INTERNATIONAL INSTITUTE OF TECHNOLOGY & MANAGEMENT, MURTHAL SONEPAT
E-NOTES, Subject: Human values, Ethics and IPR Subject Code: MGT 402
Course: B.Tech (Civil), Semester-8th
(Prepared By: Ms. Shweta, Assistant Professor, BBA)

Human Value, Ethics and IPR

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UNIT -1

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Topic covered: - Role of engineer in nation building and in services of mankind. Engineering ethics:-sense of engineering ethics, variety of moral issues, types of inquiry, moral dilemmas, moral autonomy Kohlberg theory, Gilligan theory, consensus and controversy, profession and professionalism professional ideals and virtues, theories about right action, self- interest, customs and religion, uses of ethical theories.

Role of engineer in nation building and in services of mankind

What is Engineering

There are various definitions on what is engineering and how it relates with the teaching and learning environment. Some of those can be expressed as follows;

"Engineering is all around us, so people often take it for granted, like air and water. Ask yourself, what do I touch that is not engineered?

Engineering develops and delivers consumer goods, builds the networks of highways, air and rail travel, and the internet, mass produced antibiotics, creates artificial heart valves, builds lasers, and offers such wonders an imaging technology and conveniences like microwave ovens and compact discs. In short, engineers make over quality of life possible" (William A.Wulf, President of the National Academy of Engineering)

"Engineering is the application of science to the common purpose of life" (Count Rumford) *"Scientists study the world as it is, engineers create the world that never has been"* (Theodore Von Karman)

From all these definitions, engineering contents can be further broken down into numerous details. Some of the following are relevant in one way or the other:

1. Engineering is an art Aesthetics as well as function found in the Great Wall of China, Pyramid and other wonder of the world is truly an engineering genius in the form of art.

2. Engineering is an approximation:-The mathematics of engineering system are often used to solve "*Engineering problems are under-defined, there are many solutions, good, bad and indifferent. The art is to arrive at a good solution. This is creative activity involving imagination institution and deliberate choice*".
3. Engineering is measurement, estimation, forecast and projection River flow, noise and vibration from transport system, earthquake, traffic volume, pollution and others.
4. Engineering is about modeling and simulation Validation and verification of an analysis can be tested through modeling and computer simulation.
5. Engineering is a communication, technical report writing and presentation. Making presentations, producing technical manuals, co-coordinating team of large scale project are all fundamental to engineering practice.
6. Engineering is finance Design, construction, operations, repair and maintenance costs, hiring, chartering and others determine the viability of the intended projects.

Who is Engineer

The following are some of the definitions on who is an engineer. Engineer is;

1. A person who were trained in the design, construction, and use of engines or machines, or in any of various branches of engineering: a mechanical engineer, civil engineer, electrical engineer, chemical engineer, etc.
2. A person who operates or is in charge of a power plant system in term of operation, repair and maintenance.
3. A consultant in their respective area of expertise
4. A skillful manager who manages the implementation of the engineering related decision making processes.

Engineering technology in the field of design, information technology (IT), construction, manufacturing, robotic, advanced materials or even the engineering management

techniques for problem solving. Some of the newly and enhanced technologies can be described and interpreted as the following:-

- Nuclear technologies:- Nuclear technologies provide a new source of electric power and new capabilities in medical research and imaging as well as for unwarranted military use.
- Lasers and fiber optics:- Pulses of light from lasers are used in industrial tools, surgical devices, satellites, and other products. In communications for instance, a single fiber-optic cable can transmit tens of millions of phone calls, data files, and video images.
- Petroleum and gas technologies:-Petroleum has been used to providing fuel for cars, home, and industries. Petrochemicals are used in products ranging from aspirin to zippers, Engineering in oil exploration and processing, petroleum products have an enormous impact on world economies, people, environment and politics.
- Health technologies:- Medical professionals have an arsenal of diagnostic and treatment equipment at their disposal. Artificial organs, replacement joints, imaging technologies, and bio-materials are but a few of the engineered products that improve the quality of life for millions.
- Imaging technologies:- Imaging technologies have expanded the reach of our vision. Probing the human body, mapping ocean floors, tracking weather patterns are all the result of engineering advances in imaging technologies.
- Space explorations:- The development of spacecraft has expanded our knowledge base, and improved our capabilities. Thousands of useful products and services have resulted from the space program, including medical devices, wireless communications, etc.
- Agricultural mechanization:- The machinery of farms; tractors, cultivators, combines, and hundreds of others; dramatically increased farm efficiency and productivity.
- Electronics:- Electronics provide the basis for countless innovations; CD players, TVs, and computers. From vacuum tubes to 3 transistors, to integrated circuits, engineer shave made electronics smaller, more powerful, and more efficient.

- Aeronautics Modern: - air travel transport goods and people quickly around the globe, facilitating personal, cultural and commercial interaction.
- Automobiles: - The automobile may be the world' major transporter of people and goods, and a strong source of economic growth and stability. The automobile is a showcase of 20th century engineering ingenuity, with innovations made in design production &safety.
- Electrification powers has literally lighted:- the world and impacted countless areas of daily life, including food production and processing, air conditioning and heating refrigeration, entertainment ,transportation, communication, healthcare, and computers.
- Training and advancement programmes:- A strong technical knowledge is essential for engineering managers, who must understand and guide the work of their subordinates, and explain the work in nontechnical terms to senior management and potential customers. These management positions usually require work experience and formal education.

Engineering ethics

Identification, study and resolution of ethical problem occurring in the practice of the engineering profession.

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

(c) Using codes of ethics and standards and applying them in their transactions by engineers. The descriptive sense refers to what specific individual or group of engineers believe and act, without

justifying their beliefs or actions.

VARIETY OF MORAL ISSUES

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

1. **Resource Crunch**

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

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

2. **Opportunity**

(a) Double standards or behavior of the employers towards the employees and the public. The unethical behaviors of World Com (in USA), Enron (in USA as well as India) executives in 2002 resulted in bankruptcy for those companies,

(b) Management projecting their own interests more than that of their employees. Some organizations over-emphasize short-term gains and results at the expense of themselves and others,

(c) Emphasis on results and gains at the expense of the employees, and

(d) Management by objectives, without focus on empowerment and improvement of the infrastructure.

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

3. Attitude

Poor attitude of the employees set in due to

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

(b) Absence of grievance redressal mechanism,

(c) Lack of promotion or career development policies or denied promotions,

(d) Lack of transparency,

(e) Absence of recognition and reward system, and

(f) Poor working environments.

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

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

TYPES OF INQUIRIES

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

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

1. Normative Inquiry

It seeks to identify and justify the morally-desirable norms or standards that should guide individuals and groups. It also has the theoretical goal of justifying particular moral judgments.

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Normative questions are about what ought to be and what is good, based on moral values. For example,

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

2. Conceptual Inquiry

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

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

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

3. Factual or Descriptive Inquiry

It is aimed to obtain facts needed for understanding and resolving value issues. Researchers conduct factual inquiries using mathematical or statistical techniques. The inquiry provide important information on business realities, engineering practice, and the effectiveness of professional societies in fostering moral conduct, the procedures used in risk assessment, and

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psychological profiles of engineers. The facts provide not only the reasons for moral problems but also enable us to develop alternative ways of resolving moral problems. For example,

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

MORAL DILEMMA

Definition

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

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

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

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suitable, under the existing and the most probable conditions.

Steps to Solve Dilemma

The logical steps in confronting moral dilemma are:

1. Identification of the moral factors and reasons. The clarity to identify the relevant moral values from among duties, rights, goods and obligations is obtained (conceptual inquiry). The most useful resource in identifying dilemmas in engineering is the professional codes of ethics, as interpreted by the professional experience. Another resource is talking with colleagues who can focus or narrow down the choice of values.
2. Collection of all information, data, and facts (factual inquiry) relevant to the situation.
3. Rank the moral options i.e., priority in application through value system, and also as obligatory, all right, acceptable, not acceptable, damaging, and most damaging etc. For example, in fulfilling responsibility, the codes give prime importance to public safety and protection of the environment, as compared to the individuals or the employers (conceptual inquiry).
4. Generate alternate courses of action to resolve the dilemma. Write down the main options and sub-options as a matrix or decision tree to ensure that all options are included.
5. Discuss with colleagues and obtain their perspectives, priorities, and suggestions on various alternatives.
6. Decide upon a final course of action, based on priority fixed or assumed. If there is no ideal solution, we arrive at a partially satisfactory or 'satisfying' solution.

MORAL AUTONOMY:

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

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rationally about the ethical issues, on the basis of moral concern.

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

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

1. Proficiency in recognizing moral problems in management and ability to distinguish as well As relate them to problems in law, economics, and religion,
2. Skill in comprehending, clarifying, and critically-assessing arguments on different aspects of moral issues,
3. Ability to form consistent and comprehensive view points based on facts,
4. Awareness of alternate responses to the issues and creative solutions for practical difficulties,
5. Sensitivity to genuine difficulties and subtleties, including willingness to undergo and tolerate some uncertainty while making decisions,
6. Using rational dialogue in resolving moral conflicts and developing tolerance of different perspectives among morally reasonable people, and
7. Maintaining moral integrity:- Autonomy which is the independence in making decisions and actions is different from authority. Authority provides freedom for action, specified within limits, depending on the situation. Moral autonomy and respect for authority can coexist. They are not

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against each other. If the authority of the manager and the moral autonomy of the operator are in conflict, a consensus is obtained by the two, upon discussion and mutual understanding their limits.

Kohlberg Theory

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

- **Pre-conventional level**: - It is right conduct for an individual is regarded as whatever directly benefits oneself. At this level, individuals are motivated by obedience or the desire to avoid punishment or to satisfy their own needs or by the influence by power on them. All young children exhibit this tendency.
- **Conventional level**: - People respect the law and authority. Rules and norms of one's family or group or society are accepted, as the standard of morality. Individuals in this level want to please or satisfy, and get approval by others and to meet the expectations of the society, rather than their self interest (e.g., good boy, good girl). Loyalty is regarded as most important. Many adults do not go beyond this level.
- **Post-conventional level**:- Post-conventional level people are called *autonomous*. They think originally and want to live by universally good principles and welfare of others. They have no self-interest. They live by principled conscience. They follow the golden rule, 'Do unto others as you would have them do unto you'. They maintain moral integrity, self-respect and respect for others.

Kohlberg believed that individuals could only progress through these stages, one stage at a time. He believed that most of the moral development occurs through social interactions.

Gilligan's Theory

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

Gilligan revised the three levels of moral development of Kohlberg, as stages of growth towards ethics of caring.

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

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

Kohlberg's Theory	***Carol Gilligan's Theory***
A. Basic Aspects	
Is based on the study on men.	Is based on the study on men and women
Men give importance to moral rule.	Women always want to keep up the personal relationships with all the persons involved in the situations.
Ethics of rules and rights.	Women give attention to circumstances leading to critical situations rather than

	rules: (context-oriented and ethics of care)
B Characteristic Features	
Justice	Reason
Factual	Emotional
Right or wrong	Impact on relationships
Logic only	Compassion too
Logic and rule-based	Caring and concern
Less of caring	More of caring
Matter of fact (practical)	Abstract
Present focus	Future focus
Strict rules	Making exceptions
Independence	Dependence
Rigid	Human-oriented
Taking a commanding role	Shying away from decision-making
Transactional approach	Transformational approach

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

According to Kohlberg study, men observed that the theft was morally 'wrong' at the conventional

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

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 management ethics is to discover ways of promoting tolerance in the exercise of moral autonomy by managers.

Thus the goal of teaching professional 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 managers.

In a way, the goal of courses on professional ethics and goals of responsible professionals 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.

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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 an 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.

PROFESSION AND PROFESSIONALISM:

PROFESSION

Profession is defined as any occupation/job/vocation that requires advanced expertise (skills and knowledge), self-regulation and concentrated service to the public good. It brings a high status, socially and economically.

Characteristics of profession

- Advanced expertise: Many professions require sophisticated skills (do-how) and theoretical knowledge (know-how and why). Formal education, training, continuing education, updating are needed.

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- Self-regulation: Professional societies play important role in setting standards for admission to profession, drafting codes of ethics, enforcing standards of conduct and representing the profession before the public and the Government.
- Public good: The occupation provides some important public good, by concerted efforts to maintain ethical standards. For example, a physician promotes health, a lawyer protects the legal rights, and an engineer provides a product or a project for use by the public towards their health, welfare and safety. Teaching is also claimed as a profession as it helps shaping and training the minds of the students, young as well as old.

PROFESSIONAL

Professional relates to a person or any work that a person does on a profession and which requires expertise (skills and knowledge), self-regulation and results in public good. The term professional means a 'person' as well as a 'status'.

