UNIT I   **HUMAN VALUES**   **10**

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

MORALS, VALUES AND ETHICS

1. Explain why the study about human values and morals is very essential for engineers. (Nov/Dec2006)

Human values:

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

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

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

A person's observations on its environment are filtered through his values to determine whether or not he should expend energy to do something about his experiences. A person, who values gold and sees a large bag of gold (a positive value) in his path as he walks, will be motivated to reach down and pick it up.

A person who values his life and knows about venomous snakes will retreat from the sound of a rattlesnake from nearby, when he is walking in the desert. Said in another way, "Values are the scales we use to weigh our choices for our actions, whether to move towards or away from something."

Morals:

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

Morality is concerned with principles and practices of morals such as:

(a) What ought or ought not to be done in a given situation?

(b) What is right or wrong about the handling of a situation? and

(c) What is good or bad about the people, policies, and ideals involved?

Morality is different from Ethics in the following ways:

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

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

2. What is value? Explain various types of values. (Or) Explain the different ways to improve the human values. (Nov/Dec 2006) (Or) What are the three types of values? State and explain the various attempts to reduce morality to those types of values with examples (May/ June 2009)

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

Value, also called as worth, is a term used for anything that appeals to us in anyway. In a

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

Values have two faces, viz., pleasant, painful; easy, difficult; strong, weak; rich, poor; beautiful, ugly; true, false; and good and bad. Positive ones are preferred and are the real values whereas negative ones are not preferred and called as disvalue.

Types and Human Values:

a. Right conduct
b. Peace
c. Truth
d. Love and
e. Non-violence

a. Right Conduct:

Right conduct is related to use of tool of body. Values related to right conduct are

(i) Self-help skills

(ii) Social skills, and

(iii) Ethical skills

i. Self-help Skills

Self-help skills are concerned of care of possessions, diet, hygiene, modesty, posture, self-reliance and tidy appearance.

ii. Social Skills

Social skills are good behavior, good manners, good relationships, helpfulness and no-wastage.

iii. Ethical Skills

Ethical skills are code of conduct, courage, dependability, duty, efficiency, punctuality, resourcefulness and responsibility.

b. Peace:

Peace is related to use of the tool of mind. A strong will power will enable one to discern the differences between real needs and superfluous desires. Then the desire to own more and more things stops and peaceful mind prevails. Peace in individual leads to peace in family which in turn leads to peace in community.

Values related to PEACE are: Attention, calmness, concentration, contentment, dignity,

discipline, equality, equanimity, faithfulness, focus, gratitude, happiness, harmony, humility, inner silence, optimism, patience, reflection, satisfaction, self- acceptance, self-confidence, self-control, self-discipline, self-esteem, self-respect, sense control, tolerance, and understanding

c. Truth:

Truth is related to use of power of discrimination and intellect. A strong character is built by learning to speak the truth. Practicing and voicing untruth is an anti-social act. Telling lies hurts every one and is an inhuman behavior.

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

d. Love:

Love is a spontaneous pure action of heart and not an emotion affected by the sub-conscious mind. It is only the power of love which causes one person to feel good and wish happiness for another. Also share pleasure in others well being. Loves is an unconditional action, positive and regard good of another. Inculcating love in children leads to growth of healthy mind and body.

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

e. Non-Violence:

Non-violence is related to awakening the spirit within. It may he psychological or social. Non-violence of the natural laws which create harmony with the environment may be attributed to non-violence. Non-violence in a way is that causes as little harm as possible to one-self, other people, animals, plants, etc.,

Values related to Non-Violence are:

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

love

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

3. Define Ethics. What is work Ethics? (Nov/Dec 2006) (May/ June 2009) Ethics:

The word Ethics is derived from the Greek word ethics which means the characters, the spirit or attitudes of a community, people or system. Thus Ethics is the study of the characteristics of morals.

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

The study on ethics helps to know the people's beliefs, values, and morals, learn the good and bad of them, and practice them to maximize their well-being and happiness. It involves the inquiry on the existing situations, form judgments and resolve the issues. In addition, ethics tells us how to live, to respond to issues, through the duties, rights, responsibilities, and obligations.

In religion, similar principles are included, but the reasoning on procedures is limited. The principles and practices of religions have varied from to time to time (history), region (geography, climatic conditions), religion, society, language, caste and creed. But ethics has grown to a large extent beyond the barriers listed above. In ethics, the focus is to study and apply the principles and practices, universally.

Work Ethics:

Work ethics is defined as a set of attitudes concerned with the value of work which forms the motivational orientation. Work ethics plays an essential role between the industry and society.

Industry and Society are the two systems which interact with each other and are interdependent. Society requires industry/business system which provides manufacturing, distribution and consumption activities. It needs investment (capital input), labor (input), supply (raw materials), production (industries, business organizations), marketing and distribution (transport), and consumption (public, customer). A lot of transactions (and interactions) between these sub-systems involving people are needed for the welfare of the society. It is here, the work ethics plays an essential role. Work ethics is defined as a set of attitudes concerned with the value of work, which forms the motivational orientation.

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

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

1. The people desire to be recognized as individuals and treated with dignity, as living human beings. Work is intrinsically valuable so far as it is enjoyable or meaningful in allowing personal expression and self-fulfillment. Meaningful work is worth doing for the sense of personal identity and the self-esteem it holds.

2. Economic independence: Work is the major instrumental good in life. It is the main source of providing the income needed to avoid economic dependence on others, for obtaining desired materials and services, and for achieving status and recognition from others.

3. Pay as well as the pace of work should be in commensurate with the expertise required, acquired, and utilized in the persons. Exploitation and bargained pay should be discouraged.

4. Privacy (personal freedom) of the employee, including women, is to be protected. At the same time, confidentiality of the employer is also to be protected. Mutual trust and loyalty both ways play major roles in this aspect.

5. Security during job and upon retirement: This concept is being accepted only in government jobs, public limited companies, and corporate organizations. The western thought has influenced the Indian private industries and multinationals in a paradigm shift from 'lifelong employment' to policies such as 'merit only', 'hire and fire', 'pay and use' etc. This situation has no doubt created tension in the Indian scene.

6. Recognition to non-work activities, such as leisure, paid holiday on the day of visit of a dignitary, social service, and other developmental activities. The workers in prosperous countries are less willing to consider 'work' as their prime interest in life. They claim that such service activities give them peace of mind and happiness. However, such a trend is likely to decline the work ethics.

7. Hard work and productivity are very essential for the success of an industry. The quality of work life deserves to be improved. Hard labor, undignified jobs (human- drawn rickshaw, people carrying night soil), and hazardous jobs are to be made less straining, dignified, and safer. Automation and CNC systems to a large extent have been successful in lessening the human burden. Still, many a hard work cannot be replaced by 'virtual work', in the near future.

8. Employee alienation: Absence of or inadequate 'recognition and reward system' and 'grievance redressed system', lack of transparency in policy implementation, factions in trade unions etc. lead to ethical problems, affecting the work ethics. Participative management, quality circles, job rotation, and flexible working hours are some of the measures to counter this situation.

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

10. As per the Protestant Work Ethics, the financial success is a sign that is favored by God. It means making maximal profit is a duty mandated by God. It is to be

obtained rationally, diligently, and without compromising with other values such as spending time with one's family and not exploiting or harming others.

INTEGRITY

4. Explain integrity and self respect (AU, April/May 2011) or why the integrity should be maintained in private and professional responsibilities? (Apr 2014),(Nov/Dec-2016) (APR/MAY 2018)

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 involves in two fundamental intuitions:

1. It is primarily a formal relation one has to oneself

2. It is connected in an important way to acting morally.

Integrity is a bridge between responsibility in private and professional life. Integrity makes possible the virtues of self-respect and pride in one's work. It precludes the attitude that one is not personally accountable for one's work. It implies a concern for achieving excellence in the technical aspects of one's work, a strong desire to see the work done well. In turn, this desire constituted a potent stimulus for professional conduct.

Integrity is accounted in the following aspects

(i) Integrity as self-integration

(ii) Integrity as maintenance of identity

(iii) Integrity as standing for something

(iv) Integrity as moral purpose

(v) Integrity as a virtue

Viewing integrity as self-integration is a practice of integrating various parts of their personality into a harmonious use. It is a matter of keeping self intact and without corruption.

A specific identity has to be maintained in practicising integrity. This action should be according to their commitments not based on certain acceptance of desires.

Integrity should not be just an act of consistently but should stand for something. As
such the social character of integrity is a matter of a person's proper regards for their best judgment.

Integrity in terms of moral purpose is uses dedication to the pursuit of a rural life.

Integrity is a complex and thick virtue turn. Integrity stands as a mean to various excesses.

Self respect:

Self-respect is valuing oneself in morally appropriate ways. That is, properly valuing oneself is integral to finding meaning in one's life and work. This is also a prerequisite for pursuing other moral ideals and virtues. Self respect is a moral concept
which refers to the virtue of properly valuing oneself.

Respect of Others:

Respect for others is a must for nurturing friendship and team work. The principles involved in this regard are

1. To recognize and accept the existence of other persons as human beings.

2. To respect ideas, words and actions of others.

3. To show goodwill and love on others and also allow others to grow.

SERVICE LEARNING

5. Write a short note on Service Learning (or) What is Service Learning? Why service Learning is important? Explain the characteristics of Service Learning
(Nov/Dec 2017) (Nov/Dec 2018)

Service learning refers to learning the service policies, procedures, norms, and conditions, other than 'the technical trade practices'. The service learning includes the characteristics of the work, basic requirements, security of the job, and awareness of the procedures, while taking decisions and actions.

It helps the individuals to interact ethically with colleagues, to effectively coordinate with other departments, to interact cordially with suppliers as well as the customers, and to maintain all these friendly interactions.

Alternatively, the service learning may be defined as the non-paid activity, in which service is provided on voluntary basis to the public (have-nots in the community), non-profitable institutions, and charitable organizations. It is the service during learning. This includes training or study on real life problems and their possible solutions, during the formal learning, i.e., courses of study.

In the industrial scenario, adoption, study, and development of public health or welfare or safety system of a village or school is an example of service learning by the employees. The engineering student analyzing and executing a socially-relevant project is another example of service learning.

The service learning is a methodology falling under the category of experiential education.

It is one of the forms of experiential learning and community service opportunities. It is distinguished in the following ways:

        1. Connection to curriculum

        2. Learner's voice

        3. Reflection

        4. Partners in the community

1. Connection to curriculum: Integrating the learning into a service project is a key to successful service learning. Academic ties should be clear and built upon existing disciplinary skills.

2. Learner's voice: Beyond being actively engaged in the project, trainees have the opportunity to select, design, implement, and evaluate their service activity.

3. Reflection: Structured opportunities are created to think, talk, and write about the service experience. The balance of reflection and action allows the trainee to be constantly aware of the impact of their work.

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

CIVIC VIRTUE

6. Explain the importance of civic virtue.

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 virtue:

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. Duties and rights are detailed below

Duties:

    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.
4. To follow the road safety rules.

Rights

1. To vote the local, state or central government.
2. To contest in the election to the local, state or central Government.
2. To seek a public welfare facility for the region.
3. To establish a safe and green environment.
4. To accept or reject a project in their area.

For self governing administration civic virtues are indispensable. These virtues fall under four categories,

a) Civic knowledge
b) Self-restraint
c) Self-assertion and
d) Self- reliance.

One must know fully about the constitution and understand the basis of our responsibilities as citizens, besides duties and rights. In order to live in a free society with limited government each citizen must be able to control or restrain oneself.

Self-ascertain implies that each citizen must be proud of their rights and should not let loose their rights. Self-reliant citizen's is one free citizen in the sense that they are not dependent on others for their basic needs.

Categories:

a) 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.

b) 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.

c) 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).

d) Self-Reliance

Citizens who cannot provide for themselves will need a large government to take care of them. Once citizens become dependent on government for their basic needs, the

People are no longer in a position to demand that government act within the confines of the Constitution.

Self-reliant citizens are free citizens in the sense that they are not dependent on others for their basic needs. They do not need a large provider-government, which has the potential to become an oppressive government, to meet those needs.

Only a strong self-reliant citizenry will be able to enjoy fully the blessings of liberty. These civic virtues, applicable to local, state, and central governments, nourish freedom and civil liberty at the root of democracy.

RESPECT FOR OTHERS

7. What is the necessity to respect others? Or how respect for others religious beliefs enhances the Peaceful living. (Apr 2014)

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

1. Recognize and accept the existence of other persons as human beings, because they have a right to live, just as you have.

2. Respect others' ideas (decisions), words, and labor (actions). One need not accept or approve or award them, but shall listen to them first. One can correct or warn, if they commit mistakes. Some people may wait and watch as fun, if one falls, claiming that they know others' mistakes before and know that they will fall! Appreciate colleagues and subordinates on their positive actions. Criticize constructively and encourage them. They are bound to improve their performance, by learning properly and by putting more efforts.

3. Show 'goodwill' on others. Love others. Allow others to grow. Basically, the goodwill reflects on the originator and multiplies itself on everybody. This will facilitate co-linearity, focus, coherence, and strength to achieve the goals.

LIVING PEACEFULLY

8. Explain the concept of peace. What are the benefits one derives by 'Living peacefully'.

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

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

1. Order in one's life (self-regulation, discipline, and duty).
2. Pure thoughts in one's soul (loving others, blessing others, friendly, and not criticizing or hurting others by thought, word or deed).
3. Creativity in one's head (useful and constructive).
4. Beauty in one's heart (love, service, happiness, and peace).

Get

5. Good health/body (physical strength for service).

Act

6. Help the needy with head, heart, and hands (charity). Service to the poor is considered holier than the service to God.
7. Not hurting and torturing others physically, verbally, or mentally.

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

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

CARING

9. Why to care for others? Explain.

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

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

will scare us.

Caring has the following features:

(i) Goal of caring is to help other actualize himself.

(ii) Caring is an extension of one's life.

(iii) Devotion and constancy are essential elements of caring. (iv)Caring for

another helps the other to care for and about others.

(v) Help in a way that the cared for can go on to help himself.
(vi)Learning and living a life of caring involves all other values.

In the current scenario, caring for the environment has become a necessity for our survival otherwise the environment will scare us.

SHARING

10. Explain the concept of sharing and give their examples.

Primarily, caring influences 'sharing'. Sharing is a process that describes the transfer of knowledge (teaching, learning, and information), experience (training), commodities (material possession) and facilities with others.

The transfer should be genuine, legal, positive, voluntary, and without any expectation in return. However, the proprietary information it should not be shared with outsiders. Through this process of sharing, experience, expertise, wisdom and other benefits reach more people faster.

Sharing is voluntary and it cannot be driven by force, but motivated successfully through ethical principles. In short, sharing is 'charity'

For the humanity, 'sharing' is a culture. The 'happiness and wealth' are multiplied and the 'crimes and sufferings' are reduced, by sharing. It paves the way for peace and obviates militancy. Philosophically, the sharing maximizes the happiness for all the human beings. In terms of psychology, the fear, divide, and distrust between the 'haves' and 'have-nots' disappear.

Sharing not only paves the way to prosperity, early and easily, and sustains it. Economically speaking, benefits are maximized as there is no wastage or loss, and everybody gets one's needs fulfilled and satisfied. Commercially speaking, the profit is maximized. Technologically, the productivity and utilization are maximized by sharing.

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

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

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

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

HONESTY

11. How societies discourage honesty? Or Write short notes on Honesty (Nov/Dec 2015)(Nov/Dec-2016)
   Honesty:

It is a behavior showing high moral standards. Honesty has two aspects:

   1. Truthfulness

   2. Trustworthiness

Truthfulness is to face the responsibilities upon telling truth. One should keep one's word or promise. By admitting one's mistake committed (one needs courage to do that!), it is easy to fix them. Reliable engineering judgment, maintenance of truth, defending the truth, and communicating the truth, only when it does 'good' to others, are some of the reflections of truthfulness.

Trustworthiness is maintaining integrity and taking responsibility for personal performance. People abide by law and live by mutual trust. They play the right way to win, according to the laws or rules (legally and morally). They build trust through reliability and authenticity. They admit their own mistakes and confront unethical actions in others and take tough and principled stand, even if unpopular.

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

   (i)   **Honesty in acts** - It includes not stealing, not engaging in bribes and kickbacks and respecting property of others.

   (ii) **Honesty in speech** - It means not deceiving lying and willingly revealing all pertinent

information.

(iii) **Honesty in beliefs** - It means forming one's beliefs without self-deception or other forms of unpleasant truth.

(iv) **Honesty in Discretion** - It means involving in the legitimate areas of privacy of the employer or client especially with regard to confidential information.

Honesty is a fundamental virtue for those who engage in the relationships between Engineers and then employers and clients.

Some of the acts which lead to dishonesty are,

(i) **Lying:** Honesty directly implies avoidance of lying. Lying is nothing but giving wrong information to the right people.

(ii) **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..

(iii) **Withholding information:** It means hiding the facts during communication to one's supervisor or subordinate intentionally or otherwise.

(iv) **Not seeking the truth:** Some engineers accept the information or data, without applying their mind and seeking the truth.

(v) **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.

(vi) 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 ago-bye by such actions. Certainly this is a higher-order crime.

COURAGE

12. What is courage? Explain the salient features of courage. (Nov/Dec 2015) (Or) Explain with suitable examples the need of courage in maintaining honesty and character. (Apr 2014)

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

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

(a) Physical courage,

(b) Social courage, and

(c) Intellectual courage.

a) 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: It 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: It 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.

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

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

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

a) Perseverance (sustained hard work)
b) Experimentation (preparedness to face the challenges, that is, unexpected or unintended results)
c) Involvement (attitude, clear and firm resolve to act)
d) Commitment (willing to get into action and to reach the desired goals by any alternative but ethical means).

VALUING TIME

13. With examples explain the value of time. (Or) List the important "time wasters". How can one manage his/her time properly? (Nov/Dec 2008)
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.

The history of great reformers and innovators have stressed the importance of time and valuing time. The proverbs, 'Time and tide wait for nobody' and 'Procrastination is the thief of time' amply illustrate this point. An anecdote to highlight the 'value of time' is as follows:

- To realize the value of one year, ask the student who has failed in the examinations
- To realize the value of one month, ask the mother who has delivered a premature baby
- To realize the value of one week, ask the editor of weekly
- To realize the value of one day, ask the daily-wage laborer
- To realize now the value of one hour, ask the lovers longing to meet
- To realize the value of one minute, ask a person who has missed the train
- To realize the value of one second, ask the person who has survived an accident
- To realize the value one milli-second, ask the person who has won the bronze medal in Olympics
- To realize the value of one micro second, ask the NASA team of scientists
- To realize the value of one nano-second, ask a Hardware engineer

Some of the important time wasters are

1. Lack of clear goals and objectives.
2. Lack of adequate planning.
2. Unscheduled meetings.
3. Poor delegation.
4. Too much socializing.
5. Assuming unnecessary public responsibilities.
6. Poorly organized supervision.
7. Poor use of communication devices like telephones, etc.

Some of the time management methods are:

1. Identification of objectives and converting them into a series of small manageable tasks.
2. Prioritization of tasks.
3. Sticking to the tasks and plans.
4. Allocate time for the same, and
5. Reduction and even elimination of time wasters.

COOPERATION – COMMITMENT

14. Explain detailed about cooperation and Commitment in human values.

Cooperation:

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

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

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

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

The impediments to successful cooperation are:

1. Clash of ego of individuals.
2. Lack of leadership and motivation.
3. Conflicts of interests, based on region, religion, language, and caste.
4. Ignorance and lack of interest.

By careful planning, motivation, leadership, fostering and rewarding team work, professionalism and humanism beyond the 'divides', training on appreciation to different cultures, mutual understanding 'cooperation' can be developed and also sustained.

Commitment:

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

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

EMPATHY

15. What is meant by Empathy? Explain the elements connected with Empathy.

(Nov/Dec 2018)

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

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

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

1. **Understanding others:** It means sensing others feelings and perspectives, and taking active interest in their welfare.

2. **Service orientation:** It is anticipation, recognition and meeting the needs of the clients or customers.

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

Communication = 22% reading and writing + 23% speaking + 55% listening One should get the feedback, acknowledge the strength and accomplishments, and then coach the individual, by informing about what was wrong, and giving correct feedback and positive expectation of the subject's abilities and the resulting performance.

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

4. **Political awareness:** It is the ability to read political and social currents in an organization. The benefits of empathy include:

1. Good customer relations (in sales and service, in partnering).

2. Harmonious labor relations (in manufacturing).

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

SELF CONFIDENCE

16. What is self confidence? Detailed explain (or) Explain the importance of self confidence in ethics (May/June 2016) (Nov/Dec 2017)

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

respect themselves.

