when to applied to environmental concerns.

Engineering and the environment:

If it is evident that engineers are usually creators to technology that contributes to environmental degradation as well as environmental improvement, therefore they should have a professional obligation to protect the environment.

Types of concern for environment:

There are two types.

Health related concern: Engineers can be concerned for the environment, when environment pollution, direct and clear threat to human health.

Non health related concern: Engineers can be concerned for the environment even when human health is not directly affected.

Engineers concern for environment:

* How does and to what extent a particular industry affect the environment.

What does professional codes of ethics say about the environment?

* The codes of the American society of Civil Engineers.

* The codes of the Institute of Electrical and Electronics Engineers.

* The codes of American society of Mech Engineering data.

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Approaches to resolve environmental problems:

(i) cost oblivious approach

(ii) - Approach based on cost benefit analysis.

(i) Cost oblivious approach:

* In this approach priority is given to the protection of environment than the cost of products designed by the engineers.

* Also their approach satisfies the concept of right and duty ethics.

Drawback: This approach is difficult to sustain and enforce in a modern urbanised society.

Approach based on cost benefit analysis:

In this approach the problem is analysed in terms of the benefit derived by reducing the pollution.

Drawback: It is very difficult to determine the true cost of human life (or) the loss of species is difficult.

Internalizing cost of Environmental degradation:

* The cost of any product usually direct labour cost, direct materials cost, direct expenses, factory expenses, administrative expenses and selling distribution expenses.

Technology assessment:

Technology assessment refers to the studies on the social and environmental effects of technology in various areas,

* In the view of economist Robert Proband engineers sometimes tend to find the right answer to the wrong questions.

Philosophical view of Nature:

Through there are various views on environment, now we shall briefly give important views of it.

(i) Sentiment-centred ethics:

(i)

This view acknowledges the inherent worth of all sentient animals. Sentient animals are those that feel pain & pleasure have desires & Both Singer and Regan felt that the sentient animals need not to be treated in the identical way we treat humans, but their interest should be weighted equally with human interest in making decision.

(ii) Bio centric Ethics:

* This life centered ethics recognizes that all living organisms as having inherent worth.

* According to albert schwitzer all organisms have the reverence for life.

(iii) Ecocentric Ethics:

* The contrast to the individual approach: Sentient centered and biocentered ethics, ecocentered ethics emphasizes inherent value in ecological systems.

(iv) Human centered Environmental ethics:

* Human centered ethics environmental ethics extended traditional ethics theories in the aspect of the focus to human beings presented by the destruction of nature.

* Duty ethics urges that the respect for human life implies more concern for nature than has been traditionally recognized.

Computer ethics:

What is Computer Ethics?

* Computer ethics is the study of ethical issues that are associated humanity with computing professionals.

* It is the field of applied professional ethics dealing with ethical theories, problems aggravated, transformed created by computer technology.

Categories of Computer ethics problems:

There are three broad categories.

- (i) Those ethical problems for which the Computer is the instrument of the unethical act.
- (ii) Those problems for which the Computer is the object of the unethical act.
- (iii) Those problems associated with the autonomous nature of Computers.

Computers as the instrument of unethical act

Computers are sometimes used as an instrument for carrying out unethical activities.

- (i) Bank robbery &
- (ii) Privacy.

Bank Robbery:

A Computer can be used to steal from an employee, outsider can get into a system & steal from an institution such as bank

* Computers are used more efficiently to store money in a bank.

2. Privacy:

Privacy means the basic right of the individual to control areas of information about himself.

* Invasions of privacy can be harmful to an individual in two ways.

1. The leaking of private information can lead an individual being harassed (or)

blackmailed

2. Personal information can also be considered personal property.

Computer as the object of unethical act:

* when the computers are used as objects

the unethical acts, ethical issues may arise

This act is prevalently known as hacking

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what is meant by hacking?

Hacking is nothing but gaining on authorized areas to a database, implanting false information in a database (or) deleting existing information & disassembling viruses are the internet.

* Computer Virus: Viruses are programs introduced deliberately for destroying (or) altering the operating system & data base of computer.

Autonomous Computer:

* Computer autonomy refers to the ability of computer to make decisions without the intervention of human.

* Autonomous computer systems also create problems when they have used in military weapons.

Computer code of Ethics:

The fundamental of computer ethics are

(i) Don't use computer to harm other people.

(ii) Don't use intellect with other people

Computer work.

(iii) Don't snoop around in other people's

Computer files.

(iv) Don't use a computer to steal.

(v) Don't use computer to be a false witness,

(vi) Don't copy or use proprietary software for which you have not paid

(vii) Don't use other people's computer resources without authorization.

(viii) Don't appropriate other people's intellectual

o/p.

(ix) Think about the social consequences of program you are writing or the s/m you are designing.

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Weapons development:

- * The military (or) defense industry uses most of world's latest technological activity
- * There are general reasons for engineers to join military services.
- * There are also several reasons for an engineer to refuse the war work.