PROFESSIONALISM

It is the status of a professional which implies certain attitudes or typical qualities that are expected of a professional. It is defined as the services related to achieving the public good, in addition to the practices of the knowledge of moral ideals.

The criteria for achieving and sustaining professional status or professionalism are:

- **Advanced expertise:** The expertise includes sophisticated skills and theoretical knowledge in exercising judgment. This means a professional should analyze the problem in specific known area, in an objective manner.
- **Self-regulation:** One should analyze the problem independent of self-interest and direct to a decision towards the best interest of the clients/customers. An autonomous judgment (unbiased and on merits only) is expected. In such situations, the codes of conduct of professional societies are followed as guidance.
- **Public good:** One should not be a mere paid employee of an individual or a teaching

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college or manufacturing organization, to execute whatever the employer wants one to do. The job should be recognized by the public. The concerted efforts in the job should be towards promotion of the welfare, safety, and health of the public.

Characteristics

The characteristics of the 'profession' as distinct from 'non-professional occupation' are listed as Follows:

- **Extensive Training:** Entry into the profession requires an extensive period of training of intellectual (competence) and moral (integrity) character. The theoretical base is obtained through formal education, usually in an academic institution. It may be a Bachelor degree from a college or university or an advanced degree conferred by professional schools.
- **Knowledge and Skills**: Knowledge and skills (competence) are necessary for the well-being of the society. Knowledge of physicians protects us from disease and restores health. The lawyer's knowledge is useful when we are sued of a crime, or if our business is to be merged or closed or when we buy a property. The Chartered Accountant's knowledge is important for the success of recording financial transactions or when we file the income return. The knowledge, study, and research of the engineers are required for the safety of the air plane, for the technological advances and for national defense.
- **Monopoly:** The monopoly control is achieved in two ways:
    a. The profession convinces the community that only those who have graduated from the professional school should be allowed to hold the professional title. The profession also gains control over professional schools by establishing accreditation standards.
    b. By persuading the community to have a licensing system for those who want to enter the profession. If practicing without license, they are liable to pay penalties.
- **Autonomy in Workplace:** Professionals engaged in private practice have considerable freedom in choosing their clients or patients.

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Even the professionals working in large organizations exercise a large degree of impartiality, creativity and discretion (care with decision and communication) in carrying their responsibilities. Besides this, professionals are empowered with certain rights to establish their autonomy.

Accordingly physicians must determine the most appropriate medical treatments for their patients and lawyers must decide on the most successful defense for their clients. The possession of specialized knowledge is thus a powerful defense of professional autonomy.

- **Ethical Standards:** Professional societies promulgate the codes of conduct to regulate the professionals against their abuse or any unethical decisions and actions (impartiality, responsibility) affecting the individuals or groups or the society.

VIRTUES

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

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

Civic Virtues

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

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The duties are:

1. To pay taxes to the local government and state, in time.
2. To keep the surroundings clean and green.
3. Not to pollute the water, land, and air by following hygiene and proper garbage disposal.
4. To follow the road safety rules.

On the other hand, the rights are:

a. Vote the local or state government.

b. Contest in the elections to the local or state government.

c. Seek a public welfare facility such as a school, hospital, a community hall, transport or communication facility, for the residents.

d. To establish a green and safe environment, pollution free, corruption free, and also follow the ethical principles. People are said to have the right to breathe in fresh air, by not allowing smoking in public.

e. People have inalienable right to accept or reject a project in their area. One has the right to seek legal remedy, in this respect, through public interest petition.

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

- **Civic Knowledge**

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

- **Self-Restraint**

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

- **Self-Assertion**

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

- **Self-Reliance**

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

These civic virtues, applicable to local, state, and central governments, nourish freedom and civil liberty at the root of democracy.

THEORIES ABOUT RIGHT ACTION (ETHICAL THEORIES)

Ethical Theories/Approaches

Several ethical theories have been developed over different times, each of them stressing certain ethical principles or features. Each stresses a view and many a times, we find that these theories converge and reinforce the ethics, in deciding upon the actions and justifying the results.

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1. **Utilitarian Theory: -** The term Utilitarianism was conceived in the 19th century by Jeremy Bentham and John Stuart Mill to help legislators determine which laws were morally best. They suggested that the standard of right conduct is maximization of good consequences. Good consequences mean either 'utilities' or the 'balance of good over evil'. This approach weighs the costs and benefits. Right actions are the ones that produce the greatest satisfaction of the preferences of the affected persons. In analyzing an issue in this approach, we have to:

- Identify the various courses of action available to us.
- Ask who will be affected by each action and what benefits or harms will be derived from each.
- Choose the action that will produce the greatest benefits and the least harm. The ethical action is the one that provides the greatest good for the greatest number.

  The process is unfair although this results in promotion of overall good.

- **Duty Ethics**

  - The duty ethics theory, proposed by **Immanuel Kant** (1724-1804) states, that actions are consequences of performance of one's duties such as, 'being honest', 'not cause suffering of others', 'being fair to others including the meek and week', 'being grateful', 'keeping promises' etc. For example, we should be honest because honesty is required by duty. A businessman is to be honest because honesty pays — in terms of profits from customers and from avoiding jail for dishonesty.

  - On the other hand, the DUTY ethics theory, as enunciated by **John Rawl**, gave importance to the actions that would be voluntarily agreed upon by all persons concerned, assuming impartiality. His view emphasized the autonomy each person exercises in forming agreements with other rational people. Rawl proposed two basic moral principles; (1) each person is entitled to the most extensive amount of liberty compatible with an equal amount for others, and (2) differences in social power and economic benefits are justified only when they are likely to benefit everyone, including members of the most disadvantaged groups.

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He noted that the principles such as 'Do not kill' and 'protect innocent life' involve high respect for persons than other principles such as, 'Do not lie' (less harmful). This theory is criticized on the fact, that the intuitions do not provide sufficient guideline for moral duty. He has listed various aspects of Duty Ethics that reflect our moral convictions, namely:

2. **Rights Theory: -** Rights are entitlement to act or to have another individual act in a certain way. Minimally, rights serve as a protective barrier, shielding individuals from unjustified infringement of their moral agency by others. For every right, we have a corresponding duty of noninterference.

   a. The RIGHTS approach to ethics has its roots in the 18th century philosopher **Immanuel Kant**, who focused on the individual's right to choose for oneself. According him, what makes human beings different from mere things is, that people have dignity based on their ability to choose freely what they will do with their lives, and they have a fundamental moral right to have these choices respected. People are not objects to be manipulated; it is a violation of human dignity to use people in ways they do not freely choose. Other rights he advocated are:

      - *The right to access the truth*: We have a right to be told the truth and to be informed about matters that significantly affect our choices.
      - *The right of privacy*: We have the right to do, believe, and say whatever we choose in our personal lives so long as we do not violate the rights of others.
      - *The right not to be injured*: We have the right not to be harmed or injured unless we freely and knowingly do something to deserve punishment or we freely and knowingly choose to risk such injuries.
      - *The right to what is agreed*: We have a right to what has been promised by those with whom we have freely entered into a contract or agreement.

   b. In deciding whether an action is moral or immoral, we must ask, does the action respect the moral rights of everyone? Actions are wrong to the extent that they violate the rights of

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individuals; the more serious is the violation, the more wrongful is the action. The RIGHTS theory as promoted by **John Locke** states that the actions are right, if they respect human rights of every one affected. He proposed the three basic human rights, namely *life, liberty*, and *property*. His views were reflected in the modern American society, when Jefferson declared the basic rights as life, liberty, and pursuit of happiness.

c. As per **A.I. Melden's** theory based on rights, nature mandates that we should not harm others' life, health, liberty or property. Melden allowed welfare rights also for living a decent human life. He highlighted that the rights should be based on the social welfare system.

d. *Human rights*: Human rights are explained in two forms, namely liberty rights and welfare rights. Liberty rights are rights to exercise one's liberty and stresses duties on other people not to interfere with one's freedom. The four features of liberty rights (also called *moral rights*), which lay the base for Government Administration, are:

- Rights are natural in so far as they are not invented or created by government.
- They are universal, as they do not change from country to country.
- They are equal since the rights are the same for all people, irrespective of caste, race, creed or sex.
- They are inalienable i.e., one cannot hand over his rights to another person such as selling oneself to slavery.
- The Welfare Rights are the rights to benefit the needy for a decent human life, when one cannot earn those benefits and when those benefits are available in the society.

e. *Economic rights*: In the free-market economy, the very purpose of the existence of the manufacturer, the sellers and the service providers is to serve the consumer. The consumer is eligible to exercise some rights. The consumers' six basic rights are: Right to Information, Right to Safety, Right to Choice, Right to be Heard, Right to Redressal, and Right to Consumer education.

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3. **The Virtue Theory: -** This emphasizes on the character rather than the rights or duties. The character is the pattern of virtues (morally-desirable features). The theory advocated by Aristotle, stressed on the tendency to act at proper balance between extremes of conduct, emotion, desire, attitudes to find the golden mean between the extremes of 'excess' or 'deficiency'.

4. **Self-realization Ethics: -** Right action consists in seeking self-fulfillment. In one version of this theory, the self to be realized is defined by caring relationships with other individuals and society. In another version called *ethical egoism*, the right action consists in always promoting what is good for oneself. No caring and society relationships are assumed.

5. **Justice (Fairness) Theory:-** The justice or fairness approach to ethics has its roots in the teachings of the ancient Greek philosopher Aristotle, who said that "equals should be treated equally and unequal's unequally." The basic moral question in this approach is: How fair is an action? Does it treat everyone in the same way, or does it show favoritism and discrimination?

   Issues create controversies simply because we do not bother to check the fairness or justice. Favoritism gives benefits to some people without a justifiable reason for singling them out; discrimination imposes burdens on people who are no different from those on whom burdens are not imposed. Both favoritism and discrimination are unjust and wrong.

SELF-INTEREST

Self-interest is being good and acceptable to oneself. It is pursuing what is good for oneself. It is very ethical to possess self-interest. As per utilitarian theory, this interest should provide for the respect of others also. Duty ethics recognizes this aspect as duties to us. Then only one can help others. Right ethicist stresses our rights to pursue our own good. Virtue ethics also accepts the importance of self-respect as link to social practices.

In Ethical Egoism, the self is conceived in a highly individualistic manner. It says that every one of us should always and only promote one's own interest. The ethical egoists do not accept the well being of the community or caring for others. The ethical egoists hold that the society benefits to maximum when:-

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(*a*) The individuals pursue their personal good

(*b*) The individual organizations pursue maximum profit in a competitive enterprise.

This is claimed to improve the economy of the country as a whole, besides the individuals. In such pursuits, both individuals and organizations should realize that independence is not the only important value. We are also interdependent, as much as independent. Each of us is vulnerable in the society. Self-respect includes recognition of our vulnerabilities and interdependencies. Hence, it is compatible with caring for ourselves as well as others. Self-interest is necessary initially to begin with. But it should be one of the prime motives for action; the other motive is to show concern for others, in the family as well as society. One's self-interest should not harm others. The principles of 'Live and let (others) live', and 'reasonably fair competition' are recommended to professionals by the ethicists.

CUSTOMS

Ethical Pluralism: Various cultures in our pluralistic society lead to tolerance for various customs, beliefs, and outlooks. Accordingly ethical pluralism also exists. Although many moral attitudes appear to be reasonable, the rational and morally concerned people cannot fully accept any one of the moral perspectives. There are many varied moral values, which allow variation in the understanding and application of values by the individuals or groups in their everyday transactions. It means that even reasonable people will not agree on all moral issues and professional ethics.

Ethical Relativism: According to this principle, actions are considered morally right when approved by law or custom, and wrong when they violate the laws or customs. The deciding factor is the law or the customs of the society. A few reasons to accept this are explained in the following paragraphs:

- Laws appear to be objective ways for judging values. The laws and customs tend to be definite, clear and real, but not always. Further moral reasons allow objective criticism of laws, as being morally lacking.

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- Ethical relativism assumes that the values are subjective at the cultural level. Moral standards also vary from culture to culture. The objectivity is supported by the existing laws of that society. The relative morality accepted, supports the virtue of tolerance of differences among societies.
- Moral relationalism or moral contextualize: According to this, the moral judgments must be made in relation to certain factors, which may vary from case to case. The morally important factors for making judgments include the customs and laws. The virtue ethicists hold that the practical wisdom should prevail upon assessing the facts and in the judgment.

This principle was accepted by the early anthropologists because they had a specific tendency to over-stress the scope of moral difference between cultures. The human sacrifices and cannibalism were accepted. But the modern anthropologists insist that all cultures shall exhibit the virtue of social welfare and safety against needless death or physical or mental harm. Moral differences were based on the circumstances and facts and not on the difference in moral attitudes. For example, the pharaohs buried the live attendants along with their dead king with the belief that they would continue to serve the king in his afterlife.