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

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

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

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

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

1. Heredity (attitudes of parents) and family environment (elders),
2. Friendship (influence of friends/colleagues),
3. Influence of superiors/role models, and
4. Training in the organization (e.g., training by Technical Evangelists at Infosys Technologies).

The following methodologies are effective in developing self-confidence in a person:
1. Encouraging SWOT analysis. By evaluating their strength and weakness, they can anticipate and be prepared to face the results.
2. Training to evaluate risks and face them (self-acceptance).
3. Self-talk. It is conditioning the mind for preparing the self to act, without any doubt on his capabilities. This make one accepts himself while still striving for improvement.
4. Study and group discussion, on the history of leaders and innovators (e.g., Sam Walton of Wal-Mart, USA).

CHARACTER

17. Write short notes on challenges in the work place. (or) Explain character and their importance in ethics. (May/June 2016)

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

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

People are divided into several categories, according to common tendencies such as ruthless, aggressiveness, and ambition, constricting selfishness, stinginess, or cheerfulness, generosity and goodwill.

Individuals vary not only in the type of their character but also in the degree. Those whose lives are determined and directed by the prevailing habits, fashions, beliefs, attitudes, opinions and values of the society in which they live have at best a developed social as opposed to an individual character.

The character is exhibited through conduct. Character is determined by the expectations of society. Many act and live within its norms, refusing to fall below the required social minimum, failing to rise above the maximum expected of a normal member of the group. On one extreme are those that do not even conform to the minimum standards, and fail to acquire the socially-required behaviors, attitudes and values.

These individuals have an unformed social character. At the other extreme are those whose beliefs, attitudes and values are determined internally by the strength of their own convictions. These are individuals with developed minds and formed characters of their own.

Individuals do not live or act in a vacuum. They exist and act in a human social environment of other people that constantly act on them and react to their actions. They also live in a natural environment of physical objects and material forces such as the winds and rains. And those with occult and spiritual traditions recognize that there is also a subtle environment of other planes of existence, both higher planes of spiritual
influence and lower planes of negative forces in universal nature seeking to act on the lives.

All of the social, material and the occult planes constitute the field of human activity. Each of them functions according to its own laws or principles. Each of them has its own characteristic modes of action and influence on human life.

Character is the expression of the personality of a human being, and that it reveals itself in one's conduct. In this sense every human has a character. At the same time only human beings, not animals have character: it implies rationality. But in addition to this usage, the term is also employed in narrower sense, as when we speak of a person "of character". In this connotation, character implies certain unity of qualities with a recognizable degree of constancy in mode of action.

Psychology analyzes the elements of character to trace the laws of its growth, to distinguish the chief agencies which contribute to the formation of different types of character, and to classify them. Many psychologists world over, during the last 40 years have given a large quantity of acute observations on the topic of character. Still these contributions do not constitute a science.

b) The Four Temperaments:

The original endowment or native element in character with which the individual starts life is practically identical with what the Ancients recognized as **temperament.** From the times of Hippocrates, they distinguished four main types of temperaments: the Sanguine, the Choleric, the Phlegmatic, and the Melancholic.

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

Character has been defined as **"natural temperament completely fashioned by the will".** It is, in fact, a resultant of our acquired habits with our original disposition. The regular use of the intellect, the controlled activity of the imagination, the practice of judgment and reflection, all contribute to the formation and refinement of habits of mind.

The frequent indulgence in particular forms of emotion, such as anger, envy, sympathy, melancholy, fear, and the like, fosters tendencies towards these sentiments which give a subconscious bent to a large part of man's behavior. But finally, the exercise of the will plays the predominant role in moulding the type of character. The manner and degree in which currents of thought and waves of emotion are initiated, guided, and controlled by the will, or allowed to follow the course of spontaneous impulse, has more effect in determining the resultant type of character than the quality of the thoughts or emotions themselves.

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

c) Types of Character

From the four fundamental temperaments, various classifications of character have been adopted by different psychologists. The intellectual, the emotional, and the volitional or energetic are the chief types with A. Bain. M. Pérez, based on the phenomenon of movement, distinguishes characters as lively, slow, ardent, and well- balanced.

M. Ribot, with more subjective division and excluding indefinite types as 'characterless', recognizes the forms as:

  a) The sensitive (humble, contemplative and emotional,

b) The active (great and the mediocre), and
c) The apathetic (purely apathetic or dull), and
d) The intelligent.

d) Ethics and Character

Whilst psychology investigates the growth of different types of character, ethics considers the relative value of such types and the virtues which constitute them. The problem of the true moral ideal is a question of the relative value of different types of character. The effect on the person's character of a particular form of conduct is a universally accepted as a test of its moral quality. Different systems of ethics emphasize different virtues in constituting the ideal moral character.

With the utilitarian, who places the ethical end in the maximum happiness for the whole community, **benevolence** will form the primary element in the ideal character.

For the stoic, fortitude and **self-control** are the chief excellences.

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

e) Education and Character

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

f) Building Character in the Workplace

Managers have to influence and employ creative means of stressing the importance of good character in the workplace, in the following ways

1. Employee Hiring, Training, and Promotion Activities

(i) Institute and adopt an organization policy statement to positive character in the workplace. For example, commitment to civility pledges. This may be communicated through printing on the back of the business cards of the employees.

(ii) Prominently and explicitly include character considerations in recruiting procedures, during interviews and in the hiring deliberations.

(iii) Emphasize the importance of character and adherence to the 'six pillars' of character in orientation, initial job training, and during in- service training.

The six pillars of character are the ethical values,
such as: trustworthiness, respect, responsibility, fairness, caring and citizenship. Respect means showing high regard for self, others, authority, property and country. It includes showing appreciation for cultural diversity by valuing all people as human beings.
Responsibility is

a) being accountable for one's actions,
b) being dependable in carrying out obligations and duties,
c) being reliable and consistent in word and action, and
d) Being committed to community development. Integrity or fairness means showing the inner strength and courage to be truthful, trustworthy, fair and honest in all things. It includes acting justly and honorably. Caring means being kind, considerate, courteous, helpful, friendly and generous to others, and being compassionate by treating others as you would like to be treated. Citizenship means accepting and adopting civic rights and duties as a citizen of the country.

(iv) Include evaluation of fundamental character values such as honesty, promise keeping, accountability, fairness, and caring, in appraisals/reviews.
(v) Institute recognition and reward system for the employees who exemplify the positive character. for example, awards and medals.
(vi) Think of your employees, especially the younger ones, as people whose personal and work values will be influenced by what you expect of them and how you treat them.
(vii) Think of your employees as present or future mentors, coaches, and volunteers.

2. Internal Communication

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

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

3. External Communication

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

(a) Advertise and market honoring consensual values (the six pillars),
(b) Assure that none of your products and services undermines character building,
(c) Include positive messages about voluntarism and celebrate, and
(d) 'Character counts' week in advertising, billings and other mailers.

4. Financial and Human Resources

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

      b. Sponsor 'character' movement through financial support.

5. Community Outreach

(a) Use public outreach structures to encourage mentoring and other character-building programs.

(b) Encourage educational and youth organizations to become active in character building.

(c) Use corporate influence to encourage business groups (chambers of commerce, conference boards, and Rotary clubs) and other companies to support 'character' building.

SPIRITUALITY

18. What is meant by spirituality? How does it differ from religion? (Or) Explain spirituality and their importance in ethics (May/June 2016) (APR/MAY 2018) (Nov/Dec 2018)

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

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

Spirituality is motivation as it encourages the colleagues to perform better. Remember, lack of motivation leads to isolation. Spirituality is also energy: Be energetic and flexible to adapt to challenging and changing situations.

Spirituality is flexibility as well. One should not be too dominating. Make space for everyone and learn to recognize and accept people the way they are. Variety is the order of the day. But one can influence their mind to think and act together.

Spirituality is also fun. Working is okay, but you also need to have fun in office to keep yourself charged up. Tolerance and empathy are the reflections of spirituality. Blue and saffron colors are said to be associated with spirituality.

Creativity in spirituality means conscious efforts to see things differently, to break out of

habits and outdated beliefs to find new ways of thinking, doing and being. Suppression of creativity leads to violence. People are naturally creative. When they are

forced to crush their creativity, its energy turns to destructive release and actions.

Creativity includes the use of color, humor and freedom to enhance productivity. Creativity is fun. When people enjoy what they do, it is involvement. They work much harder.

Workplace Spirituality:

Spirituality is promoted in the workplace by adhering to certain activities as discussed below.

(i) Individuals are to be respected as human and their values are recognized in all their decisions and actions.

(ii) Mingle with the people at work and get to know the important aspects of them such as their goals, desires and dreams, etc.

(iii) Express the personal ethics and beliefs clearly.

(iv) Apart from the business support the individual causes.

(v) Leader's value-based discretion and decisions are to be encouraged.

(vi) Self-knowledge and spirituality are to be demonstrated.

(vii) Only do good-things to others so as to get good- things from them.

Spirituality for Corporate Excellence:

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

1. **Self-awareness**— Realization of self-potential. A human has immense capability but it needs to be developed.

2. **Alertness** in observation and quickness in decision making, i.e., spontaneity which includes quick reflexes, no delay but also no hasty decisions.

3. **Being visionary and value based**— This includes an attitude towards future of the organization and the society, with clear objectives.

4. **Holism** — Whole system or comprehensive views and interconnected with different aspects. Holistic thinking, which means the welfare of the self, family, organization and the society including all other living beings and environment.

5. **Compassion**— Sympathy, empathy and concern for others. These are essential for not only building the team but also for its effective functioning.

6. **Respect for diversity**— It means search for unity in diversity i.e., respect others and their views.

7. **Moral Autonomy**— It means action based on rational and moral judgment. One need not follow the crowd or majority i.e., band-wagon effect.

8. **Creative thinking and constant reasoning**— Think if we can do something new and if we can improve further?

9. **Ability to analyze and synthesize**— Refrain from doing something only traditional.

10. **Positive views of adversity**— Make adversities one's source of power—a typical Karma yogi's outlook! Every threat is converted into opportunity.

11. **Humility**— the attitude to accept criticism (it requires courage!) and willing to correct. It includes modesty and acknowledging the work of colleagues.

12. **Sense of vocation**— Treat the duty as a service to society, besides your organization.

INTRODUCTION TO YOGA AND MEDITATION FOR PROFESSIONAL EXCELLENCE AND STRESS MANAGEMENT

19. What is the value of Yoga? Need the purpose of Yoga. (Nov/Dec 2015) (Nov/Dec 2016) (APR/MAY 2017)

Yoga is a complete process of perfection of man by developing his personality so that he may reach his ultimate goal, thereby fulfilling the purpose of his birth.

Value of Yoga:
Yoga is a science of life to develop the sixth sense to its fullness and to enable and equip man to enjoy peaceful and blissful life. It is essentially an art of understanding all about the soul, which is one of the life force and realizing its relationship with the body, the society, the world and the universe, maintaining its harmony and finally getting it merged with the universal soul.

In nature, man is an unique living being in that he alone is gifted with sixth sense. The sixth sense is a higher level of mind which is able o understands its own existence and functions. It is a divine meter measuring all the functions of the universe and understanding oneness among multiplicity and unit in diversity.

Purpose of Yoga:
For the liberation of the soul,

(i) The attachment with material enjoyments should be neutralized and full satisfaction should be achieved, and

(ii) The impressions of sins should be obliterated.

In order to attain these two, Soul Consciousness is imperative.

Yoga provides all the facilities and opportunities for improving the esoteric awareness to get satisfaction with worldly enjoyment and also to obtain detachment and obliterate the impressions of sins by streamlining the activities of the mind.

Yoga will help man in the performance of all his duties in harmony with the Law of Nature and the sentiments and conventions of the society, enable him to lead a successful life and to achieve satisfaction and peace of sharpening his intellect, cultivating constant awareness and strengthening the will, streamlining the mind and moralizing the behavior. Yoga is a well-balanced and perfect process for success and peace in life.

20. Explain meditation for professional excellence and stress relieve management. (Nov/Dec 2015) (APR/MAY 2017)

Meditation is a practice in which an individual trains the mind or induces a mode of consciousness, either to realize some benefit or for the mind to simply acknowledge its content without becoming identified with that content, or as an end in it.

Meditation often involves an internal effort to self-regulate the mind in some way. Meditation is often used to clear the mind and ease many health concerns, such as high blood pressure, depression, and anxiety.

Meditation may involve generating an emotional state for the purpose of analyzing that state such as anger, hatred, etc. or cultivating a particular mental response to various phenomena, such as compassion.

Steps used to relive the stress:

1. Find a quiet, relaxing atmosphere.

It could be anywhere, outside under a tree, in a bedroom with the lights off, or even in your living room. Anywhere that makes you feel comfortable is great. Make sure that there is no distraction in the area you have chosen and make sure there are no future distractions. You need to be focused on the here and now.

2. Find a comfortable position.

Whether it would be sitting, lying down, or standing up the decision is up to you. Make sure that it's comfortable for you. Once you find your position, close your eyes.

3. Take in a deep breath.

As you are in your position with your eyes closed, take in a slow deep breath. As you are taking in your breath, relax yourself. Loosen your shoulder and neck, wiggle

your toes or fingers. Try to harmonize with your breath as you relax. Breathe in slowly, and as you breathe out, imagine all your stress and worries leaving your body whenever you exhale

4. Try to clear your mind and avoid distractions, if you can.

Put off any tasks that can wait until after you're done meditating. As you are taking in your breaths, let all your worries go, Stop stressing or thinking about commitments, appointments, and responsibilities. Save that for later. Instead, become self aware. Notice your breathing, your relaxation. Be in the moment and benefit from it.

Of course, if the phone rings, or you need to do any important task, then of course you can do so and can return to this meditation later.

5. Imagine yourself in a happy place.

This may be from a holiday a few years ago, when you were younger and talking to your little sister, or simply sitting alone in a park. Another option is to simply focus on what you are experiencing at the time. Focus on your breathing, what you hear, or smell. If another thought comes into your mind, gently push it away, and try not to start thinking about other things. This will get better with practice.

6. Close your eyes continue to breathe deeply, and imagine all your body slowing down.

Your heartbeat, your blood flow and all the way down to your feet. Continue imagining yourself in this place while breathing slowly for the next few minutes now.

7. Take your time.

Don't worry how long you should meditate for. Keep meditating until you feel yourself relax and refreshed. But if you need a time frame, studies show those 5-15 minutes is beneficial. Once you feel like it's over, open your eyes and feel the benefits.

UNIT-II

UNIT II   **ENGINEERING ETHICS**   **9**

Senses of _Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

SENSES OF ENGINEERING ETHICS

1. **Describe the Senses of Engineering Ethics? (May/June 2016) or explain the importance of engineering ethics (Nov/Dec 2006) (Apr/May 2017)**

The four important senses of the engineering ethics are:

1. Interpreting ethics as an activity and area of inquiry: When the ethics is interpreted as an activity and areas of inquiry, then the sense of engineering ethics can be given as below:
   - Engineering ethics is the activity and discipline aimed at understanding the moral values that ought to guide the engineering practice
   - Resolving moral issues in engineering, and justifying moral judgment concerning engineering.
2. When the term ethics is interpreted as a means of contrasting moral problems from non moral problems, then the sense of engineering ethics can be as follows.
   - Engineering ethics refer to the set of specific moral problems and issues related to the engineering.
3. When the word ethics is used as a means of describing the beliefs, attitudes and habits related to an individuals or group's morality, then the expression engineering ethics have the following sense.
   - Ethics has widely accepted codes and standards of conduct, which are to be followed by the group of engineers and engineering societies.
4. When the word ethics is used as a synonyms for "morally correct", then the expression 'engineering ethics' may give the following meanings.
   - Engineering ethics is concerned with the set of justified moral principles of obligations, rights, and ideals that are to be followed by the engineers.

Thus the above four senses of engineering ethics to particular situation is the central objective of the engineering ethics discipline.

2. What are the scopes of engineering ethics? (May/June 2006) (Apr/May 2017)

It constitutes a normative perspective (Value based view) on Engineering Ethics.

1. Experiments which are involved in engineering projects are social experiments that generate both new possibilities and risk. Engineers should be responsible in creating benefits, preventing harms and pointing out the dangers.

2. Moral values permit all aspects of technological development, therefore both excellence in engineering and ethics go together.

E.g. A team members from Sun solar corporation in India achieved 94% of battery storage and its deep discharge capability, on parallel they also wanted to render their services to unemployed farmer men and women during their free time. They designed an LED emergency light and freely supplied it to the local villages, they employed the village people by giving them repeated training in making the Body of LED light. Thus

it improved their profit and also their moral

integrity towards the people.

3. Personal meaning and commitments matter in engineering ethics.

E.g. a team of engineers were working in an organization of designing "**Artificial Lungs**". They came to know some of the families of the children for whom the design required were able to breathe freely and relax. The workers were totally energized by concrete evidence that their efforts really did improve the people's life.

4. Promoting responsible conduct is even more important than punishing wrong doings.

5. Ethical dilemmas arise in engineering, as elsewhere, as moral values are myriad and it can conflict.

6. Engineering ethics should explore both micro and macro issues.

7. Technological development warrants cautious optimism.

VARIETY OF MORAL ISSUES

3. Explain in detail about Variety of Moral Issues?

The reasons for people including the employer and employees, behaving unethically may be classified into three categories:

1. Resource Crunch

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

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

2. Opportunity

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

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

3. Attitude

Poor attitude of the employees set in due to

a) Low morale of the employees because of dissatisfaction and downsizing
b) Absence of grievance redressal mechanism
c) Lack of promotion or career development policies or denied promotions
d) Lack of transparency
e) Absence of recognition and reward system and
f) Poor working environments.

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

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

TYPES OF INQUIRY

4. Explain in detail about the types of INQUIRY? (APR/MAY2015) (Nov/Dec 2011)

Engineering ethics combines inquiries into values, meanings and facts.

Types of inquires:

1. Normative inquiries

- The Normative inquiries are useful to identify the values that guide the individuals and the groups in taking the decisions.
- It is meant for identifying and establishing the morality desirable norms or standards that are used as the guide to access something as the good or bad.
- Generally normative questions are about what is good?.

Examples:

- When and why the engineers have obligations to their employers, their clients and the general public?
- Why some engineering information must kept confidential?
- How an engineer can protect the public safety in a given situation?

2. Conceptual inquiries

- The Conceptual inquiries are useful in clarifying the meaning of concepts, principles and issues in the engineering ethics.
- The aim of conceptual inquiries is to clarify the meaning of key ideas and issues, possibly expressing by single word or by statements.

Examples:

- What is safety?
- What is meant by risk?
- How safety is related to risk?
- What is a profession?

3. Factual inquiries

- It is also known as the descriptive or explanatory inquiries.
- It is helpful to provide facts required for understanding and resolving value issues.
- Researchers use this inquiry to get various information's, in the history of engineering profession, the effectiveness of professional societies in promoting moral conduct the procedures used in risk benefit analysis.
- It also helpful in solving moral problems by using alternative ways of solutions.
- It is helpful in understanding the business, social and political realities in which the company operates.

Example:

- What are the laws enforced in the intellectual property rights law recently?
- What are the procedures used in making risk assessment?
- What is the validity period of patented product?

MORAL DILEMMAS

5. Where and how do moral problems arise in engineering? (APR/MAY2005)

Engineers carries out various activities and decision making exercise involving technical, financial, managerial, environmental, and ethical issues. There are many situations and moral issues that causes professional disagreements among engineers.

1. Organization oriented issues

- Being an employee to a firm, the engineer has to work towards the achievement of the objectives of his/her organization.
- Engineers have to give higher priority to the benefits of the organization than one own benefits
- Engineers able to work collectively with colleagues and the other members in order to achieve firm's goal.

2. Clients are customer oriented issues

- The purpose of any business is to reach and satisfy the end users. Therefore the customers' requirements should be met.
- In this regard engineers have a major role to play in identifying the customer voice and incorporating the voice of the customer into the product design and manufacture.
- Apart from engineering technically issues, engineers also should face other moral and ethical issues with their clients / customers.

3. Competitions oriented issues

- Engineers should produce things better than their competitors by all means.
- Engineers should not practice cut throat competition. They should follow certain professionalism behavior while facing their competitors.
- They should paramount the safety, health and welfare of the customers in the performance of their professional duties.

4. Law government and public agencies oriented issues

- Engineers should obey and voluntarily comply with all government rules and regulations related to them.
- They also respect and honestly practice all other similar laws policies and regulations.

5. Professional societies oriented issues

- They should strictly follow the various codes of ethics by various societies such as national society of professional engineers (NSPE).
- Institute of Electrical and electronics engineers (IEEE).
- American society of mechanical engineers. (ASME). In order to perform standard professional behavior.
- Professional codes of ethics reflect basic norms of conduct that exists within a particular professional and provide general guidance relating to variety of issues.