Role of Engineers in defense industry:

- * Defense industry is one of the areas which provide no of job opportunities to engineers.
- * On the other hand many of the rational engineers feel that they cannot work on designing weapons.
- * In fact the above version about working in defense industry are well justified by various ethics theories.

The Engineers involvement in weapon work:

- * Engineers who have engaged themselves in manufacturing of war weapons and antipersonal bombs.

* Sometimes engineers are forced to involve in weapons work for their survival

* Thus every engineer who accepts job in a war related industry should seriously consider his (or) her motives in doing so

Defense industry Problems:

(i) The problem of waste and cost overruns is a higher one in the defense industry.

(ii) Another problem faced by the defense industry is the technology creep.

(iii) Many countries allocate funds for the defense sector from the public welfare schemes.

Engineers as Managers:

Engineers move into management role because of the following two reasons.

(i) Many corporate management prefer engineers as their managers because they believe that.

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(ii) To manage Technological Corporation, the technical understanding is necessary.

* The engineers have potential of understanding the business techniques of any corporate bodies than any non engineers.

* Engineers are attracted by various corporate incentives such as high pay, greater authority, wider responsibility & increased prestige & recognition.

Managers as professions:

* It is obvious that the transformation from engineers to managers require a no of adjustments,

* Engineers have to learn acquisition & expand their knowledge about management
* As pointed out by Henry the managers are supposed to pass the managerial role as is the below,

Role:

Interpersonal

- (i) figure head
- (ii) leader
- (iii) liaison

Informational:

- (i) Monitor
- (ii) Discriminator
- (iii) spoke person

Decisional:

- (i) Entrepreneur
- (ii) Disturbance Handler
- (iii) Resource allocator
- (iv) Negotiator

Impact of transition on Ethical Issue

- (i) Merely seeing for narrow interest of the corporation
- (ii) It's objective of increasing the profit margin only.

(iii) Not bothering about other responsibility to promote the public good.

(iv) As a manager engineers remain in professional whose primary responsibility is to provide useful product & services.

Responsibilities of Engineer - Managers:

They are

(i) Promoting an ethical climate

(ii) Resolving conflict.

(iii) Promoting an ethical climate:

Engineer - manager has the greater moral responsibility for promoting ethical culture in the organization.

What are the features of ethical corporate climate?

(i) The use of proper ethical language like code of ethics should be recognized as a legitimate power of the company.

(ii) The top management should accomplish a moral voice in both words & policies.

Resolving Conflicts:

Many study revealed that the seven most common conflict reported to managers they are

- (i) Conflict over schedules
- (ii) Conflicts over human resources available for the business
- (iii) Conflicts over technical issues.
- (iv) Conflicts over administration procedure.
- (v) Conflict over goals
- (vi) Conflict over personality
- (vii) Conflicts over projects.

Principle of Conflict resolution:

- (i) people; separate the people from the problems.
- (ii) Interests; focus on interest.
- (iii) options; Generate a variety of possibilities.

Before deciding what ⁽¹²⁾ to do.

(iv) Criteria: It is the result of conflict resolution based on some objective std.

Engineers as Consultants:

* Consultant are persons who give reports & advices in engineering business, law etc.

* Some of the responsibilities of consulting engineers are in the following areas.

1. Advertising
2. Competitive bidding
3. Contingency fees.
4. Salary & client heads.
5. Provision for resolution of disputes.

Advertising:

* Many companies seek help of the consulting engineers for advertising to promote and to improve sales of their products.

* Generally deceptive advertising happens when

product/services are made to look better than they actually are. The mis leading advertise can be achieved by many ways.

(i) by openly felling lies.

(ii) by telling half truths

(iii) by making wrong references (or) suggestion

(iv) through exaggeration

(v) through the confusion deliberately created by ambiguity (or) vagueness.

(2) Competitive bidding:

* Competitive bidding means the process of offering pieces at an auction (or) in business to achieve something.

* Negative aspect of Competitive bidding:

It was considered that permitting competitive bidding in some engineering areas might invite less unethical result.

* The banning of competitive bidding by engineers firms, have raised many issues.

Suspicious questions ⁽¹³⁾ in the minds of clients.

(3) Contingency fees:

* Consulting engineers should be paid the consultancy fees honestly and fairly for their professional competence.

* It is obvious that under contingency fee arrangements the consultants' judgements are biased.

(*) Safety and client needs:

* Since the consulting engineers enjoy greater freedom than the salary engineers therefore they have greater responsibility decision-making concern safety.

* Thus even the consultant is constructed only for the design of the project, Consulting engineers, should have some minimal responsibilities that result being the legal responsibilities specify in the contract.

Provision for resolution of Disputes:

* Also in recent times, filing of litigation the cases against the consulting engineers has increased considerably.

* Since litigation is time consuming costly & laborious process, therefore the consulting engineers should be prepared to have contractual provision to resolve conflicts.

* In addition there should be the contractual provisions for dispute-solving vehicles such as to avoid costly court battles.

Engineering as expert witness:

* At times, engineers serve as consultant for security disputes in adversarial problems.