RELIGION

Religions have played major roles in shaping moral views and moral values, over geographical regions. Christianity has influenced the Western countries, Islam in the Middle-East countries, Buddhism and Hinduism in Asia, and Confucianism in China. Further, there is a strong psychological link between the moral and religious beliefs of people following various religions and faiths. Religions support moral responsibility. They have set high moral standards. Faith in the religions provides trust and this trust inspires people to be moral. The religions insist on tolerance and moral concern for others. Many professionals who possess religious beliefs are motivated to be morally responsible.

Each religion lays stress on certain high moral standards. For example, Hinduism holds polytheistic

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(many gods) view, and virtues of devotion and surrender to high order. Christianity believes in one deity and emphasizes on virtues of Love, Faith, and Hope. Buddhism is non-theistic and focuses on compassion and Islam on one deity and adherence of *ishan* (piety or pursuit of excellence) and prayer. Judaism stresses the virtue of 'tsedakah' (righteousness). But many religious sects have adopted poor moral standards, e.g., many religious sects do not recognize equal rights for women. The right to worship is denied for some people. People are killed in the name of or to promote religion. Thus, conflicts exist between the 'secular' and religious people and between one religion and another. Hence, religious views have to be morally scrutinized.

Uses and Criteria

The ethical theories are useful in many respects.

- In understanding moral dilemma. They provide clarity, consistency, systematic and comprehensive understanding.
- It provides helpful practical guidance in moral issues towards the solution.
- Justifying professional obligations and decisions, and
- In relating ordinary and professional morality.

Different *criteria* may be applied for evaluating various ethical theories and deciding upon the best.

- The theory must be clear and (coherent) formulated with concepts that are logically connected.
- It must be internally consistent, i.e., none of its principles conflicts with any other
- The theory and its defense must depend, only upon facts.
- It must organize basic moral values in systematic and comprehensive manner. It is to fix priority of values and provide guidance in all situations
- It must provide guidance compatible with our moral convictions (judgments) about

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concrete situations. For example, if an ethical theory says that it is all right for engineers to make explosive devices without the informed consent of the public, we can conclude that the theory is inadequate.

Theories and judgments are continually adjusted to each other until we reach a reflective equilibrium. Most of the theories converge towards the welfare of the humanity. The duty ethics and right ethics differ in great extent on their emphasis. But they remain complementary always.

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E-NOTES, Subject: Human values, Ethics and IPR Subject Code: MGT 402

Course: B.Tech (Civil), Semester-8th

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UNIT -2

Topic covered: - Human Values: Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully, caring, Sharing, Honesty, Courage, Valuing Time, Co-operation, Commitment, Empathy, Self-Confidence, Character, Spirituality, Engineering as Social Experimentation: Engineering as experimentation, engineers as responsible experimenters , codes of ethics, a balanced outlook on law-the challenger case study.

MORALS

Morals are the principles on which one's judgments of right and wrong are based. These principles are derivable from full-fledged religious, cultural or political systems of belief. Morality is more fluid, personal and subjective.

Definition: - Morals are the social, cultural and religious beliefs or values of an individual or group which tells us what is right or wrong. They are the rules and standards made by the society or culture which is to be followed by us while deciding what is right.

Some examples of Morals are:

- Do not cheat
- Be loyal
- Be patient
- Always tell the truth
- Be generous

Morals refer to the beliefs what is not objectively right, but what is considered right for any situation, so it can be said that what is morally correct may not be objectively correct.

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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—our paradigm about what is acceptable."

Evolution of Human Values:

The human values evolve because of the following factors:

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

ETHICS

Ethics are widely accepted principles of right conduct. Ethics are more practical, conceived as overarching principles promoting fairness and forming the basis of criminal jurisprudence. One can say that morals are those fundamental values that are endorsed by a higher authority, and ethics are values which are based on greater objectivity and are geared towards ensuring smooth day-to-day functioning.

Some examples of Ethics are:

- Truthfulness
- Honesty
- Loyalty
- Respect
- Fairness

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- Integrity

INTEGRITY

Integrity is defined as the unity of thought, word and deed (honesty) and open mindedness. It includes the capacity to communicate the factual information so that others can make well-informed decisions. It yields the person's 'peace of mind', and hence adds strength and consistency in character, decisions, and actions. This paves way to one's success.

It is one of the self-direction virtues. It enthuse people not only to execute a job well but to achieve excellence in performance. It helps them to own the responsibility and earn self-respect and recognition by doing the job. Moral integrity is defined as a virtue, which reflects a consistency of one's attitudes, emotions, and conduct in relation to justified moral values. Integrity comes in many forms, but honesty and dependability are two traits that are expected in most workplace situations. Without responsible behavior, distrust can make a work environment tense and uncomfortable. A strong work ethic shows co-workers and clients that you're reliable and take your responsibilities seriously. Polite communication, respectable behavior and fiscal responsibility also help you stand out as a trustworthy employee.

WORK ETHICS:

It is a cultural norm that insists being personally accountable and responsible for the work.

Elements of work ethics:-

1. Interpersonal skills: - It includes the habits, attitudes, manners, appearance and behavior we use around other people, which affect how we get along with other people.
2. Initiative:- For avoid the procrastination and missed opportunities which are consider as a real problem initiative is very important character for information age workers.
3. Being dependable

SERVICE LEARNING

Service learning is learning and learning strategy that integrates meaningful community service

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with instruction and reflection to enrich the learning experience, teach civic responsibility and strengthen communities.

CIVIC VIRTUES

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

The duties are:

1. To pay taxes to the local government and state, in time.
2. To keep the surroundings clean and green.
3. Not to pollute the water, land, and air by following hygiene and proper garbage disposal.
4. To follow the road safety rules.

On the other hand, the rights are:

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

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

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1. **Civic Knowledge:** - Citizens must understand what the Constitution says about how the government is working, and what the government is supposed to do and what not to do. We must understand the basis of our responsibilities as citizens, besides duties and rights. We must be able to recognize when the government or another citizen infringes upon our rights. It implies that the government requires the participation of the enlightened citizens, to serve and survive**.**
2. **Self-Restraint:-** For citizens to live in a free society with limited government each citizen must be able to control or restrain himself; otherwise, we would need a police state—that is, a dictatorial government to maintain safety and order. He advocated for morality and declared that happiness is achieved and sustained through virtues and morals. He advocated and demonstrated self-restraint several times in his private and public life, and naturally he was a great leader.
3. **Self-Assertion:-** Self-assertion means that citizens must be proud of their rights, and have the courage to stand up in public and defend their rights. Sometimes, a government may usurp the very rights that it was created to protect. In such cases, it is the right of the people to alter or abolish that government (e.g., voting rights, rights call back).
4. **Self-Reliance:-** Citizens who cannot provide for themselves will need a large government to take care of them. Once citizens become dependent on government for their basic needs, the people are no longer in a position to demand that government act within the confines of the Constitution. Self-reliant citizens are free citizens in the sense that they are not dependent on others for their basic needs. They do not need a large provider-government, which has the potential to become an oppressive government, to meet those needs. Only a strong self-reliant citizenry will be able to enjoy fully the blessings of liberty.

These civic virtues, applicable to local, state, and central governments, nourish freedom and civil liberty at the root of democracy.

RESPECT FOR OTHER

- It is most important in everyday life.
- As a human we have to respect our parents, teachers, elders and all family members.

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- As a citizen of a country – traffic laws, cultural traditions, country flag, leaders, and other people felling and right.
- Others deserve our respect, our regards, our good thinking about them.
- It is our moral duty to treat others with respect in order to spread joy and happiness.

LIVING PEACEFULLY

Peace can be defined as a passive state of mind. It is a great influence on mind, brainpower and also the environment around you. It is most important for the efficient work in all situations.

CARING

According to net nodding, "Any thoughtful human response that enables others to thrive."

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

SHARING

Sharing is one of a notable act of mankind and a high virtue. It may be in the form of money, food, materials, books, thoughts etc.

HONESTY

Honesty is a virtue, and it is exhibited in two aspects namely,

(a) Truthfulness and

(b) Trustworthiness.

Truthfulness is to face the responsibilities upon telling truth. One should keep one's word or promise. Reliable engineering judgment, maintenance of truth, defending the truth, and

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communicating the truth, only when it does 'good' to others, are some of the reflections of truthfulness. But trustworthiness is maintaining integrity and taking responsibility for personal performance. People abide by law and live by mutual trust. They play the right way to win, according to the laws or rules. They build trust through reliability and authenticity. They admit their own mistakes and confront unethical actions in others and take tough and principled stand, even if unpopular.

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

(a) Beliefs (intellectual honesty).

(b) Communication (writing and speech).

(c) Decisions (ideas, discretion).

(d) Actions (means, timing, place, and the goals). And

(e) Intended and unintended results achieved.

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

1. Lying: Honesty implies avoidance of lying. An engineer may communicate wrong or distorted test results intentionally or otherwise. It is giving wrong information to the right people.
2. Deliberate deception: An engineer may judge or decide on matters one is not familiar or with insufficient data or proof, to impress upon the customers or employers. This is a self deceit.
3. Withholding the information: It means hiding the facts during communication to one's superior or subordinate, intentionally or otherwise.
4. Not seeking the truth: Some engineers accept the information or data, without applying their mind and seeking the truth.
5. Not maintaining confidentiality: It is giving right information to wrong people. The engineers should keep information of their customers/clients or of their employers confidential and should not discuss them with others.

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6. Giving professional judgment under the influence of extraneous factors such as personal benefits and prejudice. The laws, experience, social welfare, and even conscience are given a go-bye by such actions. Certainly this is a higher-order crime.

COURAGE

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

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

(a) **Physical courage**: In physical courage, the thrust is on the adequacy of the physical strength, including the muscle power and armaments. People with high adrenalin, may be prepared to face challenges for the mere 'thrill' or driven by a decision to 'excel'.

(b) **Social courage:** The social courage involves the decisions and actions to change the order, based on the conviction for or against certain social behaviors. This requires leadership abilities, including empathy and sacrifice, to mobilize and motivate the followers, for the social cause.

(c) **Intellectual courage:** The intellectual courage is inculcated in people through acquired knowledge, experience, games, tactics, education, and training.

In professional ethics, courage is applicable to the employers, employees, public, and the press.

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 perishable and most valuable resource too. This resource is continuously spent, whether any decision or action is taken or not.

Principles of time management

- Clear objectives

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- Prioritize task
- Stick to schedule tasks
- Allow time to manage your time
- The unexpected and
- Managing time wastage.

CO-OPERATIONS

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

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

The impediments to successful cooperation are:

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

COMMITMENT

Commitment means alignment to goals and adherence to ethical principles during the activities.

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

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

EMPATHY

Empathy is the ability to mutually experience the thoughts, emotions, and direct experience of others. The ability to understand another person's circumstances, point of view, thoughts, and feelings is empathy. When experiencing empathy, you are able to understand someone else's internal experiences.

Empathy is social radar. Sensing what others feel about, without their open talk, is the essence of empathy. Empathy begins with showing concern, and then obtaining and understanding the feelings of others, from others' point of view. It includes the imaginative projection into other's feelings and understanding of other's background such as parentage, physical and mental state, economic situation, and association. This is an essential ingredient for good human relations and transactions.

Characteristics:

- **Understanding others:** It means sensing others feelings and perspectives, and taking active interest in their welfare.
- **Service orientation:** It is anticipation, recognition and meeting the needs of the clients or

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customers.

- **Developing others:** This means identification of their needs and bolstering their abilities. In developing others, the one should inculcate in him the 'listening skill' first.

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

- **Leveraging diversity** (opportunities through diverse people): This leads to enhanced organizational learning, flexibility, and profitability.
- **Political awareness:** It is the ability to read political and social currents in an organization.

Benefits of empathy include:

- Good customer relations (in sales and service, in partnering).
- Harmonious labor relations (in manufacturing).
- Good vendor-producer relationship (in partnering.)

SELF CONFIDENCE

- It is defined as the faith in oneself, is confidence.
- Self confidence gives rise to strength and courage to the mind.
- It is very necessary for undertaking and completing any worthwhile job.

CHARACTER

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

People are divided into several categories, according to common tendencies such as ruthless, aggressiveness, and ambition, constricting selfishness, stinginess, or cheerfulness, generosity and goodwill. Individuals vary not only in the type of their character but also in the

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degree. Those whose lives are determined and directed by the prevailing habits, fashions, beliefs, attitudes, opinions and values of the society in which they live have at best a developed social as opposed to an individual character. (It comes to mean a distinctive mark by which one thing was distinguished from others, and then primarily to mean the assemblage of qualities that distinguish one individual from another).