6. Social and environmental oriented issues

- Since the work of engineers has a direct and vital impact on the quality of life for all people the engineers should be dedicated to protection of the public health, safety and welfare.
- Engineers need to be aware their roles as agents of experimenters. They should have a united commitment in protecting the environment. They should not involve in any unethical environmental issues such as misusing scare resources and fouling environment.
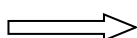
7. Family oriented issues

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

6. Explain in detail about moral dilemmas? Write short note on moral dilemmas? (May/ June 2013) (Or) Give the steps in confronting moral dilemmas. (AU NOV2005) (Or) Why are ethical problems connected to engineering work complex? (Nov/Dec 2008) (Nov/Dec 2016)

Moral dilemmas can also be called moral problems.
Moral dilemmas are situations in which two or more moral obligations, duties, rights, goods, or ideals come into conflict with one another and it appears that not all of them can be fully respected in a given situation also solving one or more moral principle can create two or more conflicting applications for a particular situation.

Moral dilemmas arise due to vagueness, conflicting reasons or due to disagreement.

Vagueness (or) Conflicting reasons (or) Disagreement ⟹ Moral Dilemmas

Causes of moral dilemmas:

1. **VAGUENESS:**
- It means not clearly expressed or perceived; not specific or exact.

- This complexity arises due to the fact that it is not clear to individuals as to which moral considerations or principles apply to their situation.

   Example:

   - Consider an engineer, starting a new assignment as quality inspector checking the incoming raw materials/ spare parts from the suppliers. Supplier offers him an expensive DVD player as a gift.
   - This is the moral dilemma situation because the engineer is unclear about what to do? Whether to accept the gift or not? Whether the thing is a gift or a bribe?

   2. CONFLICTING REASONS:
   - Even when it is perfectly clear as to which moral principle is applicable to one's situation, there could develop a situation where in two or more clearly applicable moral principles come into conflict.

   Example:

   Let us examine the space shuttle challenger explosion focusing on the dilemma faced by the engineer manager bob lund had the following conflicts:

   - Launching the challenger space shuttle without unknown probability of the shuttle will explode.
   - Postponing the launch which may lead to loss of future contracts from NASA the loss of job to many workers.

   3. DISAGREEMENT:
   - Individuals and groups may disagree how to interpret, apply and balance moral reasons in particular situations.

   Example: In most corporations there are disagreements among managers regarding whether customers can be allowed to inspect their plants and procedures as a confidence building measures.

Steps in confronting MORAL DILEMMAS:

i) Identify the relevant moral factors and reasons.

ii) Gather all available facts that are pertinent to the moral factors involved.

iii) Rank the moral considerations in the order of their importance as they apply to the situation.

iv) Consider alternative course of action, tracing the full implications of each, as ways of solving dilemma.

v) Talk with colleagues, seeking the suggestions and perspectives of the dilemma.

vi) Arrive at a carefully reasoned judgment by weighing all the relevant moral factors and reasons in light of facts.

MORAL AUTONOMY

7. Explain in detail about moral autonomy? (Nov/Dec 2008) Write short notes on

moral Autonomy? Or explain the skills needed to handle problems about moral issues in engineering ethics. (AU NOV2005) (AU APR2005) (May/June 2006) (Nov/Dec 2011) (Nov/Dec 2012) (or) What do you understand by moral autonomy? Mention the skills to be possessed by moral autonomous engineer (Nov/Dec 2012) (Nov/Dec 2016)(Nov/Dec 2017) (APR/MAY 2018)

Moral autonomy means the right or the wrong conduct which is independent on ethical issues. It deals with the improvement of an individual's moral thoughts which make him to adapt good habits.

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

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

It is concerned with the independent attitude of an individual related to ethical issues.

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

Factors influencing the moral concern:

1. Atmosphere in which the child is brought up in his childhood.

2. One's relationship with friends and relatives.

3. One's interaction with his neighbors.

4. Ones family structure and the family economy.

5. Influence of teachers and mentors.

6. Influence of social events.

"One who breaks an unjust law must do so openly, lovingly, and with a willingness to accept the penalty. I submit that an individual who breaks a law that conscience tells him is unjust and willingly accepts the penalty… is in reality expressing

the highest respect for the law." Rev. Martin Luther King, Jr. in Letter from a Birmingham Jail, 1963.

A person becomes morally autonomous by improving various practical skills listed below:
  i) Proficiency is recognizing moral problems and issues in engineering.

  ii) Skill in comprehending, clarifying and critically assessing arguments on opposing sides of moral issues.

  iii) The ability to form consistent and comprehensive viewpoints based upon consideration of relevant facts.

  iv) Awareness of alternate responses to issues and creative solutions for

practical difficulties. d precision in the use of a common ethical language necessary to express and also defend one's views adequately.

vii) Appreciation of possibilities of using rational dialogue in resolving moral conflicts and the need for tolerance of differences in perspective among orally reasonable people.

viii) A sense of importance of integrating one's professional life and personal convictions i.e. maintaining one's moral integrity

v) Sensitivity to genuine difficulties and subtleties

vi) Increase

KOHLBERG'S THEORY

8. **Explain Kohlberg's model for moral development? (APR/MAY2005) (Or) Explain Kohlberg's theory in detail? (Or) Discuss the role of Kohlberg theory in ethical judgments (Nov/Dec 2006) (or) (or) Explain the Contributions of Kohlberg in the theory of moral development and explain how it differs from Gilligan's theory. (May/ June 2009)(Or) Explain the three levels of moral developments with respect to Kohlberg views (Nov/Dec 2006) (Nov/Dec 2011) (or) discuss the Kohlberg's theory on moral development (May/ June 2013) (Apr/May 2017) (NOV/DEC 2018)**

KOHLBERG'S Theory

Level I: Preconvention Morality

Stage 1: Obedience and Punishment Orientation

Stage 2: Individualism and Exchange

Level II: Conventional Morality

Stage 3: Good Interpersonal Relationships

Stage 4: Maintaining the Social Order

Level III: Post conventional Morality

Stage 5: Social Contract and Individual Rights

Stage 6: Universal Principles

KOHLBERG'S Theory

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

Level I: Preconvention Morality

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

Stage 1: Obedience and Punishment Orientation

The child assumes that powerful authorities hand down a fixed set of rules which he or she must unquestioningly obey. To the Heinz dilemma, the child typically says that Heinz was wrong to steal the drug because "It's against the law," or "It's bad to steal," as if this were all there were to it. When asked to elaborate, the child usually responds in terms of the

consequences involved, explaining that stealing is bad "because you'll get punished" (Kohlberg, 1958).

Although the vast majority of children at stage 1 oppose Heinz's theft, it is still possible for a child to support the action and still employ stage 1 reasoning.

For example, a child might say, "Heinz can steal it because he asked first and it's not like he stole something big; he won't get punished". Even though the child agrees with Heinz's action, the reasoning is still stage 1; the concern is with what authorities permit and punish.

Kohlberg calls stage 1 thinking "preconvention" because children do not yet speak as members of society. Instead, they see morality as something external to themselves, as that which the big people say they must do.

Stage 2: Individualism and Exchange

At this stage children recognize that there is not just one right view that is handed down by the authorities. Different individuals have different viewpoints. "Heinz," they might point out, "might think its right to take the drug, the druggist would not." Since everything is relative, each person is free to pursue his or her individual interests.

One boy said that Heinz might steal the drug if he wanted his wife to live, but that he doesn't have to if he wants to marry someone younger and better-looking (Kohlberg). Another boy said Heinz might steal it because may be they had children and he might need someone at home to look after them. But maybe he shouldn't steal it because they might put him in prison for more years than he could stand.

You might have noticed that children at both stages 1 and 2 talk about punishment. However, they perceive it differently. At stage 1 punishment is tied up in the child's mind with wrongness; punishment "proves" that disobedience is wrong. At stage 2, in contrast, punishment is simply a risk that one naturally wants to avoid. Respondents at stage 2 are still said to reason at the preconvention level because they speak as isolated individuals rather than as members of society. They see individuals exchanging favors, but there is still no identification with the values of the family or community.

Level II: Conventional Morality

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

Stage 3: Good Interpersonal Relationships

At this stage children who are by now usually entering their teens see morality as more than simple deals. They believe that people should live up to the expectations of the family and community and behave in "good" ways. Good behavior means having good motives and interpersonal feelings such as love, empathy, trust, and concern for others. Heinz, they

typically argue, was right to steal the drug because "He was a good man for wanting to save her," and "His intentions were good, that of saving the life of someone he loves." Even if Heinz doesn't love his wife, these subjects often say, he should steal the drug because "I don't think any husband should sit back and watch his wife die" (Kohlberg, 1958)

If Heinz's motives were good, the druggist's were bad. The druggist, stage 3 subjects emphasize, was "selfish," "greedy," and "only interested in himself, not another life." A typical stage 3 response is that it was really the druggist's fault, he was unfair, trying to overcharge and letting someone die. Heinz loved his wife and wanted to save her. I think anyone would. I don't think they would put him in jail. The judge would look at all sides, and see that the druggist was charging too much. (Kohlberg, 1963).

Stage 4: Maintaining the Social Order

Stage 3 reasoning works best in two-person relationships with family members or close friends, where one can make a real effort to get to know the other's feelings and needs and try to help. At stage 4, in contrast, the respondent becomes more broadly concerned with society as a whole. Now the emphasis is on obeying laws, respecting authority, and performing one's duties so that the social order is maintained. In response to the Heinz story, many subjects say they understand

That Heinz's motives were good, but they cannot condone the theft. What would happen if we all started breaking the laws whenever we felt we had a good reason? The result would be chaos; society couldn't function. As one subject explained, stage 4 subjects make moral decisions from the perspective of society as a whole, they think from a full-fledged member-of-society perspective (Colby and Kohlberg, 1983).

You will recall that stage 1 children also generally oppose stealing because it breaks the law. Superficially, stage 1 and stage 4 subjects are giving the same response, so we see here why Kohlberg insists that we must probe into the reasoning behind the overt response. Stage 1 children say, "It's wrong to steal" and "It's against the law," but they cannot elaborate any further, except to say that stealing can get a person jailed.

Level III: Post conventional Morality

- In the post-conventional level, the individuals are guided by strong principles and convictions, not by selfish needs or pressures from society.
- According to Kohlberg, these individuals are called as 'autonomous', because they think for/by themselves and also they do not believe that customs are always right.
- The people at this level want to live by general principles that are universally applied to all people. They always desire to maintain their moral integrity, self-respect, and the respect of other autonomous individuals.
- Kohlberg felt that the majority of adults do not reach the post-conventional level.

Also Kohlberg believed that individuals could progress only through these stages one by one. That is, they cannot 'jump' the stages. He also pointed out that the people at post conventional level have more moral development and hence the moral autonomy.

Stage 5: Social Contract and Individual Rights

Stage 5 respondents basically believe that a good society is best conceived as a social contract into which people freely enter to work toward the benefit of all they recognize that different social groups within a society will have different values, but they believe that all

rational people would agree on two points. First they would all want certain basic rights, such as liberty and life, to be protected. Second, they would want some democratic procedures for changing unfair law and for improving society. Thus, stage 5 respondent sometimes defend Heinz's theft in strong language:

It is the husband's duty to save his wife. The fact that her life is in danger transcends every other standard you might use to judge his action. Life is more important than property.

A man went on to say that "from a moral standpoint" Heinz should save the life of even a stranger, since to be consistent; the value of a life means any life. When asked if

the judge should punish Heinz, he replied:

Usually the moral and legal standpoints coincide. Here they conflict. "The judge should weight the moral standpoint more heavily but preserve the legal law in punishing Heinz lightly". (Kohlberg, 1976)

Stage 6: Universal Principles

Kohlberg's conception of justice follows that the principles of justice require us to treat the claims of all parties in an impartial manner, respecting the basic dignity, of all people as individuals. The principles of justice are therefore universal; they apply to all. Thus, for example, we would not vote for a law that aids some people but hurts others. The principles of justice guide us toward decisions based on an equal respect for all.

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

Summarizes the Kohlberg's levels of moral development

Level	Appropriate age range	Moral development
Pre-Conventional	Birth to 9 years	- Self-centered attitude - Willingness to avoid punishment - Desire to gain reward
Conventional	Ages 9 to 20 years	- Respect for conventional rules and authority - Willingness to please or satisfy others - Importance to loyalty and close identification with others
Post-Conventional	Over 20 years or may be never	- Thinking for and by themselves. - Agreed upon universal general principles. - Personal moral stands.

GILLIGAN'S THEORY

9. Explain Gilligan theory of moral development? (AU NOV2004) (AU NOV2005) or How did Gilligan view the three level of morals development initiated by Kohlberg(May/June 2006) (or) Explain the three levels of moral developments with respect to Gilligan views (Nov/Dec 2006) (Nov/Dec 2012) (or) Discuss Gilligan Theory (May/ June 2013) (Apr/May 2017) (NOV/DEC 2018)

Carol Gilligan's theory

- Carol Gilligan, a former student and colleague of Kohlberg, has criticized Kohlberg's theory as male biased.
- She also charged Kohlberg that Kohlberg's studies were concluded with male samples only and also his approach is dominated by a typical preoccupation with general rules and rights.
- According to Gilligan, males have tendency to over-ride the importance of moral rules and convictions while resolving moral dilemmas; whereas females have tendency to try hard to preserve personal relationships with all people involved in a situation.
- Also Gilligan felt that men mostly focus their attention on content of the problem, whereas women focus their attention on the context i.e., situation of the problem.
- Gilligan refers her context-oriented emphasis on maintaining personal relationships as the ethics of care, and contrasts it with Kohlberg's ethics of rules and rights.

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

1. Pre conventional stage
2. Conventional stage
3. Post conventional stage

1. **Pre conventional stage** - One learns to care for oneself.
   - This is almost the same as Kohlberg's first level.
   - That is, in this level an individual is concerned with self-centered reasoning.

2. **Conventional stage -** One internalizes norms about caring for others and tends to neglect oneself.
   - This level differs from Kohlberg's second level.
   - According to Gilligan, women will not hurt others and have a willingness to sacrifice their own interests in order to help others.

3. **Post conventional stage -** One becomes critical of the conventions one adopted in the conventional stage and learns to balance caring for self with caring for others.

   - This level also differs from Kohlberg's third level.
   - In this level, the individual is able to maintain balance between his own needs with the needs of others.
   - The balancing can be achieved through context-oriented reasoning i.e., examining all facts, people and circumstances involved, rather than by applying abstract rules ranked in a hierarchy of importance.

Gilligan advanced the view that Kohlberg's model must be wrong. Measuring progress by it resulted in boys being found to be more morally mature than girls, and this held for adult men and women as well, although when education is controlled for there are no gender differences. This was not an objective scale of moral development, Gilligan argued, but other researchers have found the scale to be psycho-metrically sound. It displayed a particularly masculine perspective on morality, founded on justice and abstract duties or obligations. She also stated that Kohlberg's founding study consisted of largely male participants.

Gilligan offered a difference feminist perspective: men and women have tendencies to view morality in different terms, with women tending to emphasize

empathy and compassion over the notions of morality that are privileged by Kohlberg's scale. The "different voice," however, is not characterized by gender. Rather, it is associated with women by means of an empirical observation. Subsequent research, confirms that the difference in the use of the care ethic or the justice orientation is not based on gender differences.

Ethics of care and feminist ethics

While some feminists have criticized care-based ethics for reinforcing traditional stereotypes of a "Good Woman" others have embraced parts of this paradigm under the theoretical concept of care-focused feminism.

Care-focused feminism is a branch of feminist thought, informed primarily by ethics of care as developed by Carol Gilligan and Nel Nodding. This body of theory is critical of how caring is socially engendered to women and consequently devalued. "Care-focused feminists regard women's capacity for care as a human strength" which can and should be taught to and expected of men as well as women. Nodding proposes that ethical caring has the potential to be a more concrete evaluative model of moral dilemma, than an ethic of justice. Nodding care-focused feminism requires practical application of relational ethics, predicated on an ethic of care.

Summarizes the Gilligan's levels of moral development

Level	Appropriate age range	Moral development
Pre-Conventional	Not Listed	• Goal is individual survival i.e., Self-centered attitude.
Transition is from selfishness to responsibility to others		
Conventional	Not Listed	• Self-sacrifice is goodness i.e., individuals sacrifice their interests to others.
Transition is from goodness to truth that she is a person too		
Post-Conventional	May be never	• Principle of nonviolence – do not hurt others or self. • To balance between one's own needs with the needs of others.

10. Discuss the various differences between Kohlberg's Theory Carol Gilligan's Theories (AU APR2005) Or Compare Kohlberg's and Gilligan's theory? (APR/MAY2015) (Nov/Dec 2015)

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

Kohlberg's Theory	Carol Gilligan's Theory
A. Basic Aspects	
1. Is based on the study on men.	1. Is based on the study on men and women
2. Men give importance to moral rule.	2. Women always want to keep up the personal relationships with all the persons involved in the situations.
3. Ethics of rules and rights.	3. Women give attention to circumstances leading to critical situations rather than rules: (context-oriented and ethics of care)

B. Characteristic Features	
1. Justice	1. Reason
2. Factual	2. Emotional
3. Right or wrong	3. Impact on relationships
4. Logic only	4. Compassion too
5. Logic and rule-based	5. Caring and concern
6. Less of caring	6. More of caring
7. Matter of fact (practical)	7. Abstract
8. Present focus	8. Future focus
9. Strict rules	9. Making exceptions
10. Independence	10. Dependence
11. Rigid	11. Human-oriented
12. Taking a commanding role	12. Shying away from decision-making
13. Transactional approach	13. Transformational approach

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 (threatening or payment in installments?) to convince the Pharmacist. Gilligan however attributed the decision by women as context-oriented and not on the basis of rules ranked in the order of priority.

CONSENSUS AND CONTROVERSY

11. Explain in detail about consensus and controversy? Or explain the vital role of Consensus and controversy while considering moral autonomy in engineering ethics? (AU NOV2005)

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 conversations i.e., disagreements are inevitable.

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

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

The goal of teaching engineering ethics is not merely producing always a promoting a tolerance in the practical applications of moral autonomy by engineers. The goal of engineering ethics and the goal of responsible engineering have some similarities. Both situations require the need for consensus regarding the role of authority.

Relationship between autonomy and authority:

- Moral autonomy and respect for authority are compatible with each other.
- Moral autonomy is based on the moral concern for other peoples and recognition of good moral reasons. Also it emphasizes the capabilities and responsibilities of people.
- Authority provides the framework through which the learning attitudes are encouraged.
- Sometimes conflicts will arise between the individual need for the autonomy and the need for the consensus about authority. This situation can be reduced 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 the class room. In the classroom, the teachers help in maintaining the dignity and decorum of the climate in a institution also in restoring the confidence and respect between teachers and students.
- There should be the acceptance of authority by both the teachers and the students in order to conduct the class in orderly ways.
- When the authority is misused conflicts may arise between autonomy and authority.
- Allowing open discussions between teachers and students can reduce the unhealthy academic atmosphere.

MODELS OF PROFESSIONAL ROLES

12. Explain in detail about profession? (Or) Describe the criteria used for calling somebody a professional (Nov/Dec 2008) (or) what are the criteria to be met by an occupation to call it as a profession? (Nov/Dec 2012)

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

- The profession means the making of a public declaration.
- Profession referred to a person taking religious pledges to join the clergy.
- It is the act of professing means the occupation one in who professes to be skilled in and to follow.
- The word profession is also used as job or occupation.

Characteristics of a profession:

1. **Knowledge:**

   The work requires superior skills, theoretical knowledge and the exercise of discretion. Also the work should not be routine or respective mechanization. Many works require extensive theoretical and practical knowledge obtained through ones formal education and training in the chosen field.

2. **Organization:**

   There should be an organization or an association or a society to enroll the practicing the profession letting the standards for the admission to the profession, drafting the code for ethics and representing the profession before the public and the government.

3. Public good:

The professional knowledge and skills should be helpful to well being of general public, society.

Example:

- Medical practice people promote health.
- Lawyers promote the public legal rights.
- Engineers safeguard public health safety and welfare.

Job/occupation differs from profession:

- Any work for a hire can be considered a job irrespective of the skill level involved and the responsibility approved.
- The occupation means employment through which someone makes living.
- Engineers are certainly a job and also an occupation. Engineers are paid the services they make living out of it. But skills and responsibility involved in engineering is more than just a job.

Are cricketers and carpenters professionals?

The word professional is being used to distinguish the practioner from an unpaid armature. But in the real sense they are not professionals.

Whether engineering is a profession?

1. Knowledge:

It requires very sophisticated skills that can't be mechanized. It requires judgment and it requires discretion keeping the employers or clients intellectual property.

2. Organization:

Also each discipline within engineering has a professional society such as IEEE, ASME, and NSPE etc. these societies set professional standards for practice of the profession and enforce codes of ethical behavior for its members.