Some of the duties are

- (i) Finding the causes of accidents
- (ii) public planning, policy making that involve technology.

* Usually engineers are hired by one adversary in the dispute.

Engineers as expert witness in the court:

* The plaintiff or the defendant in the civil (or) criminal cases may hire engineers to serve as an expert witness.

Eye witness Vs Expert witness:

* According to the legal system as an eye witness, engineers have to present the evidences in the court about what they have seen actually.

Abuse of Engineers as expert witnesses:

(i) Hired Guns:

* When do engineers are hired by attorneys to help them to establish the facts in a way favourable to their clients then they become hired guns.

Abuses of Engineers as expert witness;

Financial biases;

* when Engineers are paid by one party then (1) will create a financial bias

* It is obvious that the bias would occur when engineers were paid on the basis of Contingency fees.

(3) Ego bias;

* Ego means an individual is deals of himself (or) herself, especially in relation to other people to the outside world.

* This egoistic bias of engineers can also influence the nature of judgment.

(*) Sympathy Biases.

* It is a human nature that engineers feel sympathetic towards a particular party & identifies themselves with that party situation

* This sympathy biases ⁽¹⁵⁾ can greatly influence the honest investigation about the facts of legal disputes.

* Thus in order to overcome the above said biases engineers should develop and maintain their integrity, especially when serving as expert witness.

Engineers as expert advisors:

Advisors in planning and policy making

* Like economist, sociologist, urban planners and

other professional, engineers also play a vital role

as advisors in planning & public policy making

* Technology advancements always require decision about public planning.

* As expert advisors, engineers are involved in both public planning & public policy making

Normative models of advisors:

In order to face these conflicting responsibilities, normative models can be used

(1) Hired Guns

(i) Value - Neutral Analyst

(ii) Value - Guided advocates.

(1) Hired Guns:

* This model discussed earlier, insists that the engineers should give avoid any bias

(2) Value neutral Analysis:

* This model should insist that engineers should be impartial. They should avoid any bias, favoritism & any form of advocacy.

* As per this model, the engineers role is to identify all options & analyze the factual complication of each option.

(3) Value - Guided advocates:

This model insists that engineering

Consultant should remain ⁽¹⁶⁾ honest & independent in their professional judgement.

Core qualities Required for an expert advisor.

(i) Honesty

(ii) Competence

(iii) Diligence

(iv) Loyalty.

Moral leadership:

* Engineers provide a many form of leadership as they play variety of roles such as managers, consultant expert witness etc.

1. Morally creative leaders:

* The success of Corporation is to a greater extent is influenced by the quality of leadership.

* In our context, the leader's goal should be morally valuable, besides achieving the Corporation objectives.

* When the leader's goals are not only permissible but also normally valuable, then it is known as moral leadership.

* Morally permissible means to stimulate groups to move forward morally desirable ends.

* Moral leaders are those who direct, motivate, organize, manage, or in other ways take groups toward morally valuable goals.

* Thus engineers should have their share of moral leadership to contribute to their professional societies to their profession to their communities.

(2) Participation in professional societies:

* Obviously, moral leadership within engineering is clearly demonstrated by playing a significant role in a leader/member of

IEEE

Engineer as moral leader can persuade the professional societies to foster the study of engineering ethics.

* Engineer should obey the codes of ethics.

Leadership in Communities:

* Engineers should have responsibilities to provide greater leadership than others.

* Another form for engineers moral leadership is in community service.

* There is a need of moral leadership in identifying & expanding the areas of possible achievable good.

* Ideals of voluntary service:

Some of the options that the

Professional engineering can in voluntary

services are

* Engineers can provide engineering services to the disadvantaged groups of reduced fees.

* The engineering institutions can encourage engineering students to focus their services on the disadvantaged groups.

Code of Conduct :

Engineering is important & learned profession. As member of the profession engineers are expected to exhibit the higher standards of honesty & integrity.

Engineering has direct and vital impact on the quality of life for all people.

* Engineers must perform under a standard of professional behaviour that requires adherence to the highest principles of ethical conduct.

1. Fundamental canons:

(a) hold paramount the safety, health, and welfare of public

(b) perform services only in areas of their competence
(c) issue public statements only in objective and truthful manner.

(d) act of each employer (or) client as faithful agents (or) trustees

(e) avoid deceptive acts.

Rules of Practice:

(i) Engineers shall hold paramount the safety health.

Professional obligations?

(i) Engineers shall be guided in all their relations by the highest standards of honesty & integrity.

(ii) Engineers shall at all times strive to serve the public interest.

(iii) Engineers shall not be influenced in their professional duties by conflicting interests.

Corporate Social Responsibility:

- * A Company has an economic responsibility.
- * However Corporate Social Responsibility means that organizations have also ethical and societal responsibilities that go beyond their economic responsibility.
- * CSR requires organization to expand their understanding of their responsibility include other stake holder such employees, customers, supplier and international organization etc.
- * Ethics could be seen as a crucial component of individual and group behaviour at the heart of organization responsibility.