SPIRITUALITY

In broad term spirituality refers to the way of living. Spirituality is a way of living that emphasizes the constant awareness and recognition of the spiritual dimension (mind and its development) of nature and people, with a dynamic balance between the material development and the spiritual development. Spirituality includes creativity, communication, recognition of the individual as human being (as opposed to a life-less machine), respect to others, acceptance (stop finding faults with colleagues and accept them the way they are), vision (looking beyond the obvious and not believing anyone blindly), and partnership (not being too authoritative, and always sharing responsibility with others, for better returns).

Spirituality in the Workplace

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

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

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7. Do unto others as you would have them do unto you.

Spirituality for Corporate Excellence

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

1. Self-awareness
2. Alertness in observation and quickness in decision making, i.e., spontaneity which includes quick reflexes, no delay but also no hasty decisions.
3. Being visionary and value based — this includes an attitude towards future of the organization and the society, with clear objectives.
4. Holism — Whole system or comprehensive views and interconnected with different aspects. Holistic thinking, which means the welfare of the self, family, organization and the society including all other living beings and environment.
5. Compassion — Sympathy, empathy and concern for others. These are essential for not only building the team but also for its effective functioning.
6. Respect for diversity — It means search for unity in diversity i.e., respect others and their views.
7. Moral Autonomy — It means action based on rational and moral judgment. One need not follow the crowd or majority i.e., band-wagon effect.
8. Creative thinking and constant reasoning
9. Ability to analyze and synthesize — Refrain from doing something only traditional.
10. Positive views of adversity
11. Humility — The attitude to accept criticism (it requires courage!) and willing to correct. It includes modesty and acknowledging the work of colleagues.
12. Sense of vocation — Treat the duty as a service to society, besides your organization.

Engineering as Social Experimentation

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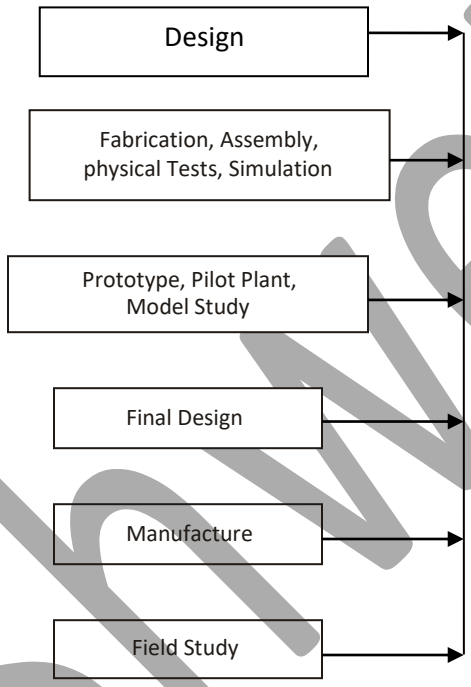
ENGINEERING AS EXPERIMENTATION

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



Several redesigns are made upon the feedback information on the performance or failure in the field or in the factory. Besides the tests, each engineering project is modified during execution, based on the periodical feedback on the progress and the lessons from other sources. Hence, the development of a product or a project as a whole may be considered as an experiment.

Engineering Experiments vs Standard Experiments

Similarities

- Design calculations

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- Exact properties of raw materials
- Constancies of material processing
- Nature of working of final product
- Learning from the past
- Continues monitoring

Contrasts

- Experimental control
- Informed consent
- Conclusive remarks
- Knowledge gained

ENGINEERS AS RESPONSIBLE EXPERIMENTERS

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

The engineer, as an experimenter, owe several responsibilities to the society, namely,

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

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4. Be accountable for the results of the project (accountability).

General features

- Protect the safety of human
- Awareness about the nature of project.
- Decided to involve
- Accountable for the projects result.

CODES OF ETHICS

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

1. Inspiration and guidance:- The codes express the collective commitment of the profession to ethical conduct and public good and thus inspire the individuals. They identify primary responsibilities and provide statements and guidelines on interpretations for the professionals and the professional societies.
2. Support to engineers:- The codes give positive support to professionals for taking stands on moral issues. Further they serve as potential legal support to discharge professional obligations.
3. Deterrence (discourage to act immorally) and discipline (regulate to act morally):- The codes serve as the basis for investigating unethical actions. The professional societies sometimes revoke membership or suspend/expel the members, when proved to have acted unethical. This sanction along with loss of respect from the colleagues and the society are bound to act as deterrent.
4. Education and mutual understanding:- Codes are used to prompt discussion and reflection on moral issues. They develop a shared understanding by the professionals, public, and the government on the moral responsibilities of the engineers. The Board of Review of the professional societies encourages moral discussion for educational purposes.

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

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

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

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

1. General and vague wordings:- Many statements are general in nature and hence unable to solve all problems.
2. Not applicable to all situations:- Codes are not sacred, and need not be accepted without criticism. Tolerance for criticisms of the codes themselves should be allowed.
3. Often have internal conflicts:- Many times, the priorities are clearly spelt out, e.g., codes forbid public remarks critical of colleagues (engineers), but they actually discovered a major bribery, which might have caused a huge loss to the exchequer.
4. They cannot be treated as final moral authority for professional conduct:- Codes have flaws by commission and omission. There are still some grey areas undefined by codes. They cannot be equated to laws. After all, even laws have loopholes and they invoke creativity in the legal practitioners.
5. Only a few enroll as members in professional society and non-members cannot be compelled.
6. Even as members of the professional society, many are unaware of the codes
7. Different societies have different codes:- The codes cannot be uniform or same! Unifying the codes may not necessarily solve the problems prevailing various professions, but attempts are still

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made towards these unified codes.

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

A BALANCED OUTLOOK ON LAW

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

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

Code for Builders by Hammurabi

Hummurabi the king of Babylon in 1758 framed the following code for the builders:

"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 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 that builder's son to death. If it causes the death of the householder's slave, he shall give slave for slave to the householder. If it destroys property, he shall replace anything it has destroyed; and because he has not made the house sound 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 his work perfect and the wall bulges, that builder shall put that wall in sound condition at his own cost".

This code was expected to put in self-regulation seriously in those years.

Steam Boat Code in USA

Whenever there is crisis we claim that there ought to be law to control this. Whenever there is a fire accident in a factory or fire cracker's store house or boat capsize we make this claim, and soon forget. Laws are meant to be interpreted for minimal compliance. On the other hand, laws

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when amended or updated continuously would be counterproductive. Laws will always lag behind the technological development. The regulatory or inspection agencies such as Environmental authority of India can play a major role by framing rules and enforcing compliance.

In the early 19th century, a law was passed in USA to provide for inspection of the safety of boilers and engines in ships. It was amended many times and now the standards formulated by the American Society of Mechanical Engineers are followed.

Proper Role of Laws

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

Thus, it is concluded that:

1. The rules which govern engineering practice should be construed as of responsible experimentation rather than rules of a game. This makes the engineer responsible for the safe conduct of the experiment.
2. Precise rules and sanctions are suitable in case of ethical misconduct that involves the violation of established engineering procedures, which are aimed at the safety and the welfare of the public.
3. In situations where the experimentation is large and time consuming, the rules must not try to cover all possible outcomes, and they should not compel the engineers to follow rigid courses of action.
4. The regulation should be broad, but make engineers accountable for their decisions, and
5. Through their professional societies, the engineers can facilitate framing the rules, amend wherever necessary, and enforce them, but without giving-in for conflicts of interest.

CASE STUDY: THE CHALLENGER

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What happened?

The orbiter of the Challenger had three main engines fuelled by liquid hydrogen. The fuel was carried in an external fuel tank which was jettisoned when empty. During lift-off, the main engines fire for about nine minutes, although initially the thrust was provided by the two booster rockets. These booster rockets are of the solid fuel type, each burning a million pound load of aluminum, potassium chloride, and iron oxide.

The casing of each booster rocket is about 150 feet long and 12 feet in diameter. This consists of cylindrical segments that are assembled at the launch site. There are four-field joints and they use seals consisting of pairs of O-rings made of vulcanized rubber. The O-rings work with a putty barrier made of zinc chromate.

The engineers were employed with Rockwell International (manufacturers for the orbiter and main rocket), **Morton-Thiokol** (maker of booster rockets), and they worked for NASA. After many postponements, the launch of Challenger was set for morning of Jan 28, 1986. **Allan J. McDonald** was an engineer from Morton-Thiokol and the director of the Solid Rocket Booster Project. He was skeptic about the freezing temperature conditions forecast for that morning, which was lower than the previous launch conditions. A teleconference between NASA engineers and MT engineers was arranged by Allan.

Arnold Thompson and **Roger Boisjoly**, the seal experts at MT explained to the other engineers how the booster rocket walls would bulge upon launch and combustion gases can blow past the O-rings of the field joints.

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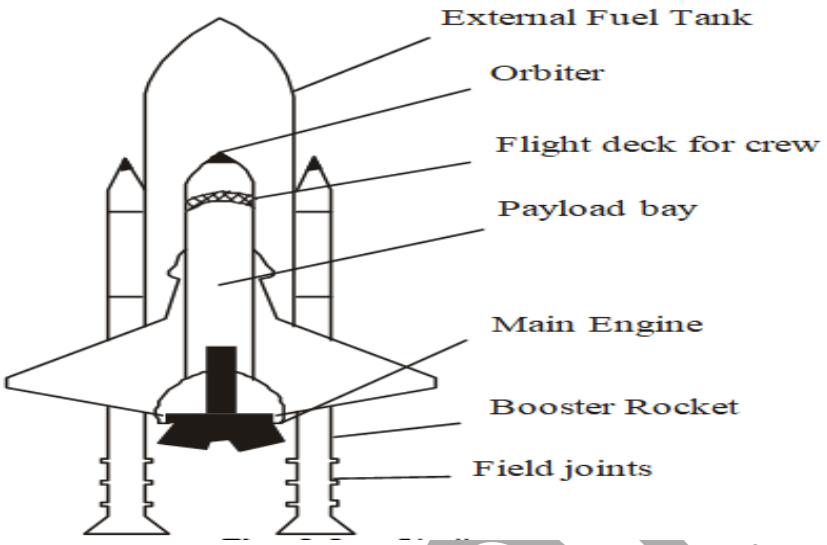

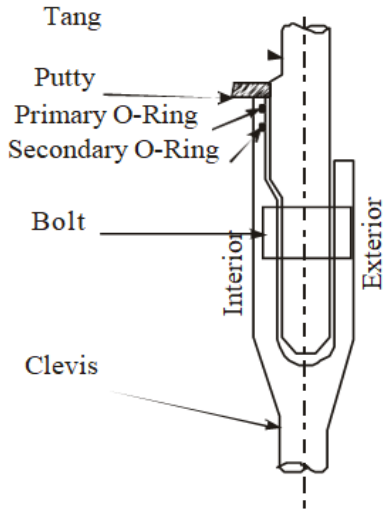

Fig. 3.2 b Field joint before ignition

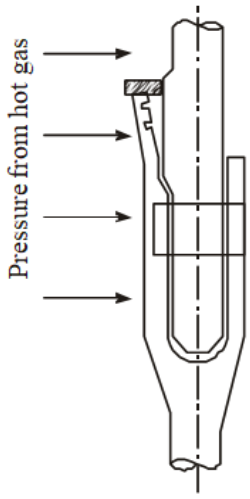

Fig. 3.2 c Field joint after ignition

On many of the previous flights the rings have been found to have charred and eroded. In freezing temperature, the rings and the putty packing are less pliable. From the past data gathered, at temperature less than 65 °F the O-rings failure was certain. But these data were not deliberated at that conference as the launch time was fast approaching.

The engineering managers **Bob Lund** and **Joe Kilminster** agreed that there was a safety problem.

Boisjoly testified and recommended that no launch should be attempted with temperature less than 53 °F. These managers were annoyed to postpone the launch yet again. The top management of MT was planning for the renewal of contract with NASA, for making booster rocket. The managers told Bob Lund "to take-off the engineering hat and put on your management hat". The judgment of the engineers was not given weight age. The inability of these engineers to substantiate that the launch would be unsafe was taken by NASA as an approval by Rockwell to launch.

At 11.38 a.m. the rockets along with Challenger rose up the sky. The cameras recorded smoke coming out of one of the filed joints on the right booster rocket. Soon there was a flame that hit the external fuel tank. At 76 seconds into the flight, the Challenger at a height of 10 miles was totally engulfed in a fireball. The crew cabin fell into the ocean killing all the seven aboard.

Some of the factual issues, conceptual issues and moral/normative issues in the space shuttle challenger incident are highlighted hereunder for further study.

Moral/Normative Issues

1. The crew had no escape mechanism. Douglas, the engineer, designed an abort module to allow the separation of the orbiter, triggered by a field-joint leak. But such a 'safe exit' was rejected as too expensive, and because of an accompanying reduction in payload.
2. The crews were not informed of the problems existing in the field joints. The principle of informed consent was not followed.
3. Engineers gave warning signals on safety. But the management group prevailed over and ignored the warning.