3. Public good:

Finally engineering serves as an important aspect of the public good.

Thus the engineering meets all the criteria of a profession therefore engineering just like medicine and law is also a profession.

13. Explain in detail about professionalism? Or discuss the key dimensions of professionalism (Nov/Dec 2012) APR/MAY 2018

Professionalism is the status of a professional which implies certain attitudes or typical qualities that are expected of a professional. According to Macintyre, professionalism is defines 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:

1. **Advanced expertise:** The expertise includes sophisticated skills and theoretical knowledge in exercising judgment. This means a professional should analyse the problem in specific known area, in an objective manner.

2. **Self-regulation:** One should analyse 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.

3. **Public good:** One should not be a mere paid employee of an individual or a teaching college or manufacturing organization, to execute whatever the employer wants one to do. The job should be recognised by the public. The concerted efforts in the job should be towards promotion of the welfare, safety, and health of the public.

14. Explain in detail about professionalism? (Or) Discuss the different models of professional roles (APR/MAY2015) (AU NOV2005) (or) what are the professional roles to be played by an engineer? (Or) what are the different types of models of professional role (Nov/Dec 2015) (May/June 2006) (May/ June 2009) (Nov/Dec 2017) (NOV/DEC 2018)

Models of Professional Roles:

An engineer has to play many roles while exercising his professional obligations.

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

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

   For example: R.L. Stevenson.

2. As A Guardian:

He guards the interests of the poor and general public. As one who is conversant with technology development, is given the authority befitting his expertise to determine what is best suited to the society.

For example: Lawrence of Arabia (an engineer).

3. As A Bureaucratic Servant:

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

For example: Jamshedji Tata.

4. As A Social Servant:

It is one who exhibits social responsibility. The engineer translates the interest and aspirations of the society into a reality, remembering that his true master is the society at large.

For example: Sir M.Viswesvarayya.

5. As A Social Enabler and Catalyst:

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

For example: Sri Sundarlal Bahuguna.

6. As A Game Player:

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

For example: Narayanamurthy, Infosys and Dr. Kasthurirangan, ISRO.

15. **Describe in detail about ideals and virtues? (Or) Write on professional ideals and virtues? (May/ June 2013)**

Virtue means:

- Virtues can be defined as moral distinction and goodness. It refers to the moral excellence of one's behavior.
- Virtue means our ideals of what is right and what is wrong.
- Virtues are describable ways of relating to other individuals, groups and organizations. They are very much related to motives, attitudes and emotions that are

responsible for right and wrong conduct of an individual.

- It should be noted that professionalism is mainly based on the virtues rather than the technological development, knowledge, economy etc.
- The professionalism can be identified only with the help of moral ideals to which ones profession is dedicated.

Do the engineers need virtues?

- The professional's responsibilities include virtues that go beyond fulfilling the basic duties of their professions.
- All the basic duties such as honesty, fair madness, reliability, integrity, benevolence, perseverance, public spiritedness, compassion, kindness and generosity are associated with the virtues of a person.

THEORIES ABOUT RIGHT ACTION

16. Explain the theories about right actions. (Nov/Dec 2008) (Or) What are the different ethical theories available for right action, self-interest, and duty ethics? (AU NOV2005) (Or) Discuss the theories pertaining to moral autonomy with specific reference to consensus and controversy (APR/MAY2005) (or) discuss the theories about virtues (AU NOV2004) (or) discuss in details the various ethical theories and their uses. (May/June 2016) (May/June 2006) (Or) Explain the ethical theories and how these theories are useful in justifying moral obligations of engineer. (Nov/Dec 2006) (Or) Summarize the principles and ideals of duty ethics (Nov/Dec 2012) (Nov/Dec 2016) (Apr/May 2017)

Ethical/moral theories to help us understand ethical cases and ethical problems that often face engineers. A Moral theory defines terms in uniform ways and links ideas and problems together in consistent ways.

Ethical Theories:

1. Virtue Ethics

2. Duty Ethics

3. Right Ethics
4. Utilitarianism

Virtue Ethics

Assumes ethical behavior follows from characteristics/traits that people acquire. People will do the right thing because they have developed virtuous habits. Considered wisdom and good judgment the most important virtues Virtue ethics focus on words such as responsibility, honesty, competence, and loyalty Vices are dishonesty, disloyalty and irresponsibility.

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'. The examples shown below illustrate the theory:

Virtue	Excess	Golden mean	Deficient
Truthfulness (governs communication)	Revealing all in violation of tact and confidentiality	Necessary and sufficient, to proper person	Secretive
Courage (face danger, risk)	Roguishness, bold	Firm and humble	Cowardice
Generosity (giving)	Wasting resources	Give, in appropriate measure	Miserly
Friendliness (governs relationship)	Without anger, effusive	Within decent limits	Bad-tempered
Green environment	Exploitation	Protection	Neglect
Work and earn	Tiresome work (strained)	Balance of work leisure	Lazy (no work) and more pay

On the other hand, the Virtue Theory proposed by **Mac Intyre**, highlighted on the actions aimed at achieving common good and social (internal) good such as social justice, promotion of health, creation of useful and safe technological products and services.

Duty Ethics

Moral duties are fundamental Ethical (right) actions can be written down as a list of duties (be good, be honest etc.) may not be good for all. Duty ethical actions express respect for Individuals. Once one's duties are recognized, then the ethically correct actions are obvious.

A. 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. The stress is on the universal principle of respect for autonomy i.e., respect and rationality of persons.

As per Kant we have duties to ourselves, as we are rational and autonomous beings. We have a duty not to commit suicide; a duty to develop our talents and a duty to avoid harmful drugs.

Kant insisted that moral duties are categorical imperatives. They are commands that we impose on ourselves as well as other rational beings.

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.

B. 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.

The first principle is of prime importance and should be satisfied first. Without basic liberties other economic or social benefits cannot be sustained for long.

The second principle insists that to allow some people with great wealth and power is justified only when all other groups are benefited. In the business scenario,

for example, the free enterprise is permissible so far it provides the capital needed to invest and prosper, thereby making job opportunities to the public and taxes to fund the government spending on the welfare schemes on the poor people.

C. C.W.D. Ross, the British philosopher introduced the term prima facie duties, which means duties might have justified exceptions. In fact, most duties are prima facie ones; some may have obligatory or permissible exceptions.

Ross assumed that the prima facie duties are intuitively obvious (self- evident), while fixing priorities among duties. 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:

1. Fidelity : duty to keep promises.

2. Reparation : duty to compensate others when we harm them.

3. Gratitude : duty to thank those who help us.

4. Justice : duty to recognize merit.

5. Beneficence : duty to recognize inequality and improve the condition of others.

6. Self-improvement : duty to improve virtue and intelligence.

7. Non-malfeasance : duty not to injure others.

Right Ethics

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:

1. **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.
2. **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.
3. **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.
4. **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 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:

1. Rights are natural in so far as they are not invented or created by government.
2. They are universal, as they do not change from country to country.
3. They are equal since the rights are the same for all people, irrespective of caste, race, creed or sex.
4. 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:

      a. Right to Information,
      b. Right to Safety,
      c. Right to Choice,
      d. Right to be Heard,
      e. Right to Redressal, and
      f. Right to Consumer Education.

A few rights are absolute, i.e., unlimited and have no justifiable exceptions. For example, rights ethicists view that the rights have not been violated if the people purchase a (technological product) hang glider and they get injured by flying them carelessly or under bad weather conditions. But human rights imply that one not to be poisoned or killed by technological products, whose dangers are not obvious or wantonly hidden. They imply a right to be informed, when the purchase was made, of the possible dangers during use or service (obtaining informed consent).

Rights ethics is distinctive in that it makes human rights the ultimate appeal — the moral bottom line. Human rights constitute a moral authority to make legitimate moral demands on others to respect our choices, recognizing that others can make similar claims on us. Thus, we see that the rights ethics provides a powerful foundation for the special ethical requirements in engineering and other professions.

Utilitarianism

Based on maximizing "goodness", produce the most good for the most people given equal consideration to all affected. Tries to establish a balance of good over bad consequences Focused on society versus individual.

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:

a) Identify the various courses of action available to us.

b) Ask who will be affected by each action and what benefits or harms will be derived from each.

c) 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 ACT UTILITARIAN theory proposed by **J.S. Mill** (1806-73) focuses on actions, rather than on general rules. An action is right, if it generates the most overall good for the most people

involved.

The RULE UTILITARIAN theory, developed by **Richard Brandt** (1910-97), stressed on the rules, such as 'do not steal', 'do no harm others', 'do not bribe', as of primary importance. He suggested that individual actions are right when they are required by set of rules which maximizes the public good.

The act utilitarian theory permitted a few immoral actions. Hence, there was need to develop rule utilitarian theory to establish morality and justice, in the transactions. For example, stealing an old computer from the employer will benefit the employee more than the loss to the employer. As per Act, utilitarian this action is right. But rule utilitarian observes this as wrong, because the employee should act as 'faithful agent or trustee of the employees'. In another example, some undisciplined engineers are terminated with the blame for the mistakes they have not committed.

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

17. Explain the theory of human right ethics and its classifications. (Nov/Dec 2015)

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purchase a (technological product) hang glider and they get injured by flying them carelessly or under bad weather conditions. But human rights imply that one not to be poisoned or killed by technological products, whose dangers are not obvious or wantonly hidden. They imply a right to be informed, when the purchase was made, of the possible dangers during use or service (obtaining informed consent).

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see that the rights ethics provides a powerful foundation for the special ethical requirements in engineering and other professions.

SELF-INTEREST – CUSTOMS AND RELIGION

18. Discuss in detail about Self-interest, Customs and Religion. (Or) Explain moral disagreement, moral absolutism, moral relativism and moral pluralism (AU NOV2004) (or) Explain how religious beliefs influence moral values and the problems associated with divine command ethics. (Nov/Dec 2008) (Or) Discuss briefly ethical relativism. (Nov/Dec 2008) (Or) what is meant by self interest? Relate the term with "ethical egoism" with suitable example (Nov/Dec 2015) or explain the need of tolerance for different customs and ethical pluralism in diverse society (Apr 2014) (Apr/May 2017)

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 ourselves. 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. However this self interest should not degenerate into egoism or selfishness, i.e., maximizing only own good in the pursuit of self-interest.

The ethical egoists hold that the society benefits to maximum when

(a) the individuals pursue their personal good and
(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. We should accept the principle of relativism or not? A few reasons to accept this are explained in the following paragraphs:

1. 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.

    For example, the Apartheid laws of South Africa violated the human rights of the native Africans. No legal protection was available for native citizens for a long time. Now, of course, these laws have been repealed.

2. 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. This argument is also not fully acceptable.

    As per ethical relativism, the actions and laws of the Nazis and Hitler who vowed on Anti-Semitism and killed several million Jews would be accepted as right.

3. Moral relationalism or moral contextualism: 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 (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.

Divine Command Ethics

As per this principle, the right action is defined by the commands by God. It implies that to be moral, a person should believe in God and an action is right only if it is commanded by God. There are some difficulties in this approach, namely, (a) whether God exists or not is not clear. (b) How to know what are the God's commands? and (c) How to verify the genuineness of the commands? Further, religions such as Hinduism, Islam, and Christianity accept the existence of God. But Buddhism, Taoism, and Confucianism adopt only faith in a right path and do not believe in God.

Socrates was said to have argued that God, an entity which is responsible, morally good, and beyond fear or favor, would not command murder, rape, torture, immoral activities, and even mass suicide. Many such crimes were committed in the name of God then and continue even now in different parts of the world. Some Western leaders had claimed that God had commanded them to invade against the Middle-East countries. If anyone claims to have obtained commands from God to kill people merciless, then we have to conclude that the person is not religious but insane.

USES OF ETHICAL THEORIES

19. Explain in detail about uses of ethical theories? (May/ June 2009) (May/ June 2013) (APR/MAY2015) Mention different types of ethical theories. What are its issues?

Simply Ethical theories have so many uses. Out of them, the following three are the most important uses:

1. Understanding moral dilemmas.

2. Justifying professional obligations and ideas and

3. Relating ordinary and professional morality

- Ethical theories are helpful in understanding and resolving in moral dilemmas.
- It is useful in justifying professional obligations and ideals.
- It is also useful in expressing everyday moral experience and justifying the professional morality.
- Ethical theories help in identifying alternative course of action.
- They provide a frame work for developing our ability to reach balanced an insight full judgment.

Ethical theories are useful in resolving moral dilemmas:

- Ethical theories are helpful in identifying the moral considerations or reasons that comprise a dilemma.
- Ethical theories provide a conceptual base for evaluation and analysis of information that are relevant to resolving moral dilemmas.
- Ethical theories provide a relative ranking of moral considerations in order of importance. Thus it ensures a minimum rough

Justifying moral obligations:

- It is very useful in justifying the moral obligations of engineers and others involved in technological development.

Relating professional and ordinary morality:

Views for concerning the origin and justification of the safety and other obligations of engineers:

First view: engineers obtain moral obligations concerning safety through some laws or enforced codes that require them to be obligated.

Second view: engineers obtain special obligations by becoming members of a professional society and thereby following the society code of ethics.

Third view: engineers obtain safety obligations through contractual agreements by which they are hired employers.

Fourth view: engineers while entering into their careers, implicitly assure the public to protect and safeguard it in the course of performing their jobs.

Some goals of ethical analysis:

1. Exploring an issue: Just exploring it, learning about it, what it involves. Just want to satisfy our curiosity and maybe even learn something. That's a value in itself and good enough reason for doing ethics.

2. Getting past conflict: Resolve a dispute, get yourself and others "unstuck," by looking to multiply options, reframe problems, discover common ground, etc.

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

4. Deciding for yourself: To resolve problems for which you feel a personal urgency, a need to have an answer, to take a stand. To settle an issue for yourself, at least for now. You want this to be careful, creative, and give due consideration to all relevant values, inferences, and options.

UNIT III   ENGINEERING AS SOCIAL EXPERIMENTATION   9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

Engineering as Experimentation:

1. **Compare and contrast engineering experiments with standard experiments. (APR/MAY 2018) [Apr/May2005]**

(Or)

Explain in detail about Engineering as experimentation?

(Or)

Discuss in detail about engineering experiments VS standard Experiments?

(Or)

What are the aspects of engineering that make it appropriate to view engineering projects as experiments? [Nov/Dec 2004]

(Or)

Why Engineer's projects are viewed as experiments?   [Nov/Dec 2013]

(Or)

State the similarities to view engineering projects as experiments. [May/June 2006]

(Or)

What is meant by an informal consistent when bringing an experimental product to the market?

(Or)

1. **How an engineer can became a responsible experimenter?[Nov/Dec 2006] Nov/Dec 2018**

Experimentation plays an important role in the process of designing the product. When it is decided to change a new engineering concept into its first rough design, preliminary tests or simulation should be conducted. Using formal experimental methods, the materials and methods of designing are tried out. These tests may be based on more detailed designs. The test for designing should be evolved till the final product produced. With the help of feedback of several tests, further modification can be made if necessary. Beyond these tests and experiments, each engineering project has to be viewed as an experiment.

Similarities to Standard Experiments

There are so many aspects, which are of virtual for combining every type of engineering works to make it suitable to look at engineering projects as experiments. The main three important aspects are:

1)   Any engineering project or plan is put into practice with partial ignorance because while designing a model there are several uncertainties occurred. The reason to the fact that engineers don't have all the needed facts available well in advance before starting the project. At some point, both the theoretical examining and the laboratory testing must be by-passed for the sake of completing the project. Really, the success of an engineer is based on the his talent which is

1

exactly being the ability to succeed in achieving jobs with only a partial knowledge of scientific laws about the nature and society.

2) The final outcomes of engineering projects are generally uncertain like that of experiments what we do in engineering, in most of the cases, the possible outcomes may not be known and even small and mild projects itself involve greater risks.

The following uncertainties occur in the model designs

  i.   Model used for the design calculations
  ii. Exact characteristics of the material purchased.
  iii. Constancies of materials used for processing and fabrication.
  iv. About the nature of the pressure the finished product will encounter.

For instance, a reservoir may cause damage to the surroundings and affect the ecosystem. If it leaks or breaks, the purpose will not be served. A special purpose fingerprint reader may find its application in the identification and close observation on the disagreeing persons with the government. A nuclear reactor may cause unexpected problems to the surrounding population leading to a great loss to the owners. A hair dryer may give damage to the unknowing or wrong users from asbestos insulation from its barrel.

3) Good and effective engineering depends upon the knowledge possessed about the products at the initial and end stages. This knowledge is very useful for increasing the effectiveness of the current products as well as for producing better products in future. This can be achieved by keenly observing on the engineering jobs by the way of experimentation. This monitoring is done by making periodic observations and tests by looking at for the successful performance and the side effects of the jobs. The tests of the product's efficiency, safety, cost-effectiveness, environmental impact and its value that depends upon the utility to the society should also be monitored. It also extends to the stage of client use.

Contrasts with standard Experiments

Engineering is entirely different from standard experiments in few aspects. Those differences are very much helpful to find out the special responsibilities of engineers and also help them in knowing about the moral irresponsibility's which are involved in engineering.

1. Experimental Control

Members for two groups should be selected in a standard experimental control, i.e. Group A and Group B. The members of the group 'A' should be given the special experimental treatment. The group 'B' does not receive the same though they are in the same environment. This group is called the **'control group'.**

Though it is not possible in engineering but for the projects which are confirmed to laboratory experiments. Because, in engineering the experimental subjects are human beings who are out of the control of the experimenters. In engineering, the consumers have more control as they are the selecting authority of a project. So in engineering it is impossible to follow a random selection. An

engineer has to work only with the past data available with various groups who use the products. So engineering can be viewed as a natural experiment which uses human subjects. But today, most of the engineers do not care for the above said Experimental Control.

2. Informed Consent

Engineering is closely related to the medical testing of new drugs and techniques on human beings as it also concerned with human beings.

When new medicines have been tested, it should be informed to the persons who undergo the test. They have moral and legal rights to know about the fact which is based on **"informed consent"** before take part in the experiment. Engineering must also recognize these rights. When a producer sells a new product to a firm which has its own engineering staff, generally there will be an agreement regarding the risks and benefits form that testing.

Informed consent has two main principles such as knowledge and voluntariness.

First, the persons who are put under the experiment have to be given all the needed information to make an appropriate decision. Second, they must enter into the experiment without any force, fraud and deception. The experimenter has also to consider the fundamental rights of the minorities and the compensation for the harmful effects of that experiment.

In both medicine and engineering there may be a large gap between the experimenter and his knowledge on the difficulties of an experiment. This gap can be filled only when it is possible to give all the relevant information needed for drawing a responsible decision on whether to participate in the experiment or not.

In medicine, before prescribing a medicine to the patient, a responsible physician must search for relevant information on the side effects of the drug. The hospital management must allow him to undergo different treatments to different patients and finally the patient must be ready to receive that information from the physician. Similarly it is possible for an engineer to give relevant information about a product only when there is a better co-operation by the management and quick acceptance from the customers.

Essential conditions for a "valid informed consent".

   i.   The consent must be given voluntarily and not by any force.
  ii.   The consent must be based on the relevant information needed by a rational person and should be presented in a clear and easily understandable form.
 iii.   The consenter must be capable of processing the information and to make rational decisions in quick manner.
  iv.   The information needed by a rational person must be stated in a form to understand without any difficulty and has to be spread widely.
   v.   The experimenter's consent has to be offered in absentia of the experimenter by a group which represents many experiments.
  vi.

Knowledge Gained

Scientific experiments have been conducted to acquire new knowledge. Whereas engineering projects are conducted as experiments not for getting new knowledge. Suppose the outcomes of the experiment is best, it tells us nothing new, but merely affirms that we are right about something. Meanwhile, the unexpected outcomes put us search for new knowledge.

Learning from the past

It has been expected that the engineers have to learn not only form their own design and the production system but also the results of others. Due to lack of communication, prejudiced in not asking for clarification, fear of law and also mere negligence, these things can happen to the continuation of past mistakes. The following are some of the examples:

1. The tragedy of 'Titanic' happened because of the sufficient number of life boats. The same disaster took place in the steamship "the Arctic" some years before, because of the same problem.

2. The fall down of "the Sunshine Skyline Bridge" in the bay of Thamba at Sweden in 1980, on a moving ship due to improper matching of horizontal impact forces in mind. This could have been avoided of the engineers had known about the striking of the ships with the Maracaibo Bridge at Venezuela in 1964 and the Tasman Bridge of Australia in 1975.

3. The nuclear reactor accident at Three Mile Island on March 1979, was due to malfunctioning of the valves. Valves though minute items, are being among the least reliable components of hydraulic systems. It was a pressure relief valve and lack of information about its opening or closing state contributed to a nuclear reactor accident at Three Mile Island. This malfunction was already happened because of the same reasons at other locations.