Conceptual Issues

1. NASA counted that the probability of failure of the craft was one in one lakh launches. But it

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was expected that only the 100000th launch will fail.

2. There were 700 criticality-1 items, which included the field joints. A failure in any one of them would have caused the tragedy. No back-up or stand-bye had been provided for these criticality-1 components.

Factual/Descriptive Issues

1. Field joints gave way in earlier flights. But the authorities felt the risk is not high.
2. NASA has disregarded warnings about the bad weather, at the time of launch, because they wanted to complete the project, prove their supremacy, get the funding from Government continued and get an applaud from the President of USA.
3. The inability of the Rockwell Engineers (manufacturer) to prove that the lift-off was unsafe. This was interpreted by the NASA, as an approval by Rockwell to launch.

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INTERNATIONAL INSTITUTE OF TECHNOLOGY & MANAGEMENT, MURTHAL SONEPAT

E-NOTES, Subject: Human values, Ethics and IPR Subject Code: MGT 402

Course: B.Tech (Civil), Semester-8th

(Prepared By: Ms. Shweta, Assistant Professor, BBA)

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UNIT -3

Topic covered: - Engineer's Responsibility for Safety: Safety and risk, assessment of safety and risk, risk benefit analysis reducing risk, the three mile island and Chernobyl case studies. Responsibilities: Collegiality and loyalty, respect for authority, collective bargaining, confidentiality, conflicts of interest, occupational crime.

SAFETY

An action is considered safe when the risk associated with it are known and are considered acceptable. There is an element of judgment involved in considering the safety of something.

CONCEPT OF SAFETY

- "A thing is safe if its risks are judged to be acceptable".
- This approach helps underscore the notion that judgments about safety are tacitly value judgments about what is acceptable risk to a given person or group.

Definition for Safety

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).

Safety: Safe operation of system and the prevention of natural or human caused disaster.

RISK

It is the possibility of something bad happening at some time in the future. The probability of getting into a dangerous situation are achieving an unfavorable result can be considered as a risk. Risk is thus something that is expected to happen in the future, which an element of probability and uncertainty is associated.

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

TYPES OF RISKS

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Acceptability of Risk: "a risk is acceptable when those affected are generally no longer apprehensive about it".

FACTORS:

- Whether the risk is accepted voluntarily.
- The effects of knowledge on how the probabilities of harm (or benefit) are known or perceived.

1. **Voluntarism and Control**: The person, who breaks a red signal, is prone to be a victim of an accident, but risks. A person who lives near a dumping yard is prone to ill-health, but neglects. A boy who rides a vehicle at a high speed cannot rely on the perfect functioning of the brakes. But these people take voluntary risks thinking they can control.
2. **Effective information on Risk assessment**: The acceptance of risks also depends on the manner in which information necessary for decision making is presented. A person can be motivated to violate the safety rules by explaining the higher probability of success, whereas the same person can be demotivated from such task, by explaining the probability of failure and the fatal effects of it.
3. **Job-related Risks**: In some jobs where the workers are exposed to chemicals, radiations and poisonous gases etc., they are not informed about the probable risks the workers would be facing, in doing their jobs. These are such dangers where the toxic environments cannot readily be seen, smelled, heard or sensed otherwise.

Hazards

It is something that can be dangerous or cause damage. Something is hazardous if it has the potential to cause harm or ill effects. An exposed electric wire in your class room is hazardous because it has the potential give an electric shock. No body may actually get shock, but the potential and probability exists.

SAFETY AND RISK

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

Unanticipated, during its use.

- Probability of safety = 1 – Probability of risk
- Probability of Risk = Probability of occurrence × Consequence in magnitude

Different methods are available to determine the risk (testing for safety)

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

ASSESSMENT OF SAFETY AND RISK

- Absolute safety is never possible to attain and safety can be improved in an engineering product only with an increase in cost.
- On the other hand, unsafe products increase secondary costs to the producer beyond the primary (production) costs, like warranty costs loss of goodwill, loss of customers, legal action costs, downtime costs in manufacturing, etc.
- Figure indicates that P- Primary costs are high for a highly safe (low risk) product and S- Secondary costs are high for a highly risky (low safe) product.
- It should now be clear that ‘safety comes with a price’ only.

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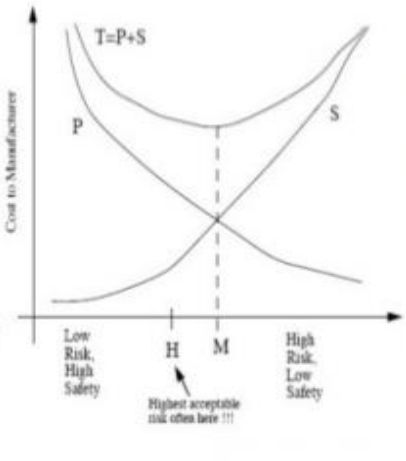
ASSESSMENT OF SAFETY AND RISK

Design principle

- **How safe should we make a product?**
- There are .... tradeoffs = T
- P = primary cost of a product (including safety measures)
- S = secondary costs



P- Primary cost of products, including cost of safety measures involved.

S-Secondary costs including warranty loss of customer goodwill T-Total cost=P+S and maintenance cost.

Minimum total cost occurs at M.

H-Highest acceptable risk may fall below risk at least cost M

H-H and its higher costs must be selected as design or operating cost.

Goal of risk assessment: - The aim of the risk assessment process is to remove a hazard or reduce the level of its risk by adding precautions or control measures, as necessary. By doing so, you have created a safer and healthier workplace.

Uncertainties encountered in design process

- Coordination problems.
- Contractor-caused delays.
- Uncertainties regarding materials and skills required in the manufacturing
- Changing economic realities.
- Unfamiliar environmental conditions like very low temperature
- A decision on maximizing profit or maximizing the return on investment.

- Uncertainties about applications like dynamic loading instead of static loading, vibrations , wind speeds.
- The available standard data on items like steel, resistors, insulators, optical glass, etc are based on statistical averages only.

Risk Benefit Analysis

- Risk-benefit analysis involving studies, testing about the comparison of the risk of a situation to its related benefits.
- Risk Benefit analysis (RBA) is an approach to risk assessment that focuses not just on the risks of the activity, but on the benefits of the activity.
- Riskbenefit analysis is analysis that seeks to quantify the risk and benefits and hence their ratio. Exposure to personal risk is recognized as a normal aspect of everyday life.
  A certain level of risk in ourlives is accepted as necessary to achieve certain benefits.
- Risk is an essential element in the development of children's physical, emotional and intellectual development.
- Risk isn't just about physical actions. **For example** climbing a tree or skateboarding.It's also about taking intellectual risks trying anything for
  the first time, testing new ideas, accepting other people's opinions (even if you don't agre e with them).
- Ex: For example, driving an automobile is a risk most people take daily.

Causes of an accident

An "accident" is an unplanned, undesired event which may or may not result in injury or property damage, which interferes with the completion of an assigned task.

A "near miss" is a form of an accident that does not result in injury or property damage. While much effort and time is expended on accident investigation, this information tells us that we

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should be focusing on accident prevention. The majorities of accidents are near-miss and may never be reported. The causes of accidents can be broken down into two basic components, unsafe conditions and unsafe acts.

Unsafe conditions are hazardous conditions or circumstances that could lead directly to an accident. An unsafe act occurs when a worker ignores or is not aware of a standard operating procedure or safe work practice designed to protect the worker and prevent accidents. A worker needs a electrical switch rewired. A work request is submitted and the work scheduled for the following week. The employee decides, I need this sooner and tries to rewire the switch. The employee receives an electrical shock after failing to lock out the energy source.

Accidents are defined as unplanned occurrences which result in injuries, fatalities, loss of production or damage to property and assets. Preventing accidents is extremely difficult in the absence of an understanding of the causes of accidents. Many attempts have been made to develop a prediction theory of accident causation, but so far none has been universally accepted. Researchers from different fields of science and engineering have been trying to develop a theory of accident causation which will help to identify, isolate and ultimately remove the factors that contribute to or cause accidents. In this article, a brief outline of various accident causation theories is presented, followed by a structure of accidents.

Accident Causation Theories

1. **Domino theory**:- According to W.H. Heinrich (1931), who developed the so-called domino theory, 88% of all accidents are caused by unsafe acts of people, 10% by unsafe actions and 2% by acts of God. He proposed a five-factor accident sequence‖ in which each factor would actuate the next step in the manner of toppling dominoes lined up in a row. The sequence of accident factors is as follows:
    - Ancestry and social environment
    - worker fault
    - Unsafe act together with mechanical and physical hazard
    - accident

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- Damage or injury.

In the same way that the removal of a single domino in the row would interrupt the sequence of toppling, Heinrich suggested that removal of one of the factors would prevent the accident and resultant injury; with the key domino to be removed from the sequence being number. Although Heinrich provided no data for his theory, it nonetheless represents a useful point to start discussion and a foundation for future research.

2. **Multiple causation theory: -** Multiple causation theory is an outgrowth of the domino theory, but it postulates that for a single accident there may be many contributory factors, causes and sub-causes, and that certain combinations of these give rise to accidents. According to this theory, the contributory factors can be grouped into the following two categories:
    - Behavioral. This category includes factors pertaining to the worker, such as improper attitude, lack of knowledge, lack of skills and inadequate physical and mental condition.
    - Environmental. This category includes improper guarding of other hazardous work elements and degradation of equipment through use and unsafe procedures.

    The major contribution of this theory is to bring out the fact that rarely, if ever, is an accident the result of a single cause or act.
3. **Pure chance theory**: - According to the pure chance theory, every one of any given set of workers has an equal chance of being involved in an accident. It further implies that there is no single discernible pattern of events that leads to an accident. In this theory, all accidents are treated as corresponding to Heinrich's acts of God, and it is held that there exist no interventions to prevent them.
4. **Biased liability theory**:- Biased liability theory is based on the view that once a worker is involved in an accident, the chances of the same worker becoming involved in future accidents are either increased or decreased as compared to the rest of workers. This theory contributes very little, if anything at all, towards developing preventive actions for avoiding accidents.

Risk assessment

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Risk assessment is the cornerstone of the European approach to prevent occupational accidents and ill health. It is the start of the health and safety management approach. If it is not done well or not at all the appropriate preventative measures are unlikely to be identified or put in place.

Risk assessment can be defined as "the process of evaluating the risk to health and safety of workers while at work arising from the circumstances of the occurrence of a hazard at the workplace". The process can be described as a continuous improvement cycle which can be implemented in the management processes in the company. The fundamental steps in risk assessment are:

Step 1: identifying hazards and those at risk

Step 2: evaluating and prioritizing risks

Step 3: Deciding on preventive action

Step 4: Taking action

Step 5: Monitoring and reviewing

Prevention measures of reducing risks

The engineer is faced with a difficult task of designing and manufacturing safe products. They have to give a fair accounting of benefits and risks for those products. They have to meet production schedule and help his or her company to maintain profits all the time. Of these objectives, the product safety is to be given top priority. The various steps towards reducing risks are as follows:

- The operator should not do any error in operation. He should not be negligent towards discharging his duties. Accidents are caused by dangerous conditions that can be corrected. Dangerous design characteristics are to be given due consideration in the design. Safety devices may be provided to reduce accidents.
- It safety is built into a product in the beginning itself it may not increase the cost. Any changes in the design later, may lead to increase in the cost.

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- We become aware about safety after a product has been manufactured and tested. If safety is not built into the original design, people can be hurt during the time of usage. Hence one should not be reluctant to change the design, safety point of view.
- Warnings about hazards should be adequate. It is also better to have insurance coverage, but a warning merely indicates that a hazard is known to exist. This provides only minimal protection against harm. Sometimes, insurance rates are sky rocketing. Engineers should understand that reducing risk is not an impossible task even under financial and time constraints. Hence in the design, safety I stop be given top priority by an engineer.

Case Study: Three Mile Island Accident

On March 28, 1979 the most serious United States commercial nuclear power plant accident happened outside of Middletown, Pennsylvania. Although no deaths occurred, the accident at Three Mile Island Unit 2 was the worst in operating history. It highlighted the need for changes in emergency response planning, reactor operator training, human factors engineering, and radiation protection. The accident was a result of equipment malfunctions, worker errors, and design related problems that ultimately led to a partial core meltdown and a small release of radioactivity.

The nuclear power plant had a pressurized water reactor system (PWR). The main reactor core:- (1) release heat which is transferred to water in the primary circuit (1-2-3-4). The heat from the steam generator (3) is transferred to water in the secondary circuit (7) at low pressure. The water in the secondary circuit gets converted into steam in the boiler (3). This steam flow drives the turbine (8) and the exhaust stem is converted into water in the condenser (10) and circulated back into the boiler (3) by means of pumps (11, 13, and 14).

The demineraliser (12) contains resin beads to clean condensate. A problem in the demineraliser arose and this led to the closure of the outlet valve of (12) to the steam generator (3). This resulted in shut down of main feed water pump (13) and the auxiliary feed water pump (14) failed.

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The reactor pressure increased to very high level, opened a pressure relief valve (6) and gave a signal (SCRAM), which helped to lower the control rods in the reactor core, in order to stop the main fission process. This valve (6) remained opened for long.

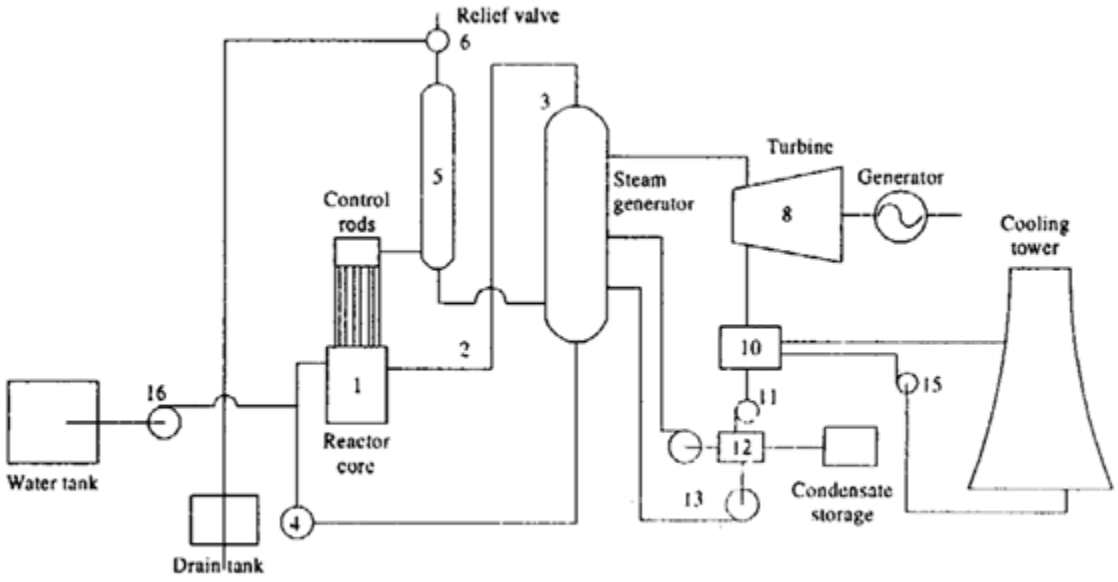

Fig 4.5 System components of TMI - 2 plant

When pump (14) failed, the steam generator (3) went dry. So, heat was not removed from the reactor. Water was pouring out at 220 gallons/min but reactor has not cooled down.

Pumps (16) were started to refill water reactor core. There was too much of water in the reactor now. The reactor fuel rods began to break to pieces.

Then the chemical reaction between steam and the Zinc alloy fuel elements produced Hydrogen and the Hydrogen accumulated caused the explosion of the structure.

The radiation levels in the building increased and the sound alarm blew. Immediately people contacted Nuclear Regulatory Commission and B and W, who constructed the reactor. Nobody was there to answer the call at B and W. But somehow people escaped without any loss of human lives.

After 13 hours and a half, the reactor was put under control.

Case study: - Chernobyl, Near Kiev, Russia (April 1986)

The RBMK (Acronym for water cooled and graphite moderated) reactors were graphite moderated and they use water tubes. A test on the turbine generator was planned to be conducted during a scheduled plant shut-down maintenance.

To conduct the test, the power plant output was reduced to 700 MW. But due to a sudden and unexpected demand, the power output has to be raised.

1. To go ahead with the test, the reactor operators had already disconnected the emergency core-cooling system, ignoring the raise in demand situation.
2. Further, a control device was not properly reprogrammed to maintain power at 700-100 MW level
3. The test was conducted at 200 MW power out-put which is very low for the test. They should have shut down the reactor.
4. The operators blocked all emergency signals and automatic shut-down controls, thus all safety systems were disconnected.
5. The operators raised control rods to increase power output and tried to continue the test. This made the reactor unsafe. The temperature of RBMK reactor increased and the fission rate increased.
6. The test should have been postponed but continued. The reactor core melted and due to the Hydrogen accumulation, the reactor caught fire and the radioactive waste began to spread out in USSR and also Europe.

The people living around were informed after a few hours and were evacuated 12 hours after the explosion. More than 30 workers in the complex lost their lives, while 200 workers sustained burns. About 8000 people lost their lives. The agricultural products were affected due to contaminated radioactive water, for several years.

Introduction of responsibility

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Loyalty to corporations, respect for authority, collegiality and other teamwork are a few important virtues in the field of Engineering. Professionalism in engineering would be threatened at every turn in a corporation driven with powerful egos. Robert Jackall, a Sociologist criticizes professionalism saying, "what is right in the corporation is what the guy above you wants from you. That's what morality is in the corporation."

In order to understand how good the ethical factors in a corporate world should be, let us consider the following points −

- Ethical values in their full complexity are widely acknowledged and appreciated by managers and employees alike.
- In an ethical corporate climate, the use of ethical language is honestly applied and recognized as a legitimate part of corporate dialogue.
- Top management sets a moral tone in words, in policies and by personal example.
- The procedures should be followed for conflict resolution.

Loyalty

Loyalty is the faithful adherence to an organization and the employer. Loyalty to an employer can be either of the two types −

- **Agency-loyalty** − Agency-loyalty is acting to fulfill one's contractual duties to an employer. This is entirely a matter of actions, such as doing one's job and not stealing from one's employer, irrespective of the motive behind it.
- **Attitude-loyalty** − Attitude-loyalty has a lot to do with attitudes, emotions and a sense of personal identity as it does with actions. It can be understood that people who work grudgingly and spitefully are not loyal; in spite of the fact they may adequately perform all their work responsibilities and hence manifest agency loyalty.

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Collegiality

Collegiality is the term that describes a work environment where responsibility and authority are shared among the colleagues. When Engineering codes of ethics mention collegiality, they generally cite acts that constitute disloyalty. The disloyalty of professionals towards an organization reflects the attitude they have towards the work environment for the salaries they are paid and the trust the company has for them.

The National Society of Professional Engineers (**NSPE**) Code, for example, states that "Engineers shall not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice or employment of other engineers. Engineers who believe others are guilty of unethical or illegal practice shall present such information to the proper authority for action".

The main factors that help in maintain harmonies among members at a workplace are −

- Respect
- Commitment
- Connectedness

In detail, the colleagues are to be respected for their work and contribution towards the organizational goals and should be valued for their professional expertise and their dedication towards the social goods promoted by the profession. Commitment observed in the sense of sharing a devotion to the moral ideals inherent in one's profession. The coordination among all the members at a workplace or the awareness of participating in cooperative projects based on shared commitments and mutual support also encourages the quality of the work.

Respect for Authority

In order to meet the organizational goals, the professionals should possess respect for authority. The levels of authority maintained by the organization provide a means for identifying areas of personal responsibility and accountability.

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Following are the major types of authority −

- **Executive Authority** − The corporate or institutional right given to a person to exercise power based on the resources of an organization.
- **Expert Authority** − This is the possession of special knowledge, skill or competence to perform a particular task or to give sound advice.

According to the goals of the company, the hierarchical authority is distributed. A service oriented or engineer-oriented company concentrates on the quality of the products which are decided by the engineers as they are the subject matter experts. Whereas a company when it is customer-oriented company, focuses primarily on the satisfaction of the customers. Hence the goal of the company decides the power between a General Manager and a Technical Manager or an Engineer.

Collective Bargaining

It is the responsibility of an organization to look into the welfare of the section of people working in it. Their issues need to be discussed. When we discuss issues, there can be issues which need to be discussed among the employees themselves and resolutions can be found for the same. However, there can be issues which might require the intervention of the management. In order to deal with such complex situations, an Employee Union is formed wherein, each employee becomes a member and a leader is elected to represent the group whenever needed.

At the time of conflicts or arguments, there will arise the need for negotiation between the parties. Conflicting situations which call for negotiation might occur on areas related to pay scales, working hours, training, health and safety, overtime, grievance mechanisms, rights in work places or company affairs, etc. The process of voluntary negotiations between the employers and a group of employees to resolve the conflicts is called **Collective Bargaining**.

The parties often refer to the result of the negotiation as a **Collective Bargaining Agreement (CBA)** or as a **Collective Employment Agreement (CEA)**.

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The underlying idea of collective bargaining is that the employer and employee relations should not be decided unilaterally or with the intervention of any third party. Both the parties must reconcile their differences voluntarily through negotiations, yielding some concessions and making sacrifices in the process. Both should bargain from a position of strength. There should be no attempt to exploit the weaknesses or vulnerability of one party.

With such awareness, the necessity of formation of Unions was observed in all the organizations and the idea was strengthened to form larger labor unions. Both parties have, more or less, realized the importance of peaceful co-existence for mutual benefit and continued progress.

Types of Collective Bargaining

Let us now discuss the types of collective bargaining. There are four main types of collective bargaining −

- **Distributive Bargaining** − in this, one party's gain is another party's loss. **Example** − Wages
- **Integrative bargaining** − in this, both the parties may gain or none of the parties may face a loss. **Example** − Better training programs
- **Attitudinal Structuring** − When there is backlog of bitterness between both the parties then attitudinal structuring is required to make smooth industrial relations.
- **Intra-organizational Bargaining** − There can be conflicting groups in both management and unions also. So, there is need to achieve consensus in these groups.

The other important responsibility of an employee or an engineer is to maintain the confidentiality of the organization or the employer. To understand confidentiality, we need to understand what Intellectual Property is.

Intellectual Property

- This term is often used in the world of business. Intellectual property refers to creations of mind such as inventions; literary and artistic works, designs; and symbols, names and images used in commerce.

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- The ideas and formulations in one's mind are put in action or may not be done so, but that idea is the result of one's intelligence and it cannot be stolen. Such problems are mostly encountered by scientists, engineers, business people or the upcoming entrepreneurs, and such. Intellectual Property, i.e., IP is protected by the law; **patents, trademarks** and **copyrights** enable people to earn recognition from what they invent or create.
- While being associated with an organization, an engineer is expected to follow a few moral rules and avoid affecting the intellectual properties of anyone. These when adopted by an organization, through some agreement, it becomes the responsibility of every employee to maintain the confidentiality throughout that project.

Confidentiality

- When the word **confidential** is added to any information, it means that it should not be shared with one and all. It is mostly a trade secret. Maintaining confidentiality and avoiding harmful conflicts of interest are especially important aspects of teamwork and trustworthiness.
- Confidentiality is that practice which helps **to keep secret** all information deemed desirable to keep secret. The maintenance of secrecy refers to the unrevealing of any data concerning the company's business or technical processes that are not already in public knowledge. Every company has some knowledge and can identify the individuals and groups that might have access to a particular set of information. The members of such groups share the responsibility of maintaining confidentiality

Types of information

The confidential information can be understood as Privileged Information and Proprietary information. **Privileged information** means "available only on the basis of special privilege" such as a privilege accorded an employee working on a special assignment. **Proprietary information** is the information that a company owns or is the proprietor of, and hence is a term carefully defined by property law. It is simply called trade secret.

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The patents legally protect the products from being manufactured and sold by other competitor unless a patent holder grants permission. Whereas the trade secret, has no such legal protection. Hence a reverse engineering can be done by analyzing a product to estimate its manufacturing so as to duplicate it or to develop something more than that, without any kind of permissions.

Changing jobs

The obligation to protect confidential information does not cease when employees change jobs. The former employees are bound by moral rules and are not supposed to indulge in revealing or selling such information to the new employers. An employee may change his job for his personal financial or career-oriented growth. But that should never affect the old company, which he used to work for.

An engineer's knowledge base generates an intuitive sense of what designs will work and will not work, and trade secrets form part of this knowledge base. It is usually considered a better deal, if the employee is not allowed to change the job until the project finishes; this helps in avoiding unnecessary revelation of information.

Management Policies

To protect the personal interest and rights of engineers and other employees while recognizing the rights of employers, employment contracts with a few restrictions imposed, helps. Usually, those restrictions centered on the geographical location of future employers, the length of time after leaving the present employer before one can engage in certain kinds of work and the type of work it is permissible to do for future employers.

But such contracts threaten the right of individuals to pursue their careers freely and hence courts tend not to recognize them as binding. The employers might try different plans such as an agreement not to work for similar project for few years or to be an outside consultant for the same project until it finishes so as making them abide morally. Other tactics like restricting trade secrets to employees where absolutely essential might result in lessening the knowledge base of engineers involved in research and development.