4. The disaster of Tettron Dam in Los Angles was due to rapid flow of water and sudden break down. The builder didn't consider the case of the Fontenelle Dam, which was also collapsed due to the same problem. So, to say that engineers should not fully depend on handbooks and they should have some review of the past cases relating to their current task.

2. With a case study explains "learning from the past" in engineering experimentation.   [Nov/Dec 2015]

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Engineers as Responsible Experimenters:-

3. Discuss on "Engineers as Responsible Experimenters". [May/June 2006]

(Or)

How do you call an engineer as a responsible experimenter? [May/June 2006]

(Or)

Explain in detail as the Engineers are the responsible Experimenters? [M/J 2016] [nov/dec 2016] (Apr/May 2017)

The engineers have so many responsibilities for serving the society.

1. A primary duty is to protect the safety of human beings and respect their right of consent. [A conscientious commitment to live by moral values].

2. Having a clear awareness of the experimental nature of any project, thoughtful forecasting of its possible side effects, and an effort to monitor them reasonably. [A comprehensive perspective or relative information].

3. Unrestricted free personal involvement in all the steps of a project. [Autonomy]

4. Being accountable for the results of a project [Accountability]

5. Exhibiting their technical competence and other characteristics of professionalism.

Conscientiousness

Conscientiousness implies consciousness (sense of awareness). As holding the responsible profession with maintaining full ranges moral ethics and values which are relevant to the situation. In order to understand the given situation, its implications, knowhow, person who is involved or affected, Engineers should have open eyes, open ears and open mind.

The present working environment of engineers, narrow down their moral vision fully with the obligations accompanied with the status of the employee. More number of engineers are only salaried employees, so, they have to work within large bureaucracies under great pressure to work smoothly within the company. They have to give importance only to the obligations of their employers. Gradually, the small negative duties such as not altering data by fraud, not violating patent right and not breaking confidentiality, may be viewed as the full extent of moral desire.

As mentioned, engineering as social experimentation brings into light not only to the person concerned but also to the public engineers as guardians of the public interest i.e., to safeguard the welfare and safety of those affected by the engineering projects. This view helps to ensure that this safety and welfare will not be affected by the search for new knowledge, the hurry to get profits, a small and narrow follow up of rules or a concern over benefits for the many and ignoring the harm to the few.

The social experimentation that involved in engineering should be restricted by the Participants consent.

Relevant Information

Without relevant factual information, conscientious is not possible. For showing moral concern there should be an obligation to obtain and assess properly all the available information related to the fulfillment of one's moral obligations. This can be explained as:

To understand and grasp the circumstance of a person's work, it is necessary to know about how that work has a moral importance. For example, A person is trying to design a good heat exchanger. There is nothing wrong in that. But at the same time, if he forgets the

fact that the heat exchanger will be used in the manufacture for an illegal product, then he is said to be showing a lack of moral concern. So a person must be aware of the wider implication of his work that makes participation in a project.

Blurring the circumstance of a person's work derived from his specialization and division of labor is to put the responsibilities on someone else in the organization. For example if a company produces items which are out of fashion or the items which promotes unnecessary energy wastage, then it is easy to blame sales department.

The above said means, neglecting the importance of a person's works also makes it difficult in acquiring a full perspective along a second feature of factual information i.e., consequence of what one does.

So, while giving regard to engineering as social experimentation points out the importance of circumstances of a work and also encourages the engineers to view his specialized activities in a project as a part of a large social impact.

Moral Autonomy:

It is the ability to think critically and independently apply about moral issues and apply this moral thinking to situations that arise during the professional engineering practice. An individual personality depends on the integration of moral beliefs and attitudes. Because the moral belief and attitudes lead to a committed action. As an experimenter, engineer has to undergo an extensive updated training to form his identity as a professional.

Accountability:
  i.   The accountability means being responsibility, liable, answerable.
  ii. The accountability refers to the general tendency of being willing to submit one action to any type of moral scrutiny and be responsive to others assessments.
  iii. It involves a willingness to present morally convincing reasons for ones actions and conduct.
  iv. Morally responsible people are expected to accept moral responsibility for their actions.

Codes of Ethics

4. Enumerate the code of ethics of engineers. [Nov/Dec 2013] (Apr/May 2017) Nov/Dec 2018

(Or)
Explain in detail about code of ethics? / Highlight the code of ethics for Engineers. [May/June 2016]

Or

Discuss the codes of ethics in detail and also highlight the limitations associated with it? (APR/MAY2015)

Or

Discuss on the roles played by the codes of ethics set by professional societies. [Nov/Dec 2005][May/June 2016]

Or

What are the different roles and functions of "code of ethics" [Nov/Dec 2015]

(Or)

What is the importance of codes of ethics? Give a brief account on four canons of codes of ethics given by an international standard or associates. [Nov/Dec 2005][May/June 2006]

(Or)

Write short notes on (i) abuse of code of ethics. [May/June 2006]

(Or)

What are codes of ethics? State and explain the functions of code of ethics. In what ways engineering societies can promote ethics?

(Or)

Want are the pros and cons of code of ethics? [May/June 2012] (Nov/Dec 2017)

The codes of ethics have to be adopted by engineering societies as well as by engineers. These codes exhibit the rights, duties, and obligations of the members of a profession. Codes are the set of laws and standards.

A code of ethics provides a framework for ethical judgment for a professional. A code cannot be said as totally comprehensive and cover all ethical situations that an engineer has to face. It serves only as a starting point for ethical decision-making. A code expresses the circumstances to ethical conduct shared by the members of a profession. It is also to be noted that ethical codes do not establish the new ethical principles. They repeat only the principles and standards that are already accepted as responsible engineering practice. A code defines the roles and responsibilities of professionals.

Roles of codes and its functions

1. Inspiration and Guidance

Codes give a convinced motivation for ethical conduct and provide a helpful guidance for achieving the obligations of engineers in their work. Codes contribute mostly general guidance as they have to be brief. Specific directions may also be given to apply the code in morally good ways. The following engineering societies have published codes of ethics.

AAES - American Association of Engineering Societies

ABET - Accreditation Board for Engineering and Technology (USA)

NSPE - National Society of Professional Engineer USA)

IEEE - Institute of Electrical and Electronics Engineering (USA)

AICTE - All India Council for Technical Education (India)

Most of the technological companies have established their own codes such as pentagon (USA), Microsoft etc. These codes are very much helpful to strengthen the moral issues on the work of an engineer.

2. Support

Codes always support an engineer who follows the ethical principles. Codes give engineers a positive, a possible good support for standing on moral issues. Codes also serve as a legal support for engineers.

3. Deterrence and Discipline

Codes act as a deterrent because they never encourage to acting immorally. They also provide discipline among the Engineers to act morally on the basis of codes does not over rule the rights of those being investigated.

4. Education and Mutual Understanding

Codes have to be circulated and approved officially by the professionals, the public and government organizations which concern with the moral responsibilities of engineers and organizations.

5. Contributing to the profession's Public Image

Codes help to create a good image to the public of an ethically committed profession. It helps the engineers in an effective manner to serve the public. They also give self- regulation for the profession itself.

6. Protecting the Status Quo

Codes determine ethical conventions which help to create an agreed upon minimum level of ethical conduct. But they can also suppress the disagreement within the profession.

7. Promoting Business Interests

Codes help to improve the business interests. They help to moralize the business dealings to benefit those within the profession.

Limitations of Codes

  i.   Codes are restricted to general and vague wordings. Due to this limitation they cannot be applicable to all situations directly. It is also impossible to analyze fully and predict the full range of moral problems that arises in a complex profession.

  ii. Engineering codes often have internal conflicts. So they can't give a solution or method for resolving the conflict.

  iii. They cannot be treated as the final moral authority for any professional conduct. Codes represent a compromise between differing judgments and also developed among heated committee disagreements.

  iv. Only a few practicing engineers are the members of Professional Societies and so they cannot be compelled to abide by their codes.

v.   Many engineers who are the members of Professional Societies are not aware of the existence of the codes of their societies and they never go through it.

vi.   Codes can be reproduced in a very rapid manner.

vii.   Codes are said to be coercive i.e., implemented by threat or force.

A Balanced Outlook on Law

5. Explain in detail about industrial standards? (APR/MAY2015)

Standards make the interchange of components and serves as readymade substitute for lengthy design. Specification is also reducing the production costs. When the standards have been followed carefully, the quality will be attained in a very easy way. Examples of standards may range from automobiles tire sizes and load rating to computer languages.

Type of standards:

1. Quality
Moderate value.

Eg: types and grains in wood working life of the product

2. Quality related to service Capability in achieving the target Eg:

Accreditation procedures for institution.

3. Safety

To safeguard from injury and thereby to reduce income loss and property damage. Eg:

Methods of handling waste disposal

4. Acceptance in procedures for usage

Flexibility communications and reliable design.

Eg: Procedures for testing and designing the symbols

5. Physical properties and functions

Interchangeability and conventional handling procedure measurement accuracy Eg:

Standards in length time and weights.

Standards are created by the companies for their internal use and by the professional associations for industry in wide use. They can also be prepared as part of laws and official regulations.

Standards help both the manufactures and the client/public. They help to keep

competitiveness in industry and give channels to the smaller producers to compete with the larger ones. They secure a measure of quality and generate realistic trade off decisions.

In past standards were mostly descriptive. Now they move to performance standards are most essential for application.

6 . Explain in detail the powerful support and proper role of law in engineering. [Nov/Dec 2015](NOV/DEC 2017)

Role of law in Engineering:-
- ❖ The laws can establish standards of professional conducts.
- ❖ The laws can provide motivation to the people and the corporations.
- ❖ The laws act as a protector of engineers.
- ❖ It serves as a powerful support and defense to those who wish to involve in ethical activities.
- ❖ The law can also be considerate with some exceptional engineering situations.

7. Explain in detail about a balanced outlook on law?(nov/dec 2016)

A balanced outlook on laws stresses the necessity of laws and regulations and their limitations in directing engineering practice.

In order to live, work and play together in harmony as a society, there must be a balance between individual needs and desires against collective needs and desires. Only ethical conduct can provide such a balance. This ethical conduct can be applied only with the help of laws. Laws are important as the people are not fully responsible and because of the competitive nature of the free enterprise system which does not encourage moral initiative.

The model of engineering as social experimentation allows for the importance of clear laws to be effectively enforced.

Engineers sought to play an effective role in promoting or changing enforceable rules of engineering as well as in enforcing them. So the codes must be enforced with the help of laws. The following are the two best examples.

1. Babylon's Building Code: (1758 B.C.)

This code was made by Hammurabi, king of Babylon. He formed a code for builders of his time and all the builders were forced to follow the code by law. He ordered

"If a builder has built a house for a man and has not made his work sound, and the house which he has built was fallen down and so caused the death of the householder, that builder shall be put to death. If it causes the death of the house holder's son, they shall put that builder's son to death. If it causes the death of the house holder's slave, he shall give 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 to sound condition at his own cost".

The above portion of Babylon's building code was respected duly. But the aspects find only little approval today. This code gives a powerful incentive for self-regulation.

2. The United States Steamboat Code: [1852 A.D]

Steam engines in the past were very large and heavy. James Watt, Oliver Evans   and Richard Trevethik modified the old steam engines by removing condensers and made them compact. Beyond careful calculations and guidelines, explosions of boiler happened on steam boats, because of the high speed of the boats. The safety valves were unable to keep steam pressure up causing explosion. During that period in 18th century, more than 2500 people were killed and 2000 people were injured because of the explosion of boilers in steam boats.

Due to this, the ruling congress in USA passed a law which provided for inspection of the safety aspects of ships and their boilers and engines. But his law turned out to be ineffective due to the corruptions of the inspectors and also their inadequate training regarding the safety checking. Then Alfred Guthiro, an engineer of Illinoise had inspected about 200 steam boats on his own cost and found out the reasons for the boiler explosions and made a report. His recommendations were published by a Senator Shields of Illinoise and incorporated in senate documents. With the help of this, another law was passed. Now it is in the hands of the American Society of Mechanical Engineers who formulated the standards for producing steam boats.

The Challenger Case Study.

8. **Explain in detail about the challenger case study? (APR/MAY2015)**
(Or)
   Describe the ethical violations in challenger space shuttle tragedy?
(Or)
   Explain in detail the challenger accident. What are the ethical problems involved in this.
                              (Or)
   What lessons have we learnt from "challenger space shuttle disaster? APR/MAY 2018

The world has known about many numbers of accidents. Among them the explosion of the space shuttle 'Challenger' is the very familiar one. In those days this case had been reviewed vigorously by media coverage, government reports and transcripts of hearings. This case deals with many ethical issues which engineers faced. It poses many questions before us. What is the exact role of the engineer when safety issues are concern? Who should have the ultimate authority for decision making to order for a launch? Whether the ordering of a launch is engineering or a managerial decision?

Challenger space shuttle was designed to be a reusable one. The shuttle mainly consisted of an orbiter, two solid propellant boosters and a single liquid-propeller booster. All the boosters were ignited and the orbiter was lifted out the earth. The solid rocket booster was of reusable type. The liquid propellant booster was used to finish the lifting of the shuttle in to the orbit. This was only a part of the shuttle which has been reused.

The accident took place on 28th January 1986, due to the failure of one of the solid boosters. In the design of the space shuttle, the main parts which needed careful design of the fields joints

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where the individual cylinders were placed together. The assembly mainly consists of tang and clevis joints which are sealed by two O-rings made up of synthetic rubber only, not specifically heat resistant. The functions of the O-rings are to prevent the combustion gases of the solid propellant from escaping. The O-rings were eroded by hot gases, but this was not a serious problem, as the solid rocket boosters were only for reuse initially for the few minutes of the flight. If the erosion of the O-rings could be in a controlled manner, and they would not completely burnt through, then the design of the joint would be acceptable, however the design of the O-rings in this shuttle was not so.

In the post flight experiment in 1985, the Thiokol engineers noticed black soot and grease on the outside of the boosters due to leak of hot gases blown through the O-rings. This raised a doubt on the resiliency of the materials used for the O-rings. Thiokol engineers redesigned the rings with steel billets to withstand the hot gases. But unfortunately this new design was not ready by that time of flight in 1986.

Before launching, it was necessary to discuss the political environment under which NASA was operating at that time. Because the budget of NASA has decided by Congress. These factors played the main cause for unavoidable delay in the decision to be taken for the shuttle performance, the pressures placed for urgency in launching in 1986 itself, before the launch of RUSSIAN probe to prove to the congress that the program was on processing. The launching date had already been postponed for the availability of vice president GEORGE BUSH, the space NASA supporter. Later further delayed due to a problem in micro switch in the hatch-locking mechanism. The cold weather problem and long discussions went on among the engineers. The number of tele-conferences further delayed the previous testing in 1985 itself. The lowest temperature was 53_o F but O-ring temperature during the proposed launch period happened to be only 29_o F, which was far below the environment temperature at which NASA had the previous trail. Somehow, the major factor that made the revised final decision was that previous trial. Somehow, the major factor that made the revised final decision was that with the available data at that time there seemed to be no correlation between the temperature and the degree at which O-rings had eroded by the blow-by gas in the previous launch. Assuming a safety concern due to cold weather, though the data were not concluded satisfactorily, a decision was taken not to delay further for so many reasons, and the launch was finally recommended.

But unexpectedly the overnight temperature at the time of launch was 8 oF colder than ever experienced. It was estimated that the temperature of the right hand booster would be only at 28_o F. The camera noticed a puff of smoke coming out from the field joints as soon as the boosters were ignited. But the O-rings were not positioned properly on their seats due to extreme cold temperature. The putty used as heat resistant material was also too cold that it failed to protect the O-rings. All these effects made the hot gases to burn past both the O-rings, leading to a blow-by over an arc around the O-rings. Though immediately further sealing was made by the by-products of combustion in the rocket propulsion, a glassy oxide formed on the joints. The oxides which were temporarily sealing the field joints at high temperature, later were shattered by the stresses caused by the wind. Again the joints were opened and the hot gases escaped from the solid boosters. But the boosters were attached to the large liquid fuel boosters as per the design. This made the flames due to blow-by from the solid fuel boosters quickly to burn through the external tank. This led to the ignition of the liquid propellant making the shuttle exploded.

Later the accident was reviewed and investigations were carried out by the number of committees involved and by various government bodies. President Regan appointed a commission called Rogers Commission which constituted many distinguished scientists and engineers. The

eminent scientists in the commission after thorough examination and investigations gave a report on the flexibility of the material and proved that the resiliency of the material was not sufficient and drastically reduced during the cold launch.

As the result of commission hearings, a lot of controversial arguments went on among the Thiokol engineers. Thiokol and NASA investigated possible causes of the explosion. Mr.Boisjoly, the main member in the investigation team, accused Thiokol and NASA of intentionally downplaying the problems with the O-rings while looking for the other causes of the accidents. The hot discussions hurtled the feelings and status of the headed engineers like Mr.Boisjoly, Mr.Curtis and Mr.Mellicam. Finally the management's atmosphere also became intolerable. This event shows the responsibility, functions, morality, duties of the engineers leading to ethical problems.

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

SAFETY AND RISK

1. **Discuss safety and its concept. What may be for one person may not be safe for the others? (OR) Explain the concept of safety. How the same differs with the standard of living countries? (NOV/DEC 2008),(APRIL 2014) (NOV/DEC 2016) (APR/MAY 2018)**

SAFETY
- Safety means the state of being safe.
- Safe means protected from danger and harm.
- The American Heritage Dictionary defines safety as freedom from damage, injury or risk.

ONE PERSON MAY NOT BE SAFE FOR THE OTHERS
- The term 'safety' is always difficult to describe completely.
- What may be safe for one person may not be safe for another person.
- It is because different persons have different perceptions about what is safe.

Example
A shaving razor in the hands of a child is never safe as it can be in the hands of an adult.

William Lawrence's definition for safety

"A thing is safe if its risks are judged to be acceptable".

- A thing is safe for a person if the perceived risk is less.
- Similarly a thing is unsafe if the perceived risk is high.

Drawbacks of the Lawrence's Initial Version of Definition

a.   Under-estimation of risks

An unsafe product may be considered to be safe, because of faulty view and misjudgment of a person.

Example
- Buying improperly designed coil type water heater, which eventually ends up with a severe electric shock.
- In the above example the judgment about the product has failed, which is against the Lawrence's definition.

b.   Over-estimation of risks

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

Example

- Thinking that adding chlorine in drinking water will kill a lot of people.In this case: according to Lawrence's definition, the water became unsafe the moment we judged the risks are unacceptable for us.
- But our common concept of safety says chlorinated drinking water is safer. This again contrasts the Lawrence's definition.

c.   No estimation of risks

For the person who does not judge about the risks, the product may be either safe or unsafe.

Example
- Purchasing a LPG gasoline fuel driven car without judging anything about its safety.
- So in order to overcome the above said contradictions, Lawrence's proposed a modified version of definition for safety.

Concept of Relative Safety

- Safety is expressed frequently in terms of degree and comparisons.
- We often use words such as 'fairly safe' or 'relatively safe'.
- The relative safety expresses the safety of a thing in comparison with safety of similar things.

Example
Stating that airplane travel is safer than car travel and car travel is safer than traveling in a bike.

2.   What are design uncertainties? How are they analyzed? (OR) How will an engineer assess the safety? (NOV/DEC 2016)(MAY/JUNE 2012)

ENGINEERS AND SAFETY

Criteria to Ensure Safe Design

It is universally accepted that safety should be an integral part of any engineering design. In order to ensure the safe design, the following criteria should be met:
1.   A design should comply with the legal standards for product safety and other applicable laws.
2.   An acceptable design should meet the standard of 'accepted engineering practice.
3.   Alternative designs that are potentially safer should be explored.
4.   While designing any product, all possible misuses of the product by the consumer should be identified and the identified problems should be avoided by the engineers.
5.   Finally, the designed product should be tested using prototype to determine:
            (i). whether the product meets the specifications, and
            (ii). whether the product is safe to use.

Designing for Safety (Incorporating safety into the engineering design process)

Alan D. Wilcox has summarized the process of incorporating safety into the engineering design as follows:
Step 1: Define the problem. It includes the issues of safety in the product definition and specification.
Step 2: Generate multiple alternate design solutions.

Step 3: Analyze each design solution. It evaluates the pros and cons of each solution.

Step 4: Test the solutions.

Step 5: Select the best solution.

Step 6: Implement the chosen solution.