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One potential solution for employers might be generating a sense of professional responsibility among the staff that reaches beyond merely obeying the directives of current employers.

Justification

The primary justification is to **respect the autonomy** (freedom, self-determination) of individuals and corporations and to recognize their legitimate control over some private information concerning them. The rights and duties of autonomy along with its utilities are to be observed. The trust and trustworthiness can grow once confidentiality is maintained properly.

Conflicts of Interest

A person may have different types of interests. Such interests can be pursued according to the will, convenience and the laws prevailing. A person working in an organization might have multiple interests related to the job he is doing; if he does some side business which means he might be a competitor or he might work with a competitor, it might pose a problem for the employer. Such an employee is usually fired from the organization.

Thus, we can refine our definition of **conflicts of interest** by saying that they typically arise when the following two conditions are met −

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

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'.

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- These crimes are motivated by personal greed, corporate ambition, misguided company loyalty etc.
- These crimes impinge on various aspects such as professionalism, loyalty, conflicts of interest and confidentiality.

Examples of occupational crimes:

- Endangering Live
- Price Fixing
- Industrial espionage(spying)

1. Price Fixing: While fixing price for a product/service, sometimes all competitors come together and jointly set the prices to be charged. These are called as "Pricing Cartels". In order to avoid these crimes laws are enforced which forbids companies from jointly fixing prices.
2. Endangering Lives: Workers are employed without disclosing the effects of the harmful health effects and safety hazards. Due to this, workers are exposed to serious health problems.
3. Industrial Espionage: Espionage means Spying. It refers to secret gathering of information in order to influence relationships between two entities. Acquisition of other's secret to one's advantage is Espionage. The vital information is secretly gathered/theft through espionage agents called spies. The information may be intellectual properties such as designs, prototypes, formulae, software codes, passwords, manufacturing process, marketing plans, supplier/contractor details etc.

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INTERNATIONAL INSTITUTE OF TECHNOLOGY & MANAGEMENT, MURTHAL SONEPAT

E-NOTES, Subject: Human values, Ethics and IPR Subject Code: MGT 402

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(Prepared By: Ms. Shweta, Assistant Professor, BBA)

UNIT -4

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Topic covered: - Rights: professional rights, intellectual property rights (IPR), discrimination, arbitration and litigations. Global issues: Multinational corporations, environmental ethics, computer ethics, weapon development, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership, simple code of conduct.

Introduction

The basic rights of engineers include the right to live freely and pursue their legitimate interests as any human being, along with the right to be against racial or sexual discrimination, receiving one's salary according to the work, choosing of political activities, etc., as other employees. Besides all of them, engineers have some special rights as professionals.

Professional Rights

The rights that engineers have as professionals are called Professional Rights. These professional rights include −

- The basic right of professional conscience.
- The right of conscientious refusal.
- The right of professional recognition.

Right of Professional Conscience

This is a basic right which explains that the decisions taken while carrying on with the duty, where they are taken in moral and ethical manner, cannot be opposed. The right of professional conscience is the moral right to exercise professional judgment in pursuing professional responsibilities. It requires autonomous moral judgment in trying to uncover the most morally reasonable courses of action, and the correct courses of action are not always obvious.

There are two general ways to justify the basic right of professional conscience.

- The exercise of moral reflection and conscience that justifies professional duties is necessary, with respect to that duty.

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- The general duties to respect persons and rule-utilitarianism would accent the public good of allowing engineers to pursue their professional duties.

Right of Conscientious Refusal

The right of conscientious refusal is the right to refuse to engage in unethical behavior. This can be done solely because it feels unethical to the doer. This action might bring conflicts within the authority-based relationships.

The two main situations to be considered here are −

- When it is already stated that certain act is unethical in a widely shared agreement among all the employees.
- When there occurs disagreement among considerable number of people whether the act is unethical.

Hence it is understood that engineers and other professionals have a moral right to refuse the unethical acts such as bribery, forging documents, altering test results, lying, padding payrolls or coercing employees into acting by threatening, etc.

Right to Recognition

An engineer has a right to the recognition of one's work and accomplishments. An engineer also has right to speak about the work one does by maintaining confidentiality and can receive external recognition. The right for internal recognition which includes patents, promotions, raises etc. along with a fair remuneration, is also a part of it.

The fulfillment of right to recognition motivates the employee to be a trustful member of the organization, which also benefits the employer. This makes the employee morally bound which enhances the ethical nature to be abided by the professional ethics.

Employee Rights

An employee right can be any right, moral or legal, that involves the status of being an employee. They involve some professional rights also, such as the right to be paid according to

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the salary mentioned in one's contract. Privacy and equal opportunity can be considered essential rights too.

Privacy

The right to privacy refers to the right of having a private life, off the job. It is the right to control the access to and the use of information about oneself.

The examples of situations where the functions of employers conflict the rights of employees will be when the job-related queries or any other tests conducted in a job, includes questions relating to personal life such as alcohol usage or sexual conduct. The instances when a supervisor unlocks and checks the desk of his subordinate in his absence or when the management questions about his likes, dislikes or posts on social media regarding his personal opinions where it has nothing to do with the company.

Employers should view the relationship with their employees concerning confidentiality that cannot break the trust. The personal information in such cases is given based on the special professional relation and trust.

Equal Opportunity – Non-discrimination

The demeaning of a person based on trivial factors such as one's sex, race, skin color, age or political or religious outlook can be understood as Discrimination. Such discrimination should never be allowed at any workplace; this is where everyone has to be treated equally. These things internally affect the person's self-identity and self-respect which is pernicious within the work environment, where the work itself should represent a person's self-image.

According to the **Civil Rights Act of 1964**, "It shall be unlawful employment practice for an employer to fail or refuse to hire or to discharge any individual or otherwise to discriminate against any individual with respect to his compensation, terms, conditions, or privileges of employment, because of such individual's race, color, religion, sex or national origin".

Equal Opportunity – Sexual Harassment

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In today's world, there is an increase in the number of sexual harassment cases across the world. This is quiet an unfortunate scenario. There were a number of cases where the charges were levied since last two decades, which kept on growing. A definition of **Sexual harassment** is, "The unwanted imposition of sexual requirements in the context of a relationship of unequal power". Sexual harassment is a display of power and aggression through sexual means. It takes two forms, quid pro quo and hostile work environment.

Equal opportunity – Affirmative Action

Affirmative action refers to the preference given to a person or a group who was denied equal importance in the past. For example, the women and the minority communities were not given equal treatment and were ill-treated in the past. So to compensate that, amendments were made in recent laws to provide them special quota for reservations in education, employment and social sectors.

These preferential treatments are made in order to compensate the previous ill-actions. Ideally such compensation should be given to those specific individuals who in the past were denied jobs. But the practical possibilities of such actions are limited. Sexism and racism still permeate in our society and to counterbalance their insidious impact reverse preferential treatment is warranted in order to ensure equal opportunity for minorities and women.

Intellectual Property Rights

Intellectual property right is a type of property right which allows the creators or owners of patents trademarks or copyrighted works to benefit from their own work or investment. These rights enable the right person to benefit from the protection of moral and material interests resulting from the authorship of scientific, literary or artistic productions. These rights are outlines in the article 27 of the Universal declaration of Human rights.

Protection of IPR

The other rights, the intellectual rights also should be protected and supported. The IPR (Intellectual property Rights) need to be protected in order to serve the following reasons:

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- The creations and inventions are the paths which lead to the progress of human development, either in technology or culture.
- These inventions should be protected legally in order to develop the commitment and interest for more creations.
- These intellectual properties must be protected and promoted which indirectly promote the economic growth that creates new jobs and industries, and enhances the quality and enjoyment of life.

  The Intellectual property rights are protected by certain measures like patents, trademarks, industrial designs, copyrights, etc.

- **Patents:-** A Patent is an exclusive right granted for an invention. It provides the patent owners with protection generally for a period of 20years. With the patent rights one can access any material reward for their marketable innovations.

  Once the patent protection is granted, that invention cannot be commercially made used, distributed or sold without the patent owner's consent. Courts provide the legal safety for these patent rights. Conversely, if a third party challenges the invention and is successful, the court can declare the patent invalid.

- **Trademarks: -** We often come across certain distinctive marks or signs that identifies certain goods or services produced or provided by an individual or a company. These trademarks ensure the belongingness of products to the authorized owners. The owners can authorize other persons in return for some payment. The protection offered through the trademarks is limited for a period, but can be renewed indefinitely upon payment of the corresponding fee.

  These trademarks can be one or a combination of words, letters and numerals. They may even consist of drawings or signs such as shapes, colors, holograms, sizes or some non-visible signs such as smell, taste and sound also. The collective trademarks are owned by an association whose members use them to indicate products with a certain level of quality and who agree to adhere to specific requirements set by the association.

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- **Industrial Designs: -** The ownership of an industrial design protects it from any duplication. Industrial designs are what make an article attractive and appealing and add commercial value to the product. This further increases marketability. Duplication will definitely mislead consumers and might also lead to the defamation of the original product.

- **Geographical Locations: -** The geographical location indications are helpful for the customers to identify the original and quality products, which are produced using the raw materials of that geographical area. This indication guarantees the customers that a product was produced in certain place and has certain characteristics that are due to the place of production. It may be used by all the producers who make products that share certain qualities in the place designated by a geographical location.

- **WIPO: -** The intellectual property rights are protected by an International organization called as the **World Intellectual Property Organization** (WIPO) which was established in 1970. This organization was established to ensure the protection of rights of creators and owners of Intellectual property across the world. The inventors and authors are therefore recognized and rewarded for their ingenuity. Following is an image of the headquarters of WIPO (World Intellectual Property Organization) situated at Geneva, Switzerland.

  Determination: a consensual procedure in which the parties submit a specific matter (e.g. technical question) to one or more experts who make a determination on the matter, which can be binding unless the parties have agreed otherwise.

  Arbitration: a consensual procedure in which the parties submit their dispute to one or more chosen arbitrators, for a binding and final decision (award) based on the parties' respective rights and obligations and enforceable as an award under arbitral law. Arbitration constitutes a private alternative to court litigation.

  Litigations: - Ultimate legal method for settling controversies or disputes between and among persons, organizations, and the State. In litigation process, a case (called suit or lawsuit) is brought before a court of law suitably empowered (having the jurisdiction) to hear the case, by the parties involved (the litigants) for resolution (the judgment).

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Introduction of globalization

The concept of globalization increases with the integration of nations through trade, investment, transfer of technology and exchange of ideas and culture.

So far as the engineers and companies are concerned, the Multinational Companies play crucial roles in promoting globalization. The ethics related to business, environment and computer will also be discussed in this chapter.

Multinational Companies

Multinational Companies, also called Transnational Companies are the companies that have a main branch in a country called the **Home country** and its other branches in different companies called the **Host countries**, as International Labor Organization (ILO) defines it.

Multinational Corporations can have a powerful influence in local economies, and even the world economy, and play an important role in enhancing international relations and globalization. These MNCs also get tax benefits, pledges of governmental assistance or improved infrastructure or lax environmental and labor standards enforcement as they help in increasing the national GDP. MNCs should produce high degree of operational efficiency pertaining to high standards in the jurisdiction of the place where they are. The wages, safety measures, employee benefits are all should be taken care of by the MNCs.

There have been instances of corporate and government confrontations when governments tried to force MNCs to make their intellectual property public in an effort to gain technology for local entrepreneurs. Such an idea paves way for conflicts where either the government has changed its rules or the companies have withdrawn their investments. Multinational corporate lobbying is directed at a range of business concerns, from tariff structures to environmental regulations. The threat of nationalization or changes in local business laws and regulations can limit a MNCs power.

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Environmental Ethics

Globalization and industrialization have impacted the environment on a very large scale. The long term effects of the environment are usually neglected unless it is gross and immediate effect.

We are getting habituated to the ill-effects of pollution and industrial negligence shows on our environment. The aftermath can be seen in acid rains, water and land contamination, effect on crops and food sources, the cattle getting affected, the drying of lakes and canals, floods, drought, tsunamis and earthquakes due to drilling of underground wealth, the effect on marine being, the effect on ozone and the melting of snow mountains due to global warming, etc. The aftermath can be an alarming call for the required environmental changes.

Engineers need to show some responsibility towards the environment and should be ethical in their approach and find mitigating solutions for the protection of environment. Organizations should support the activities that promote environment protection. The **environment ethics** include −

- The study of moral issues concerning the environment
- Moral perspectives, beliefs and attitudes concerning those issues.

The ethics that need to be followed by a corporation dealing with the manufacture of computers. The organization needs to set priorities for the efficient use of resources, the design of the energy-efficient products, and easy disassembly for recycling and waste minimization. The application of high standards throughout its operation and placing priority to companies that have an environmental concern can also extend the support for environmental protection.

Computer Ethics

Computers with Internet raise a host of difficult moral issues, many of them connected with basic moral concerns such as free speech, privacy and respect for property, informed consent and harm. To evaluate and deal with these issues, a new area of applied ethics called Computer

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Ethics has come up. These ethics are related to all the computer professionals such as programmers, analysts, operators, designers, etc. along with the users.

The ten commandments of Computer Ethics, created in 1992 by the Computer Ethics Institute consist of the following −

One should **never** use a computer −

- To harm the people (anti-social activities)
- To interfere with other's work (illegal manipulations)
- To snoop into other's files (malware)
- To steal a computer/data (hacking)
- To bear false witness (manipulation and morphing)
- To use/ copy a software you didn't pay for (like illegal downloads and usages)
- To use or copy other's software without compensations (illegal pirated versions)
- To use other's intellectual output inappropriately (violating IPR)
- Doing without thinking of social consequences of the program being written (libeling)
- Always use a computer ensuring consideration and respect towards fellow beings.

However, these ethics are facing lax in today's world. A very small section of concerned individuals seems to be following these ethics. A large section seems to be violating these ethics. With this, there is an unprecedented increase in cybercrime.

Role of Computers in Technological Development

The limitations of Internet usage and free speech are to be known clearly by every citizen. In this digital era, the morals expected from a human being are the basic tools that control the unethical and sleazy manner of handling the internet.

Internet which is now a global network of networks initially used the infrastructure of the telephone system and is now being handled by many telecommunication systems by wire, fiber

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or wireless systems. The Internet provides a spring 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 **social experiment s**triding stocks and bonds. Like other major, it also has raised a host of new issues. One set of issues centers on free speech, including control of obscene forms of pornography, hate speech, spam which is unwanted commercial speech and libel. Computers contribute to greater centralization or decentralization insofar as human decision makers direct them.

The two main factors that make computers troublesome are their speed and geographical coverage, which allows the masses to be victimized further. The difficulty lies in tracing the underlying transactions to apprehend the thieves. This problem is compounded when the communication lines linking the computers involved cross national boundaries.

The most commonly discussed cases of computer abuse are instances such as −

- The stealing or cheating by employees at work.
- The stealing by non-employees or former employees.
- The stealing from or cheating clients and consumers.
- The violation of contracts for computers sales or services.
- The many conspiracies to use computer networks to engage in widespread fraud.

Privacy Factors

The misuse of Internet also influences privacy factors. The illegal attackers or hackers get access to restricted data which is a security threat.

- The inappropriate access which leads to security breach in an office leads to the leakage of confidential information which might severely affect the growth of the company.
- The hackers who crack the security and get unauthorized entry into the highly secured information zone, tend to copy the content or they may change the content, delete the content or get it affected with virus as soon as the authorized personnel opens the file.

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- The different types of viruses such as Trojan Horse, Memory Resident, Overwrite, Browser Hijacker, Directory Virus, etc. can create instances wherein, the data on computer system get affected in various ways.
- The legitimate access to information is restricted to protect individual privacy, national security and freedom within a capitalist economy to protect proprietary information essential in pursuing corporate goals.
- The Privacy Act of 1947 prohibits the information contained in government files from being used for purposes beyond those for which it was originally gathered.

Weapons Development

Based on the size of expenditures, direct or indirect involvement of engineers and innovative developments, military technology is an area that calls for serious discussion on engineering ethics. 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, the soldiers as well as citizens, they had as their general target.

For some engineers, their involvement with weapons develop conflicts with personal conscience, such as knowing that making weapons in a company, is the job which would be done by someone else if he doesn't do and that cannot change the results. Though working in a toxic chemical manufacturing plant can make you feel guilty, the idea abolishing this disastrous thing once you become the CEO of the company makes you get the feeling of being in good books, though you might or might not do that when the time comes.

There can also be instances where an engineer can feel that the development of weapons is an expression of conscientious participation in national defense. An engineer, who is a specialist in missile control and guidance, can feel proud that he is being able to help his country through his efforts in the defense industry, especially as part of the "War on terrorism". In a broader context, weapons include anything used to gain an advantage over an adversary or to place them at a

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disadvantage. Examples include the use of sieges, tactics, and psychological weapons which reduce the morale of an enemy.

Engineers as Managers

An engineer, whether he works individually or works for a company, has to go through some ethical issues, mostly under conditions such as, conceptualization of a product, issues arising in design and testing departments, or may be on the issues involving the manufacturing, sales and services. An Engineer is responsible in promoting ethics in an organization, through framing organizational policies, responsibilities and by personal attitudes and obligations.

Suppose, an issue occurs which might lead to a conflict, an engineer or say a professional should respond pertaining to specific morals and professional ethics. An engineer should be able to work as a manager in such situations, resolving conflicts according to priorities, keeping the organizational benefits in mind. The issue must be resolved without hurting anyone's feelings and by developing a mutual understanding with subtlety. Not only the engineers who act as managers or the managers alone will share the responsibility, but there lies some social responsibility to stakeholders, customers and employers of a company. They act to develop wealth as well as the welfare of the society.

Ethicists project the view that the manager's responsibility is only to increase the profit of the organization, and only the engineers have the responsibility to protect the safety, health, and welfare of the public. But the manager, though an engineer or not, has the ethical responsibility to produce safe and good products (or useful service), while showing respect for fellow human beings including his employees, customers and the public. Hence, the objective for the managers and engineers is to produce valuable products that are also profitable.

Managing Conflicts

A conflict is a result of differences in opinions. Conflicts generally arise where the work is shared among more than one member. In fact, the situations of conflicts should be tolerated with patience, understood impartially and resolved by the participation by all the concerned.

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When a project is distributed among a few members, the conflicts that generally occur are −

- The schedule based conflicts might occur at different levels of execution of a project, depending upon the priorities and limitations at each level.
- The prioritizing of projects or departments which can be arrived from end requirements may change from time to time.
- The deficiency of personnel availability for certain project completion in due time may also lead to a conflict.
- Conflicts that occur over technical, economic, and time factors such as cost, time, and performance level.
- Conflict arising in administration such as authority, responsibility, accountability, and logistics required.
- Conflicts of personality, human psychology and ego problems.
- Conflict over expenditure and its deviations.

Picking out on the personnel creating may keep others away from the problem and doesn't affect everyone. Such personnel can be trained again or given precautions. The interest of the personnel doing a project should be focused on the ethical attitudes and morals but not on their positions. In addition, the conflicts between the personnel can be solved by the manager who has more ways to solve it. The evaluation of the results should be based on certain specified objectives such as efficiency, quality, and customer satisfaction.

Consulting Engineers

The consulting engineers differ from the salaried engineers of an organization. These consulting engineers work in private and are paid per advice they offer or for the service they provide in a field of specialized knowledge or training. Consultants are individuals who typically work for themselves but may also be associated with a consulting firm.

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Consultants can play a multi-faceted role; for example, they function as advisors, fixers, bosses, generalists, stabilizers, listeners, advisors, specialists, catalysts, managers or quasi-employees. Bringing in an expert can save time, effort and money. It has been estimated that approximately 3/4 of all companies call upon consultants at one time or another. Many companies claim that they receive a higher return for their invested dollars by using consultants for specific tasks.

A Consulting Engineer should maintain the ethical values in the profession, such as giving proper information without any ambiguities for advertisements, the allowance of small individual companies to participate in bidding and also maintaining clarity in the contingency fee which is previously agreed. The greater amount of job freedom enjoyed by consulting engineers as opposed to salaried engineers leads to wider areas of responsible decision making concerning safety.

Engineers as Advisors

Engineers may accept an assignment requiring education and/or experience outside of their own fields of competence, but their services shall be restricted to other phases of the project in which they are qualified. All other phases of such project shall be performed by qualified associates, consultants, or employees.

For an engineer to be an advisor, should study the costs and benefits of all alternatives in objective manner, study economic viability, technical feasibility, operational feasibility and social acceptability; follow honesty, and technical complicity leading to moral complicity. Then after analyzing the factors that lead to such things and also the consequences that occur, engineers can work as an advisor.

There may be various roles or models played by engineers who work as advisors. The roles or models are −

- **Hired Guns: -** This model highlights the client's wishes and acts accordingly. All the other factors are given less priority. Assumptions about uncertainties are inclined in a direction favorable to the client's case.

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- **Value-Neutral Analysts: -** This model expresses the idea of being neutral and the avoidance of any form of advocacy towards anyone. The cost-benefit analyses if made, are to be done according to the value criteria, explicitly.
- **Value-Guided Advocates**:**-** This model advocates the idea that it is the responsibility of engineers to keep the public good in mind and maintain honesty about both technical facts and the values that guide their studies.

  Rosemary Tong defends this model noting, "Honesty is essential, both in negative sense of avoiding deception and in the positive sense of being candid in stating all relevant facts and in being truthful in how the facts are interpreted."

Introduction of Moral Leadership

Engineers, within their communities and professions contribute to technological process, as managers, business entrepreneurs, corporate consultants, academics and government officials they provide many forms of leadership in developing and implementing technology. Leadership can be understood as success in moving a group collectively, towards goals.

Moral leaders, are the individuals who direct, motivate, organize, creatively manage, or in other ways move groups towards morally valuable goals. Leaders might be in position of authority within a corporation, or they might not be. Leadership can be shown by individuals participating at all levels of organizations.

Morally creative leaders

Moral leaders are morally creative. This does not mean that they discover or improvise new moral values from scratch. Moral values are the product of centuries and millennia of gradual development, not instantaneous invention. Moral creativity consists in identifying the most important values that apply in a particular situation, bringing them into focus through effective communication within groups and forming workable commitments to implement them.

Moral creativity is achieving success through new ways of thinking with standard moral values. This is achieved by identifying new possibilities for applying, extending and putting values into

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practice rather than inventing new values for temporary comforts. But, this requires fresh moral insights with deeper commitments grounded in integrity.

Participation in Professional Societies

Professional Societies do more than just promoting continuing education for their members. They also serve to unify a profession, and to speak and act on behalf of it. Professional societies provide a forum for communicating, organizing and mobilizing change within and by large groups, which has a moral dimension. After few incidents, many of the tensions existed in professional societies are because of the uncertainties about their involvement in moral issues.

Effective professional activity whether in Engineering or any other profession, requires a substantial degree of trust from clients and the public. Total absence of such trust would undermine the possibility of making contracts, engaging in cooperative work, exercising professional autonomy free of excessive regulation and working under humane conditions. Building and sustaining that trust is an important responsibility shared by all engineers. It is also an area where moral leadership within professional societies is really important.

Leadership in Communities

In communities and groups, the issues that bother and that are important should be informed to everyone. But the stronger obligations arise for those who by professional background are well grounded in specific issues as well as for those who have time to train themselves as Public advocates. It shows that there is certainly a need for moral leadership in identifying and expanding the areas of possible good that can be achieved.

Ideals of Voluntary service

The need for moral leadership in Engineering emphasizes the need for involvement in professional societies and in community service. The leadership should have substantial involvement in professional societies which, in addition to furthering technical knowledge and representing engineers collectively, help establish high standards of moral integrity within the profession. The moral leadership should also have some involvement in community service.

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Moral leadership does not consist of moral elitism and dominance, but instead moral creativity in helping to guide, organize and stimulate groups toward morally desirable goals.

Sample Code of Conduct

The professional societies for engineers have formulated few codes of ethics which are expected to be followed by an engineer of the particular discipline. Following are a few societies that look into the discipline in Engineering −

- **NSPE** − National Society of Professional Engineers
- **IEEE** − The Institute of Electrical and Electronics engineering
- **AICE** − American Institute of Chemical Engineers
- **ASCE** − American Society of Civil Engineers
- **ASME** − American Society of Mechanical Engineers
- **ACM/IEEE/CS** − Joint Task Force on Software Engineering Ethics and Professional Practices

All these societies have proposed different codes of ethics expecting adherence from the Engineers, to the highest standard of ethical conduct. This not only helps the societies but also the Engineers.

The **NSPE** (National Society of Professional Engineers) has formulated codes as engineering has a direct and vital impact on the quality of life for all the people. Accordingly, the services provided by engineers require honesty, impartiality, fairness and equity and must be dedicated to the protection of the public health, safety and welfare.

The fundamental things to be kept in mind, while engineers fulfill their professional duties are the following −

- Hold paramount the safety, health and welfare of the public.
- Perform services only in area of their competence.
- Issue public statements only in an objective and truthful manner.

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- Act for each employer or client as faithful agents or trustees.
- Avoid deceptive acts.
- Conduct themselves honorably, responsibly, ethically and lawfully so as to enhance the honor, reputation and usefulness of the profession.

All the other societies have proposed the code of ethics to be followed in their respective disciplines, by the engineers. The professional ethics should be accompanied by moral concerns, in acting responsibly towards the profession while being in ethical limits.

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THANK YOU

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