BECOMING A RESPONSIBLE ENGINEER REGARDING RISK
(Role of Engineers to Safeguard the Public from Risk)

- The engineers can provide background material to prove the faulty positions.
- Engineers should actively participate in the debates related to safety and risk.
- Engineers should always insist on meaningful numbers and figures when assessing safety and risk.
- ➢ Engineers should also recognize the previously mentioned difficulties with measuring risks and benefits in absolute terms.
- ➢ Engineers should not be influenced by any influential lobby or trade organization.
- ➢ Engineers need to be sensitive to various qualitative value judgments related with human and ethical values.
- ➢ Engineers should be aware at the legal liabilities regarding risk.

3.   Define risk and its concept. And also explain what are the factors influencing in risk. (APR/MAY 2018)

RISK
- ➢ A risk is the potential that something unwanted and harmful may occur.
- ➢ The American Heritage Dictionary defines "risk as the possibility of suffering harm or loss".
- ➢ Generally the term 'risk' is synonymously used with adverse effect or harm.

HARM
- ➢ The term 'harm' may be defined as an invasion or limitation of a person's freedom or well-being.

TYPES OF WELL-BEING
- ➢ Physical well-being,
- ➢ Psychological well-being, and
- ➢ Economical well-being

ENGINEERING RISK
Engineering risk affects mostly the physical and economic well-being.

Example

Faulty design of a chemical plant can cause accidents and economic disaster.

EFFECTS OF RISK
It includes dangers of bodily harm, economic loss: and environmental degradation.

CAUSES OF RISK
Risks or harms are caused by delayed job completion, faulty products or systems, and economically or environmentally injurious solutions to technological problems.

William W. Lawrence DEFINITION
Risk as "a compound measure of the probability and magnitude of adverse effect".

GE6075- PROFESSIONAL ETHICS IN ENGINEERING

Mathematically DEFINED RISK

Risk = (Probability of the harm)　　x (Magnitude or consequence of the harm)

Natural Hazards and Disaster

➢ Natural hazards such as floods, earthquakes, droughts, volcanoes etc. greatly threatens and damages the long lifelines of human populations.

➢ A disaster is a serious disruptive event coincides with a state of insufficient preparation.

➢ In recent years, engineering and technology have greatly reduced some of the ill effects of natural hazards and disasters.

Factors Influencing Risk

Since the concept of risk is subjective in nature, it depends on many factors. They are:

1. Voluntary Vs. Involuntary Risk

If a person knowingly takes any risk, then he feels it safe. In contrast, if the same risk is forced to him, then he feels it unsafe.

In simple terms, the voluntary risks are considered as safe (even if the risks are really unsafe) and the involuntary risks are considered as unsafe (even if risks are really safe).

2. Short-term Vs. Long-term Consequences

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

3. Delayed Vs. Immediate Risk

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

4. Expected Probability

A relatively slight harm having, more probability of occurring (say, 50:50 chance) seems to be a greater/unacceptable risk than a relatively a severe harm having lesser probability of occurring (say, 1 in 1,00,000).

5. Reversible Effects

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

6. Threshold Levels for Risk

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

From the above discussion, it is understood that something is unsafe or risky to one person may seem very safe to someone else. This creates the great challenge for the engineers to decide on the optimal safety level.

ASSESSMENT OF SAFETY AND RISK

4.　　What are the factors that affect risk acceptability? What is the use of knowledge of risk acceptance to engineer? (OR) explain in detail about the effect of information on risk assessments? (APRIL/MAY 2005) , (MAY/JUNE 2016)　(APR/MAY 2018)

ACCEPTABILITY OF RISK

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

Elements of Risk Perception (Factors influencing the perception of risk)

The risk perception is influenced by the factors such as:

1. Whether the risk is assumed voluntarily;
2. The effect of knowledge on how the probabilities of harm are perceived;
3. Job-related or other pressures that cause people to be aware of risks;
4. Whether the effects of a risky activity or situation are immediatelynoticeable.
5. Whether the potential victims are identifiable beforehand.

We shall discuss these elements of risk perception, in detail, in the following sections.

1. Voluntarism and Control

Voluntary risk: If people take risk knowingly, then their involvement of risk is known as Voluntary risk.

Many people consider safer if they knowingly take on the risk. Also the people believe that they have 'full control' over their actions.

Examples

Buying a flat / house near a chemical plant that emits low levels of a toxic waste into the air, because the property values are very low.

Participating in a potentially adventurous sport such as motorcycle racing, skiing, boxing, hang-gliding", bungee jumping, etc. without much safety guards.

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

Examples

In practice, all the dangerous sports such as motorcycle racing, skiing,hang-gliding, bungee jumping, horseback riding, boxing etc. are carried out under the assumed control of the participants. They use all safety guard to keep the risk under control.

2. Effect of Information on Risk Assessments

The information about a harm/danger should be presented in a systematic and appropriate manner. Because the manner in which the- required information for decision-making is presented has a great influence on how risks are perceived.

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

The threshold limit of individuals for information varies from person to person. Some would be comfortable only when they have information of deeper depth and quality, while others may be comfortable with minimal information.

Many experiments have drawn the following two conclusions:

1. Options perceived as yielding company gains will tend to be preferred over, those from which gains are perceived as risky or only probable.
2. People tend to be more willing to take risks in order to avoid perceived company losses than they are to win only possible gains.
3. Job-related Risks

The exposure of risk depends on the person's job and his work place. The nature of the job and the working environment will determine the risk level of a person.

Example

People working, in the coal mines, oil mines, shipyards, chemical plants, nuclear power plants and etc. have more probability of being· exposed to the high risk.

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

Unions, and occupational and safety regulations should regulate and enforce the employers, to facilitate the standard working environment.

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

4.   Magnitude and Proximity

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

For instance, we feel very bad if one of our close relatives or friends are subjected to great harm by some accident than if it might affect 20 strangers.

Thus the magnitude of risk and the proximity (i.e, closeness) with the victims greatly influences the degree of reaction to the risk.

LESSONS FOR THE ENGINEERS

Engineers have the challenge to face/overcome the following two different public conceptions of safety.

1.   Positive or optimistic attitude

Some people assume that things that are familiar, that have not hurt them before and over which they have some control, present no real risks.

2.   Negative or pessimistic attitude

Some people feel feared, when an accident kills or harms in large numbers, or affects their relations, they consider those risks as high risks.

Therefore, while designing a thing engineers should recognize and consider such widely held perceptions of risks along with their routine technical design issues. So engineers should recognize this as part of their work.

Engineers should also understand that it is not wise to proceed under an assumption that education will quickly change the people's under-estimation or over-estimation of the risk.

The continuous, proper information about dangers and other issues of risk are necessary to educate the people to have right attitude and perception about the risk.

The risk communication and risk management efforts should be structured as a two way process (between experts and ordinary people).

REDUCING RISK

5.   Discuss the various measures of assessing and reducing risk? (OR) How will you assess and reduce the risk? (MAY/JUNE 2006),(NOV/DEC 2006), (MAY/JUNE 2013)

ASSESSMENT OF SAFETY AND RISK

Relationship between Safety, Risk and Cost

➢ It is always a great challenge to engineers to balance quality and safety against cost.
➢ In general, engineer's tendency is to design and produce high-quality products, but business managers tend to keep the cost down.
➢ Therefore it is necessary to understand the relationship between safety, risk, costs and price.
➢ The relationship between them is depicted in below Table.

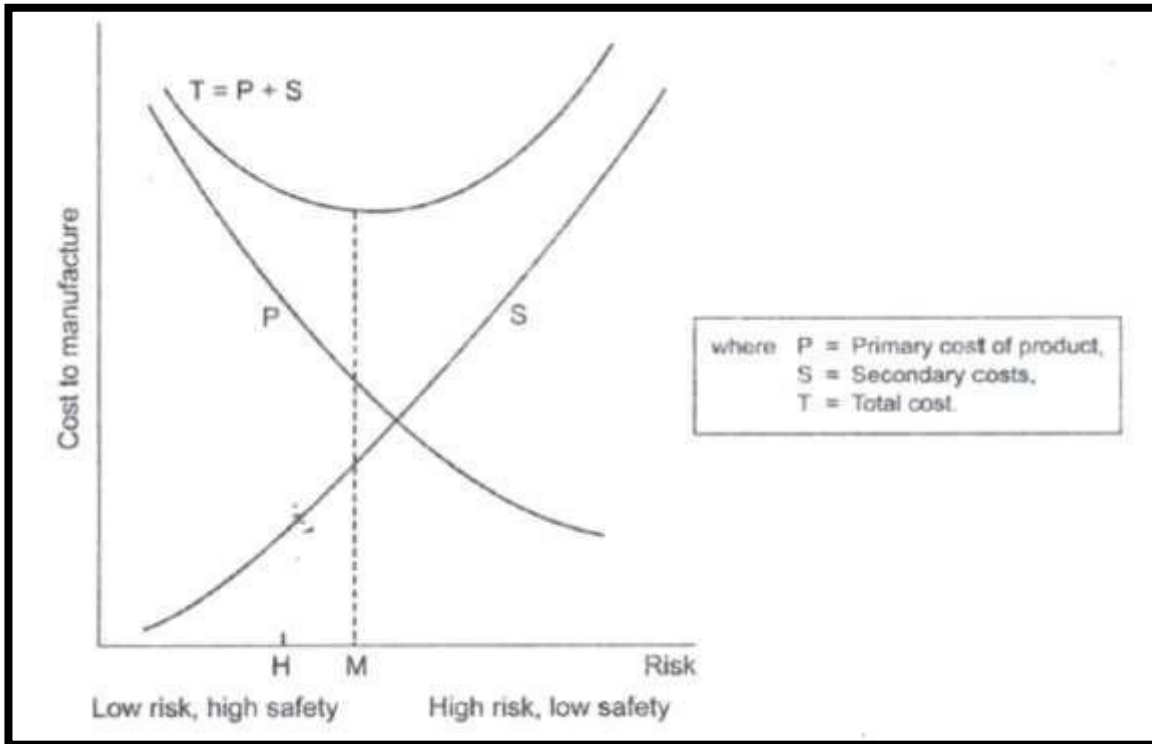| Safety		
	High	**Low**
High	High safety and High risk High cost, High price **Examples:** Nuclear plant, aircraft, missiles.	Low safety and High risk Low cost, High price **Example:** Automobiles.
Low	High safety and Low risk High cost, Medium price **Examples:** Electrical products, safety valves,	Low safety and Low risk, Low cost, Low price **Examples:** Electronic, goods, computers.

(Risk is the vertical axis label on the left)

Why Both Low-Risk and High-Risk Products Are Costly?

A product cost may have two elements:

1. Primary cost of product, and
2. Secondary cost of product.

The primary cost of product (P) includes production cost and cost of safety measures involved. The secondary cost of product (S) includes costs associated with warranty, expenses, loss of customer good will, litigation-, possible downtime in the manufacturing process, etc.

The following fig. illustrates relationship between risk and cost to manufacture.

$$T = P + S$$

where P = Primary cost of product,
S = Secondary costs,
T = Total cost.

(Y-axis: Cost to manufacture; X-axis: Risk)

H   M

Low risk, high safety   High risk, low safety

As Fig, indicates, a stress on low risk and high safety leads to high primary costs and lower secondary costs, and vice versa.

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

As shown in Fig. the total cost is minimum at point M, where the slopes of the primary and secondary cost curves are equal in magnitude but opposite indirection.

Therefore it is evident that both low-risk and high-risk products are costly. The optimal total cost (M) occurs in between low-risk and high-risk region.

DETERMINATION OF RISK

In order to determine the risk, one should have knowledge about the following criterions.

1. Knowledge of Risk:

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

Though past experience and historical data provide good information about the safety of standard products, still it is insufficient to completely assess the risk of a product.

The past experience and historical data are inadequate to access the risk, because of the following reasons.

The information is not freely shared among firms, and

There are always new applications of old technology that makes the available information less useful.

Therefore in order to access the risk, engineers and firms should share the information and knowledge about the safety of products freely.

2. Uncertainties in Design

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

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

Traditionally engineers use' 'factor of safety' while designing to cope with uncertainties about materials and actual operating conditions of the product.

The factor of safety is proposed to account for unpredictably high loads or unaccountably weak construction material.

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

3. Testing for Safety

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

The testing is not just to determine whether the product meets the specification. It should also involve testing to see if the product is safe.

It is essential that in any engineering design, all safety systems be tested to ensure that they work as planned.

REDUCING RISK

As we know, it is impossible to design and manufacture anything to be completely risk free. However, it is the responsibility of the engineers to explore all the possible ways to reduce the risk under the given financial and time constraints.

Risk Management Defined

Risk management may be defined as the eradication or minimization of the adverse effects of the pure risks to which an organization is exposed.

Elements of a risk management program

According to the recent health and safety legislation, the three important elements of a risk management program are:

        1.   Risk identification;

        2.   Risk evaluation (or risk measurement); and

3.   Risk control.

1.   Risk Identification

Risk can be identified by various techniques such as physical inspection, safety audit, job-safety analysis, management and worker discussions, and historical data analysis.

2.   Risk Evaluation

Risk can be measured on the basis of economic, social or legal considerations.

Economic and social considerations include financial aspects, uninsured cost of accidents, insurance premium, overall effect on the profitability and possible loss of production.

Legal considerations include possible constraint from compliance with health and Safety legislation, code of practice, guidance notes and accepted standards, fire prevention, pollution and product liability.

3.   Risk Control

Risk control consists of four areas: risk avoidance, risk retention, risk transfer and risk reduction.

Risk avoidance: It refers to the conscious decision by the management to avoid completely a particular risk by discontinuing the operation producing the risk.

Risk retention: It refers to retaining a particular risk for which any consequent loss is financed by the organization.

Risk transfer: It refers to the legal assignment of the cost of certain potential losses from one party to another (example, by insurance).

Risk reduction: It refers to the reduction or elimination of all aspect of accidental loss that lead to a wastage of an organization's assets.

6.   Compare 'fault tree analysis' and 'Event tree analysis' with suitable examples?(NOV/DEC 2012) NOV/DEC 2016)

Fault-Free Analysis:

This approach proposes a system failure and then traces the events back to possible causes at component level.

This is a qualitative method and was originated by Bell Telephones. It is technology-based deductive logic.

The failure (undesirable event) is initially defined, and the events (causal relationships) leading to that failure are identified at different components level.

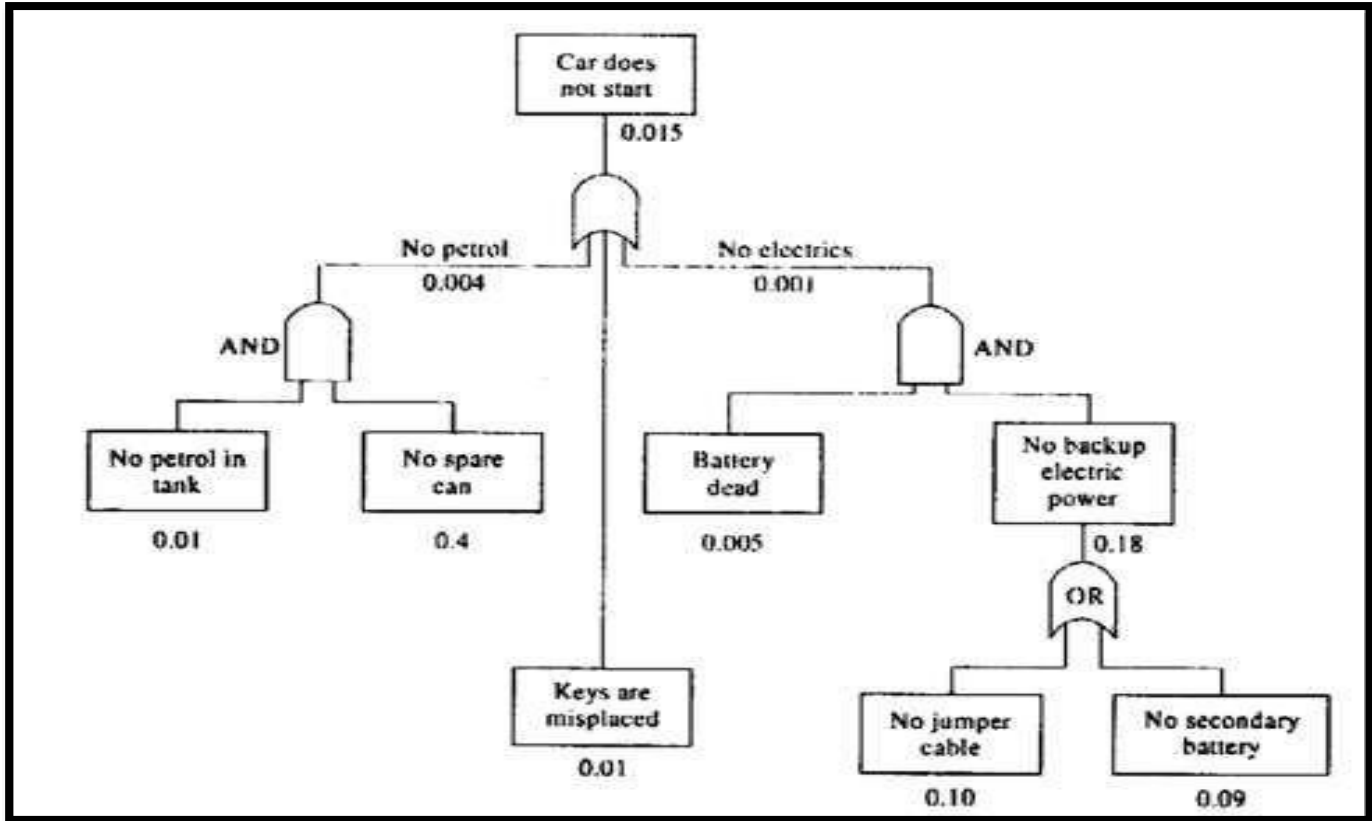This method can combine hardware failures and human failures.

 Example

An automobile car does not start. The details of this case are shown inFig.

Advantages of FTA

The primary cause can be located easily, and

It is useful in emergent situations i.e., a fire-fighting approach.

Event-Free Analysis:

This is the reverse of the fault-free analysis. This analysis is very useful in identifying a potentially

This method illustrates the sequence of outcomes which may arise after the occurrence of a selected initial event. This method uses inductive logic. It is mainly used for consequence analysis and in identifying the potential hazardous existing situation in the system. It is the inverse of the FTA. FTA allows one to proceed back in time from possible catastrophic accidents to examine the components of sequences with probability of failure. But, the ETA allows the observer to proceed forward in time from potential component failures to final accident.

hazardous situation in the plant.

Example: Going late for duty

The events are listed, arranged chronologically, and in separate clusters, to include only that are relevant and important. Fig. 4.4 shows the ETA for the event of going late to the office as a simple illustrative example. The branching structure starts with the initiating event (initiator) on the left hand side of the tree and lead to a bad end event (final damaged state) shown at the far right side. The sequence starts with the person getting up late and being time pressed to get to duty.

The person has three alternatives to get there, namely, (a) driving his own car along the highway, that is subject to periodic overcrowding and delays while driving, (b) to use the public transport (express train or bus), and (c) call a colleague and share the car.
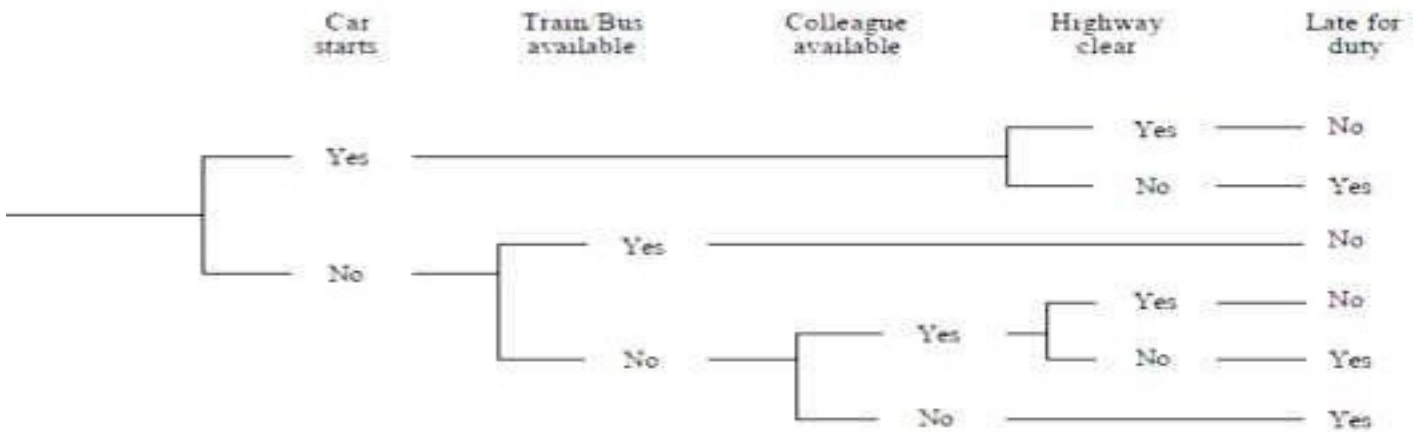
The figure shows the event-tree including the alternatives and different things that could lead to the employee being 'late again'. Alternative outcomes are shown under each column. Trace back from the outcomes towards the left hand side of the tree along horizontal paths. There are series of vertical branches labeled, Yes or No, which are connected to previous paths.

The vertical branches represent the response (Yes/No) to the question (or the systems responsible) that appear on the top of the tree. Tracing back from first 'No' under 'Late again' one comes to the first label Y/N: Is the highway clear? The up branch represents 'Yes' showing that the highway that morning was clear. The person arrived on time for duty. The down branch representing 'No' means that the highway was not clear and the person was late. This branch is attached to theearlier path and Representing the condition that the car did not start. The up branch corresponding to question 'car starts?' indicates 'Yes'. Because car did start, there is no need to consider the backup alternatives of the colleague. What are the possible outcomes, if the car does not start? Work from left to right starting on the lower "no" branch for the question 'car starts?'. The next question is train/express bus available? The 'Yes' path goes straight to the outcome of not being late. Notice the questions in the event tree are very simple. We may even ask, is the train sufficiently frequent and are the terminals conveniently located to go to the office in time? Is the day analyzed a holiday with reduced trips? Has there been an accident or breakdown that day, on the line in question? If the answer is 'No', then we are left with the 'colleague' option, and if he is available and is he willing to offer the ride in time. If not, he will be late. If 'Yes', the question 'Is the highway clear?' must be considered. Heavy highway traffic (Monday morning) may still cause a late arrival.

RISK-BENEFIT ANALYSIS

7. Describe the concept of risk benefit analysis?(MAY.JUNE 2006)(Nov/Dec-2016)(Apr/May 2017)
(NOV/DEC 2018)

RISK-BENEFIT ANALYSIS

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

Risk-benefit analysis answers the following questions:

What are the benefits of the project/product?

Is the project/product worth the risks connected with its use? and

Do benefits outweigh the risks?

It is understood that everyone is ready to certain levels of risk as long as the project/product/activity promises sufficient benefit or gain.

In risk-benefit analysis, the risks and benefits of a project/product are assigned money values, and the most favorable ratio between risks and benefits is determined.

Conceptual Difficulties in Risk-Benefit Analysis

Risk-benefit analysis is a very difficult process, because of the following reasons:

In risk-benefit analysis, both risk and benefits are very difficult to quantify. Because both lie in the future. That is both risk and benefits are associated with uncertainties.

It should be noticed that who takes the risks and who enjoys the benefits? Therefore it is important to ensure that those who have taken the risks are the beneficiaries of it.

It is mostly difficult to express both risk and benefits in a common setof units.

Example

When the risks can be expressed and measured in one set of units (say, accidents/deaths on the airways) and benefits in another (say, speed of travel), then very difficult to do risk-benefit analysis. In this case, risk-benefit analysis is used to judge the relative merits of different designs.

Ethical Implications on Risk-Benefit Analysis

While performing the risk-benefit analysis, one should keep in mind the following ethical questions:

Under what conditions, someone in society is entitled to impose a risk on someone else on behalf of a supposed benefit to others?

How can we consider the worst-case scenarios of persons exposed to maximum risks while they are also obtaining only minimum benefits? Are their rights violated? Are they provided safer alternatives?

8. Write a short notes on: personal risk and public risk? (MAY/JUNE 2006)

PERSONAL RISK

If sufficient information is given to a person, then he can be able to decide whether to participate in a risky activity or not.

Many experiments have concluded that individuals are more willing to face voluntary risks than involuntary risks, even when the voluntary risks are more harmful than the involuntary ones.

Personal risks are difficult to assess especially if they are involuntary personal risks.

Examples for personal risks

A person living near a chemical plant voluntarily or involuntarily; and

A person working in a nuclear power plant or oil refinery plant.

The quantification in assessing personal safety and risk is very difficult to estimate.

While assessing the personal risk, one should consider the following ethical questions.

How to access the money value of an individual's life?

On what basis, the compensation for a risk can be decided?

Is the compensation for a risk by an amount based on the exposure tolerance of the average person justifiable?

What will be the compensation if the tolerance level of the person is below or above the average tolerance level?

In order to minimize the above difficulties in assessing personal risks, the analysts employ all the available quantitative measures such as

Making judgments on the basis of the amount of life insurance taken out by an individual; and

Assessing a hazardous job by looking at the increased wages a worker demands to carry out the task.

PUBLIC RISK AND PUBLIC ACCEPTANCE

Risks and benefits to the public at large can be more easily determined than the personal risks and benefits. Because individual differences tend to even out as large numbers of people are considered.

Assessment studies relating to technological safety can be conducted in a better manner for public risk than for personal risk, as statistical parameters take on greater significance.

In this regard, America's National Highway Traffic Safety Administration (NHTSA)has emphasized the following two points:

A value for human life can be estimated based on loss of future income and other costs associated with an accident.

An estimate of quantifiable losses in social welfare (resulting from a fatality) is not based on the maximum expenditure allocated to save a life.

CASE STUDIES

9.   Discuss the concept of safety exits in the Chernobyl case studies.
(MAY/JUNE 2006), (NOV/DEC 2015)

SAFE EXIT

In the study of safety, the 'safe exit' principles are recommended. The conditions referred to as 'safe exit' are:

The product, when it fails, should fail safely

The product, when it fails, can be abandoned safely (it does not harm others by explosion or radiation)

The user can safely escape the product (e.g., ships need sufficient number of life boats for all passengers and crew; multistoried buildings need usable fire escapes).

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.

RBMK 1000
(Diagrammatic)

The damaged Chernobyl unit 4 reactor building
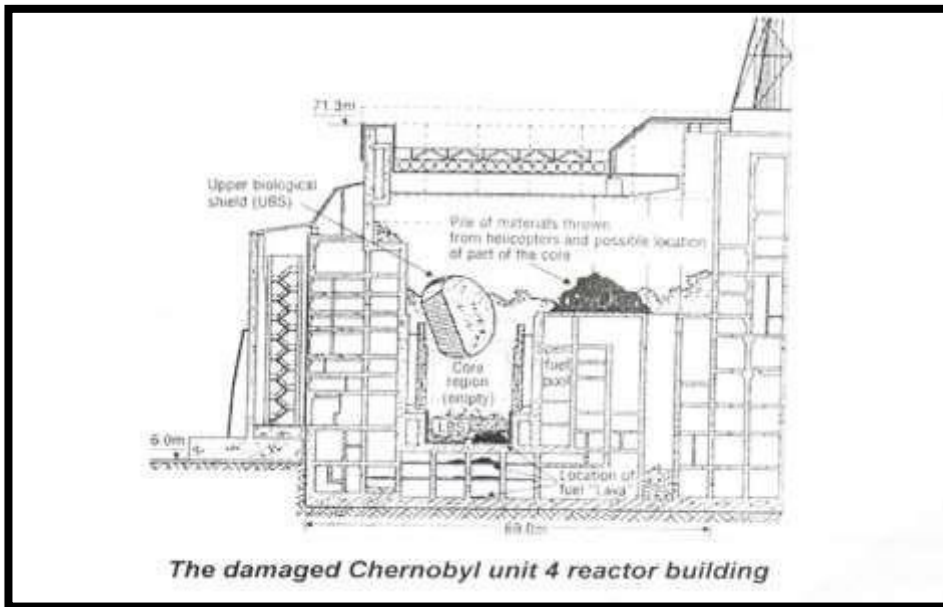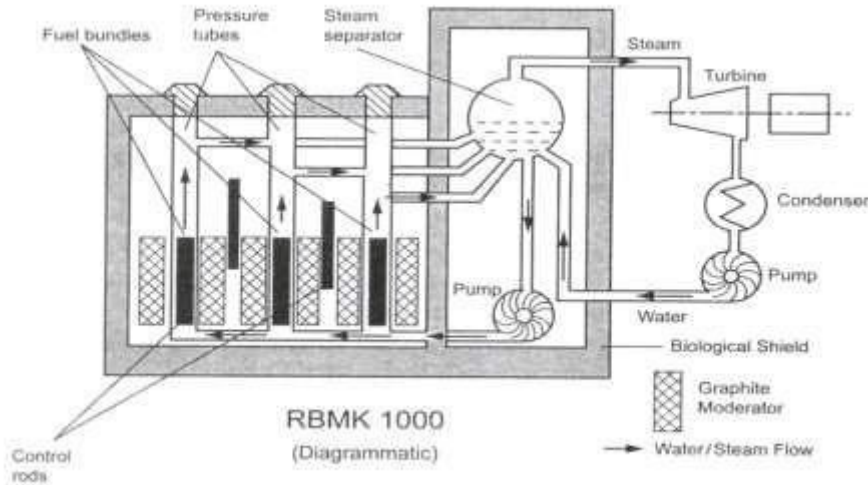
The people living around were informed after a few hours and were evacuated 12 hours after the explosion. More than 30 workers in the complex lost their lives, while 200 workers sustained burns. About 8000 people lost their lives. The agricultural products were affected due to contaminated radioactive water, for several years.

Safety Lessons from Chernobyl

The thickness of the containment should be more, to withstand the possible explosion and further damage due to radiation and leakage over the surroundings.

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When the test began at low loads, the demand for increased output power should have been declined.

Or the tests should have been abandoned and all controls switched on.Then the output should have been increased.

The decision making on test and increase the load should have been with one person or the decision makers should have coordinated with each other

Periodical mock drill of emergency for the operators (safe exit) should have been arranged.

In stack radioactivity monitoring instrument indicated a rise earlier. Peoples residing in the neighborhood ought to have been informed and steps initiated to evacuate the public immediately.

CHERNOBYL-DESIGNERS' RESPONSIBILITIES

On Design

Design a heavy containment to withstand possible explosion due to pressure build-up, design stand-by facilities for super critical items, safety gadgets, signals, alarms, specify safety procedures through safety manual, safe-exit, and redesign efforts based on reported failures and others experience.

On Operation

Specify the operation procedures, procedures for monitoring and recording the process parameters, operators manual, periodical training and updating the monitoring of the safety and the health of the operators.

On Maintenance

Management must specify the maintenance policy, promote autonomous, maintenance groups. Designers specify the maintenance procedures, shut down procedure and mock drills on maintenance problems.

For Family and Public

Awareness program and mock drills on evaluation, monitoring the health and safety of the family and public living in the neighborhood.

Administration

Disaster planning and management, publication of operation manual, maintenance manual, safety manual, and monitoring of the process parameters and the anticipatory management for the unexpected outcomes.

10.   'A nuclear accident anywhere is a nuclear accident everywhere'. Explain this with respect to Three Mile Island (TMI) case study.   (NOV/DEC2006),(MAY/JUNE 2009)

Abstract

The accident at the Three Mile Island Unit 2 (TMI-2) nuclear power plant in Pennsylvania on March 28, 1979 was one of the most serious in the history of the U.S. nuclear industry. It not only brought to light the hazards associated with nuclear power, but also forced the industry to take a closer look at the operating procedures used at the time. What makes the TMI-2 accident such an interesting case study is the series of events, which led up to the partial meltdown of the reactor core. It was a combination of human error, insufficient training, bad operating procedures and unforeseen equipment failure that culminated in a nuclear accident that could have easily been prevented.

The TMI nuclear Power Plant Unit 2 is located in a river basin in Pennsylvania, USA (March 28, 1979, 4 a.m.)

The nuclear power plant had a Pressurised 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 (11,13,14) (Fig. 4.5).

Fig 4.5 System components of TMI - 2 plant

When pump (14) failed, the steam generator (3) went dry. So, heatwas 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.

Safety Lessons from TMI

Valves are the least-reliable components in the hydraulic system. Such a malfunction of the pressure relief valve and lack of information about its opening (or closing) were reported elsewhere in the past. But there was no 'learning from the past' (TMI).

Continuous monitoring of the components such as demineraliser and the pressure operated relief valve must have been made (TMI).

A comprehensive precursor program (emergency procedures) should have been implemented to record a few accident sequences and map these events to risk models. The mapping based on technical and human factors give us accounts, how people react and interact under conditions of stress (TMI).

Periodical mock drill of emergency for the operators (safe exit) should have been arranged (TMI and Chernobyl).

In-stack radioactivity monitoring instrument indicated a rise earlier. The operators at TMI 2 should have informed the superiors at once. People residing in the neighborhood ought to have been informed and steps initiated to evacuate the public immediately (TMI especially, and also Chernobyl).

TMI-DESIGNERS' RESPONSIBILITIES

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On Design

Design a heavy containment to withstand possible explosion due to pressure build-up, design stand-by facilities for super critical items, safety gadgets, signals, alarms, specify safety procedures through safety manual, safe-exit, and redesign efforts based on reported failures and others experience.

On Operation

Specify the operation procedures, procedures for monitoring and recording the process parameters, operators manual, periodical training and updating the monitoring of the safety and the health of the operators.

On Maintenance

Management must specify the maintenance policy, promote autonomous, maintenance groups. Designers specify the maintenance procedures, shut down procedure and mock drills on maintenance problems.

For Family and Public

Awareness program and mock drills on evaluation, monitoring the health and safety of the family and public living in the neighborhood.

Administration

Disaster planning and management, publication of operation manual, maintenance manual, safety manual, and monitoring of the process parameters and the anticipatory management for the unexpected outcomes.

COLLECTIVE BARGAINING

11.   Define collective bargaining. Explain the role of collective bargaining in workplace rights and responsibilities? (NOV/DEC 2018)

COLLECTIVE BARGAINING

International Labor Organization (ILO) has defined collective bargaining as "negotiation about working conditions and terms of employment between an employer and one or more representative employee's with a view to reaching agreement".

The process is collective in the sense that the issue relating to terms and conditions of employment are solved by representatives of employees and employers rather than individuals.

The term bargaining refers to evolving an agreement using methods like negotiation, discussion, exchange of facts and ideas rather than confrontation.

Process of Collective Bargaining

The process of collective bargaining can be summarized in the following three
steps:

Step I. Presenting the character of demands by the union on
behalf of the constituent elements.
Step II. Negotiations at the bargaining table.
Step III. Reaching an agreement.

Unionism and Professionalism
(Are unionism and collective bargaining practices ethical?)

Collective bargaining assumes 'unionism'. Legally, any organization employing more than 20 employees could have a union. In organizations, more than one union is also permitted.

The employers form unions to safeguard the interests of employees and to prevent exploitation of employee.

Many professional managers have argued that the ethical aspects of professionalism in engineering are inconsistent with union ideology and practice.

According to John Kemper, the unionism and professionalism are conflicting with each other. Professionalism offers paramount importance to the interests of society and of the employer. But unions, also known as collective bargaining agents, consider the economic interests of the members ahead of the interests of their employer.

Also, a number of professional societies have emphasized that loyalty to employers and the public is not possible with any form of collective bargaining.

Even many professional societies indirectly instruct the engineers that they should not become member of the unions. For example, the NSPE code of ethics states that engineers shall not actively participate in strikes, picket lines, or other collective coercive action.

Thus professional societies oppose unionization because of the issue of conflicting loyalties and on the grounds that it is unprofessional.

In a nutshell, the general view is that it is impossible for an engineer to belong to a union and at the same time to maintain the standards of his profession.

Conclusion

From the above discussions, the following conclusions can be made:

We can observe whether collective bargaining and its tactics are ethical or unethical, only on the basic of the given situation.

Though unions often have misused their power and irresponsibly disregarded the public good, the formation of engineering unions should not be considered always unprofessional.

The moral assessment of unions is complex. Many morally relevant facts and factors should be considered while judging about any union.

Arguments over Unions

There are two arguments in favor of and against unions.

1. Arguments in Favor of Unions

➢ Unions play a vital role in achieving high salaries and improved standard of living of employees.
➢ Unions give employees a greater sense of participation in organization decision making
➢ Unions ensure job security and protection against arbitrary treatment to the employees.
➢ Unions have the ability to resist any orders from employers to perform unethical acts.
➢ Unions maintain stability by providing an effective grievance procedure for employee complaints.
➢ Unions can act as a counterforce to any radical political movements that exploit the employees.

2. Arguments against Unions
➢ Unions shatter the economy of a country by placing distorting influences on efficient uses of labor.
➢ Unions remove person-to-person negotiations between employers and employees. Thus an individual is not given much importance in the process of collective bargaining.
➢ Unions encourage unrest and strained relations between employeesand employee.
➢ Unions encourage the unhealthy concept of job promotion, salary hike, etc. on the basis of seniority.
➢ Unions prevent employer from rewarding individuals for their personalachievements.

GE6075- PROFESSIONAL ETHICS IN ENGINEERING

CONFIDENTIALITY & CONFLICTS OF INTEREST

12. How will you apply confidentiality for avoiding harmful conflicts of interests in workplace? (OR) Explain the expected confidentiality to be maintained by a computer engineer while he shifts job on career advancement. (MAY/JUNE 2006)(Nov/Dec 2017)

CONFIDENTIALITY

It is widely accepted that the engineers have an obligation to keep certain information of the employer/client secret or confidential.

Just as with lawyers and medical physicians, engineers also require the confidentiality principle in their profession.

Confidentiality is highly emphasized in most engineering codes of ethics.

Example: lawyers, doctors, and counselors keep information of their clients/patients confidential. In the same way, engineers have an obligation to keep proprietary information of their employer/client confidential.

What Is Meant By The Term 'Confidential Information'?

Confidential information is any information that the employer/client would like to keep secret in order to compete effectively against business rivals.

ABET (Accrediting Board for Engineering and Technology) Definition

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

Terms Related To Confidential Information

1.   Privileged Information

It refers information that is available only on the basis of special privilege. That is information available to an employee who is working on a special assignment.

This term is often used as a synonym for confidential information.

2.   Proprietary Information

It refers to a new knowledge established within the organization that can be legally protected from use by others.

This term is often used as a synonym for 'property' and 'ownership'.

3.   Trade Secrets

A trade secret can be any type of information that has not become public and which an employer has taken steps to keep secret.

These trade secrets may be about designs, technical processes, plant facilities, quality control systems, business plans, marketing strategies and so on.

4.   Patents

Patents legally protect specific products from being manufactured and sold by Competitors without the permission of the patent holder.

Patents vs. Trade Secrets: A patent holder has legally protected mono poly power. But in case of trade secrets, the legal protection is limited to keeping relationships of confidentiality and trust.

Why Must Some Engineering Information Be Kept Confidential?

Many information such as privileged information, proprietary information, and trade secrets are very important for a company to compete in the market. If such information are leaked to competitors, then the competitors may gain competitive edge and may capture the market. Therefore it is in the company's best interest to keep such information confidential as much as possible.

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What Types Of Information Should Be Kept Confidential?

Some of the types of information that should be kept confidential are:

➢ Information about the unreleased products.
➢ Test results and data about the products.
➢ Design or formulas for products.
➢ Data about technical processes.
➢ Organization of plant facilities.
➢ Quality control procedures.
➢ Business information such as the number of employees working on projects, the suppliers' list, marketing strategies, production costs, and production yields.

Justification and Limits of Confidentiality

The obligation of confidentiality can be justified at two levels.

1. First level: It focuses on three moral considerations - respect for autonomy, respect for promises, and regard for public well-being.
2. Second level: It focuses on the major ethical theories. It includes justification of confidentiality by right ethicists, duty ethicists, and utilitarian's.

Changing Jobs and Confidentiality

The obligation of protecting confidential information is not over when employees change jobs.

Legally, ar. engineer is expected to keep information confidential even after the Employee has moved to a new employer.

Management Policies for Maintaining Confidentiality

Approach 1: To use employment contracts that place special restrictions on future employment. This type of agreement violates the right of individuals to proceed their careers freely.

Approach 2: To use an employment contract that offers positive benefits in exchange for the restrictions it places on future employment.

Approach 3: To offer an employee a special post-employment annual consulting fee for several years on the condition that he will not work for a direct competitor during that period.

Approach 4: To tighten the security controls on the internal flow of information by restricting access to trade secrets. This may create an unhealthy working atmosphere of distrust.

Approach 5: To have unwritten and informal agreements among competing companies not to hire one another's more important employees.

CONFLICTS OF INTEREST

What Is A Conflict Of Interest?

In general, conflicts of interest means an individual has two or more desires that all interests cannot be satisfied given the circumstances.

Examples

An employee working in a company depositing a substantial investment in a competitor's company.
An employee working in a company serving as a consultant for a competitor's company

What Do The Engineering Codes Of Ethics Say About Conflicts Of Interest? Fundamental canons of the NSPE code says

"Engineers shall not be influenced in their professional duties by conflicting interests".

Fundamental canons of ethics of ABET says

"Engineers shall not solicit nor accept gratuities, directly or indirectly, from contractors, their agents, or other parties dealing with their clients or employers in connection with work for which they are responsible".

Difference between General Conflicts Of Interest and Professional Conflicts Of Interest

In general conflicts of interest, satisfying all desires interests of a person can't be possible because of physical or economical or other problems.

By contrast, the professional conflicts of interest cannot be pursued only because of moral or ethical problems (not because of physical or economical problems).

Types of Conflicts Of Interest

1.   Actual conflicts of interest;
2.   Potential conflicts of interest; and
3.   Apparent conflicts of interest.

1.   Actual Conflicts of Interest

The actual conflicts of interest arises when an employee compromise objective engineering judgment.

It refers to the loss of objectivity in decision-making and inability to faithfully discharge professional duties to employer.

Example: A mechanical engineer working in the purchase department of an automobile industry might have his personal influence while offering the contract for supply of raw materials to a vendor. In this case, pursuing his financial interest with the vendor might lead him not to objectively and faithfully discharge his professional duties to his industry.

Thus actual conflicts of interest can corrupt professional judgment.

2.   Potential Conflicts of Interest

The potential conflicts of interest may corrupt professional judgment in the future, if not in the present.

Although potential conflicts of interest may not harm the interest of the employer initially, there is a threat that potential conflicts of interest will become actual conflicts of interest at later stage.

Example: An engineer becoming a friend with a supplier for his company. In this case, the engineer may not have conflicts of interest initially. However, in future he may favor his friend, as in the case of actual conflicts of interest.

3.   Apparent Conflicts of Interest

There are situations in which there is the appearance of a conflict of interest. This type is referred as apparent conflicts of interest.

Apparent conflicts of interest actually not corrupting the professional judgment. However it decreases the confidence of the employer and the public in the objectivity and trustworthiness of professional services. Thus it harms both the profession and the public.

Example: Consider a situation, where a design engineer is paid based on a percentage of the cost of the design and there is no incentive for him to reduce the costs down. In this context, it may appear that the engineer will make the design more expensive in order to earn more commission for himself. This appearance of conflict of interest may cause the distrust on the engineer's ability to perform his professional duties.

Conflicts of Interest and Accepting Gifts/Bribes

Mostly engineers find themselves in actual, potential, or apparent conflicts of interest are those involving accepting gifts.

What is a bribe?

A bribe is something, such as money or a favor, offered or given to someone in a position of trust in order to induce him to act dishonestly.

It is something offered to influence or persuade.

What are the ethical reasons for not tolerating bribery?

Bribes are illegal and immoral because of the following three reasons:

1. Bribery corrupts free-market economic systemand isanticompetitive.
2. Bribery corrupts justice and public policy by allowing rich people to make all the rules. In today's business, it is understood that only large and powerful companies will survive, since they are capable of providing bribes.
3. Bribery treats people as commodities that can be bought and sold. This practice degrades the human beings and corrupts both the buyer and the seller.

Kickback

Kickbacks are another form of bribing.

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

When is a gift a bribe? (OR) (What are the differences between a gift and a bribe?)

Gifts are not bribes as long as they are gratuities of smaller amounts. But bribes are illegal and immoral because they are worth of substantial amounts.

Gift may play a legitimate role in the normal conduct of business, whereas a bribe influences the judgment.

Today a more appropriate thumb rule says:

"If you think that your offer (or acceptance) of a particular gift would have grave or merely embarrassing consequences for your company if made public, then the gift should be considered a bribe".

What Is Moonlighting? Does It Create Conflicts Of Interest?

The term 'moonlighting' is used when an employee of a company works for another company during his spare time.

Moonlighting creates conflicts of interest only in special circumstances, such as working for competitors, suppliers, or customers.

Different Ways to Avoid Conflicts Of Interest

To follow the guidance of company policy.

In the absence of company policy, one can go for a second opinion from aCoworker or manager.

In the absence of above two options, it is better to examine one's own motives and use ethical problem solving techniques.

Finally, one can follow the statements' in the professional code of ethics. Some of the ethics codes have given clear statements to identify whether the given situation is a conflict of interests or not.

OCCUPATIONAL CRIMES

13. What is occupational crime? Explain any one in detail. (OR) Discuss the ways and means of reducing occupational crime in industries? (NOV / DEC 2015)

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Occupational crime

Occupational crimes are illegal acts committed through a person's lawful employment.

It is the secretive violation of laws regarding work activities.

When professionals or office workers commit the occupational crimes, it is referred as **'white collar crime'.**

These crimes are motivated by personal greed, corporate ambition, misguided company loyalty, and many other motives.

Examples of Occupational Crimes

Three cases of occupational crimes that are commonly observed are:

1. Price fixing.
2. Endangering lives, and
3. Industrial espionage (i.e.) industrial spying.

1. Occupational Crime of Price Fixing

While fixing a price for any commodity/product/service, sometimes all competitors come together and jointly set the prices to be charged. These are called as pricing cartels.

The above price fixation is unfair and unethical practice. This leads to restraint the free trade and open competition.

Thus the above kind of price fixing is an example of occupational crime.

Case Illustration: In 1983, in American state of Washington, six large electrical contractors along with eight company presidents and vice presidents were indicted on charges of fixing bids (contracts) for building public power plants. This is evident instance of occupational crime. In order to avoid the above kind of occupational crimes, the laws are enforced which forbids companies from jointly fixing prices.

2. Endangering lives

Endangering the lives of employees is another kind of occupational crime.

Some companies employ workers without disclosing them the harmful health effects and safety hazards about the working environment and the product to be manufactured.

In due course of time, workers are exposed to very serious health problems.

In this case, the employers are guilty of involved in an occupational crime.

Case Illustration: Manville Corporation, the largest producer of asbestos in U.S, knew that asbestos dust was harmful for their employees' health. It could cause a lung disease named 'asbestosis' and an incurable cancer named 'mesothelioma'. The company kept this information secret from the employees and the public. During 1940-1979, over 27 million workers were exposed to asbestos and more than 1,00,000 workers have died. Many victims and their families have successfully filed civil suits to claim damages.

The above shocking case study is the typical illustration of an occupational crime committed by the Manville Corporation.

3. Industrial Espionage

Industrial espionage means industrial spying.

Espionage refers secret gathering of information in order to influence relationships between two entities.

Keeping information secret is a right.

But acquisition of others' secret to one's advantage is espionage.

The espionage is one of the most unethical and lawless activities.

The vital information are secretly gathered/theft through espionage agents (also called spies).

Industrial or corporate espionage is the theft of trade secrets foreconomicgains.

The trade secret may be any of the intellectual properties such as designs, prototypes, formulas, software codes, passwords, manufacturing processes, marketing plans, supplier/contractor details, etc.

From the above discussion, it is clear that the industrial espionage is also a typical occupational crime existing in our society.

PROFESSIONAL RIGHTS

14.   Define professional rights and also write various aspects of professional rights? (MAY/JUNE 2006)

Professional Rights

Professional rights are the rights possessed by virtue of being professional shaving special moral responsibilities.

Examples

Right to refuse to involve in unethical activities;

Right to warn the public about harms and dangers;

VARIOUS ASPECTS OF PROFESSIONAL RIGHTS

Rights of Professional Conscience

It is one of the most fundamental rights of engineers.

The right of professional conscience refers to the moral right to exercise responsible professional judgment in discharging one's professional responsibilities.

In simple words, it is the right to do what everyone agrees it is obligatory for the professional engineer to do.

The right of professional conscience is a 'negative' right. Because it places an obligation other people not to interfere with its exercise.

In order to exercise the rights of professional conscience, engineers require special resources and support from others. So this right is also considered as a 'positive' right, as it is placing on other people an obligation to do more merely not interfering.

Specific Rights

The right of professional conscience is most general professional rights. It consists of many other specific rights. Two of the important specific rights are:

1.   Right of conscientious refusal, and
2.   Right to recognition.

1.   Right of Conscientious Refusal

The right of conscientious refusal is the right to engage in unethical behavior.

According to these rights, no employer can force or pressure an employee to do something that the employee considers unethical and unacceptable.

This conscientious refusal arises under two situations:

1.   Where there is widely shared agreement in the profession regarding ethical and unethical acts; and
2.   Where there is a possibility for disagreement among the people over unethical acts.

Thus the engineers should have a moral right to refuse in participating unethical activities. The examples of unethical activities are forging documents, lying, giving or taking bribes, selling the company secrets to others, information theft, etc.

Also the employers should have a moral right not to force or pressurize the employee to participate in any unethical activities. Employers should not use any revenge techniques (such as denial of promotions, harassment, and assigning irrelevant tasks) against the employees in this regard.

2.   Right to Recognition

The right to recognition refers to the engineers' right to professional recognition for their work and accomplishments.

The recognition/reward may be of anyone of the following types:

1.   Extrinsic rewards: These are related to monetary remunerations such as increased salaries, commissions, cash bonus, gain sharing, etc.

2.   Intrinsic rewards: These are related to non-monetary remunerations such as acknowledging achievements by issuing appreciation letters, certificates and oral praises, etc.

The right to fair remuneration should be worked out cooperatively between employers and employees. The remuneration depends on the resources of the company and the bargaining power of the employees.

15.   List and explain the features of whistle blowing that characterize the cases with example.   (NOV/DEC 2005)

WHISTLE BLOWING

Whistle blowing is the act by an employee of informing the public or higher management of unethical or illegal behavior by an employer or supervisor.

It is the act of reporting on unethical conduct within an organization to someone outside of the organization in an effort to discourage the organization from continuing the activity.

According to the codes of ethics of the professional engineering societies, engineers have the professional right to disclose wrong doing within their organization and expect to take appropriate actions. Thus, in a way, whistle blowing is also one of the professional rights of engineers.

Example

Journalists and media persons blow the whistle on politicians to bring outtheir corruption by publishing articles or informing regulatory authorities.

Types of Whistle Blowing
1.   Internal whistle blowing

Internal whistle blowing occurs when the information is conveyed to someone within the organization.

2.   External whistle blowing

External whistle blowing occurs when the information is passed outside the organization.

3.   Open whistle blowing

Open whistle blowing, also known as acknowledged whistle blowing, occurs when the persons openly reveal their identity as they convey the information.

4.   Anonymous whistle blowing

Anonymous whistle blowing occurs when the person who is blowing the whistle refuses to reveal his name when making allegations.

When Should Whistle Blowing Be Attempted?
Whistle blowing should be attempted only when the following four conditions are met:

1. Need

The whistle-blower should be very clear about the problems to be conveyed.

Examples of important problems are criminal offence, unethical policies or practices, injustices to the employees, threats to public safety, and threats to the environment.

2. Proximity

The whistle-blower should be in a very clear position to report the problem.

The whistle-blower should have the expertise and firsthand knowledge about the problems.

3. Capability

The whistle-blower should have a reasonable chance of success in carrying out whistle blowing.

The whistle-blower should be able to take care the financial security of their family.

4. Last Resort

Whistle blowing should be attempted only for extremely rare emergencies. First one should try to work out the problem through proper formal and informal organization channels.

Moral Guidelines

1. When is the whistle-blowing morally permissible?

Richard Degeorge has provided a set of criteria that must be satisfied before whistle blowing can be morally justified. Degeorge believes that whistle blowing is morally permissible when the following three criteria are met:

1. If the harm that will be done by the product to the public is serious and considerable;
2. If the employees report their concern to their superiors; and
3. If getting no satisfaction from their immediate superiors, they tire out t he channels available within the organization.

2. When is the whistle-blowing morally obligatory?

Degeorge believes that whistle blowing is morally obligatory when the following two criteria are met:

1. If the employee has documented evidence that would convince a responsible, impartial observer that his view of the situation is correct and the company policy is wrong; and
2. If the employee has strong evidence that making the information public will in fact prevent the threatened serious harm.

PREVENTING WHISTLE BLOWING
(How to Solve the Whistle Blowing Problem Within A Company?)

In order to solve the whistle blowing problem within a company, anyone of the following four methods can be used.

1. The company should create a strong ethics culture. There should be clear commitment to ethical behavior from both employers and employees.
2. The organizations should remove rigid channels of communication. Instead, they should encourage free and open communication system within the organization.

3.   The companies can create an ethics review committee with real freedom to Investigate complaints and make independent recommendations to top management.

4.   There should be willingness on the part of management to admit mistakes, if necessary. This attitude will set an atmosphere for employee's ethical behavior.

EMPLOYEE RIGHTS

16.   Write short notes on employee rights for privacy and choice of outside activities.(MAY/JUNE 2006) (Apr/May 2017)

Employee Rights

        Employee rights are the rights that apply or refer to the status or position of
Employee.

        In fact, the professional rights are also employee rights.

Example

        Professional rights such as the right to go against the unethical instructions and the rights to express dissent about company policies are also evidently employee rights.

Types of employee rights

        1.   Contractual employee rights, and
        2.   Non-contractual employee rights.

1.   Contractual Employee Rights

        These employee rights are institutional rights that arise only due to specific agreements in the employment contact.

Examples

        Right to receive a salary of a certain amount; and
        Right to receive other company benefits such as bonuses, salary increments,etc.

2.   Non-contractual Employee Rights

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

Examples

        Right to choose outside activities;
        Right to privacy and employer confidentiality;
        Right to due process from employer; and
        Right to non-discrimination and absence of sexual harassment at the workplace.

Right To Outside Activities

        As per the basic human rights, all employees have the right to practice outside activities of their own interest without any interference from employers.

        However, the rights of employees to practice outside activities should not violate the duties and responsibilities of their jobs.

        Also, employers have the right to take action when outside activities create a Conflict of interest.

        In addition, employees have no right to damage their employers' interests even during non-working hours.

Rights to Privacy

        The right to personal privacy" means the right to have a private life off the job.

In other words, the right to privacy refers the right to control access to and use of information about oneself.

As with outside activities, the right to privacy is also limited by the legitimate exercise of employers' rights. The employers can obtain and use information of employees for their effective management of the company. However this personal information should not be given to outsiders.

Rights to Due Process

The rights to due process means right to fair procedures safe guarding/protecting the exercise of other rights.

This right also extends to fair procedures in firing, demotion, and other disciplinary actions. In order to implement the right of due process, the following two general procedures can be used:

1. Written explanations, specifying the reasons, should be given to employees who are penalized in any ways.

2. An appeals procedure should be established so that an employee can appeal against their penalties if he believes his rights have been violated.

INTELLECTUAL PROPERTY RIGHTS (IPR)

17. What is intellectual property rights (IPR)? Explain essential elements of an IPR and also benefits of an IPR. (NOV / DEC 2015)(Nov/Dec 2017)

Intellectual property rights (IPR)

The legal rights built up on the intellectual property created are known as intellectual property rights (IPRs).

IPR allows the people to independently own their innovations and creativity, which is similar to legal protection of any other properties.

Elements of Intellectual Property Rights:

1. Patents;
2. Industrial designs;
3. Trademarks;
4. Copy rights;
5. Trade secrets;
6. Design of integrated circuits; and
7. Geographical indications.

1. Patents

Patents are the legal rights approved for new inventions involving scientific and technical knowledge.

Patent means an official document giving the holder the sole right to make, use or sell an invention and preventing others from copying it.

To be patent, the invention must be useful, original, new, unusual and hardly noticeable.

An invention may be a product, method, apparatus, design, composition of matters, etc. But one cannot patent 'a way of doing business' or anything that occurs in nature.

The validity period of most of the patents are 20 years from the date of filing. However for the design patents such as 'new design for a product, the patent validity is 14 years.

2.   Industrial Designs

It is the right to safeguard one's industrial designs.

As stated by TRIPS, a design is an idea or conception as to the features of shape, configuration pattern, ornament of composition of lines or colors applied to any article, two or three dimensional or both by any industrial process or means which in the finished article appeals to and is judged solely by the eye or product.

3.   Trademarks

Trademarks are words, phrases, sounds or symbols associated with goods or services.

Trademark means a registered design or name used to identify a company's goods.

It is used to indicate the public the origin of manufacture of the goods affixed with that mark.

Example

Pepsi is a registered trademark in soft drinks; Thomson in electronic goods; and Nestle in food products.

4.   Copyrights

Copyright means the legal right, held for a certain number of years, to print, publish, sell, broadcast, perform, film or record an original work or any part of it.

The copyrights protect the expression of the idea, not the idea themselves. The copyright expires fifty years after the death of the author.

Example

Poems, paintings, script of movies, and computer programs.

5.   Trade Secrets

Trade secret means a device or technique used by a company in manufacturing its products, etc. and kept secret from other companies or the general public.

Trade secrets such as formulas, patterns, methods, and data compilations are kept secret in order to gain a competitive advantage over competitors.

Though the trade secrets cannot be registered like other intellectual properties, thefts of trade secrets are legally considered as a crime.

Example

The formula of Fanta soft drink, and the formulas for making drugs.

6.   Design of Integrated Circuits

It is the right granted to the inventor to prevent anybody making use of the design of integrated circuits, semiconductor devices, and other electronic devices.

Example

Invention of a new microprocessor chip.

7.   Geographical indication's

Geographical indications identify goods as originating in the territory of a country, an origin or a locality in that territory, where a specific quality, reputations or other characteristics of the goods is essentially attributed to their geographical origin.

Example

Tirunelveli halwa, Dindugal locks, Sivakasi crackers, Kancheepuram sarees.

Benefits of Intellectual Property Rights

IPRs promote technological, industrial, and economical developments of a country.

IPRs provide incentives for the inventions and ensure adequate returns on commercialization of the invention.

- IPRs prevent the competitors from using one's invention.
- IPRs are useful in identifying unprotected areas to avoid violation.
- IPRs grant exclusive rights to the inventors.
- IPRs provide use the invention for the public purpose.
- IPRs are useful in identifying unexplored areas for undertaking research so as to become a leader in that area.

DISCRIMINATION

18.   Explain Discrimination is a boon and pain in professional life? (NOV/DEC 2005)

DISCRIMINATION

- Discrimination is the unequal treatment of an individual intentionally on unintentionally.
- Discrimination refers to treating people unfairly because of one's sex, race, skin color, age, or religious outlook.
- Discrimination based on these aspects of biological makeup and basic convection is disgraceful.
- Discrimination violates the fundamental human rights of fair and equal treatment humans.
- Discrimination is a morally unjustified treatment of people on arbitrary or irrelevant grounds.

Preferential Treatments

Preferential treatments mean giving an advantage to a member of a group that in the past was denied equal treatment, in particular, women and minorities.

The preferential treatments are also referred as reverse preferential treatments, as it 'reverses' the historical order of preferences.

Two Kinds of Preferential Treatment

1.   Weak Preferential Treatment: In involves giving an advantage to members of traditionally discriminated-against groups over equally qualified applicants who are members of other group.

2.   Strong Preferential Treatment: In involves giving preference to minority applicants or women over better-qualified applicants from other groups.

Arguments over Preferential Treatment

1.   Arguments Favoring Preferential Treatment

- A rights-ethics who favor preferential treatment emphasizes on the principle of   compensatory justice.   According   to   them,   past   violations   "Of   rights   must becompensated. So preference should be given on the basis of membership in a group that has been disadvantaged in the past.
- The utilitarian's who favor preferential treatment argue that the women and minorities should be integrated into the economic and social mainstream.

2.   Arguments against Preferential Treatment

- It can be argued that preferential treatment is a straightforward violation of other people's rights to equal opportunity.
- It is also argued that there is the economic harm that results from a policy of not consistently recruiting the best-qualified persons.
- The reverse discrimination is unfair in the present, similar to the unfair discrimination made against disadvantaged groups in the past.

- Thus in the present scenario, it is very important to find a way to balance these for and against arguments over preferential treatment, in order to achieve social integration.

Sexual Harassment

Sexual harassment is a particular undesirable, objectionable form of sex discrimination.

"Sexual harassment is any sexual oriented practice that endangers a woman's job that undermines her job performance and threatens her economic livelihood".

UNIT V   **GLOBAL ISSUES**   **8**

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

MULTINATIONAL CORPORATIONS (MNCs)

1.   **Define MNC's. State and explain the benefits to host countries from MNC's. (MAY / JUNE 2016) (or)**

Explain in detail the various advantages and disadvantages of MNCs.(Nov/Dec-2016)

MNC's

Large corporations having investment and business in a number of countries are known as the 'multinational' or 'transnational' corporations.

Examples for Multinational Corporation.

➢   Smith Kline Beecham, Unilever, Ford, Toyota, Sony, LG, ITC, etc., are MNCs.

When a corporation to be called as a MNC?

A corporation can be called as a MNC, only when the following five criteria are

Operations are spread in many countries, which are at different levels of

1. Its local subsidiaries are managed by nationals.
2. It maintains industrial organizations including R&D and manufacturing facilities in several countries.
3. It has a multinational central management.
4. It has a multinational stock ownership.

The benefits to MNCs of doing their business in underdeveloped and developing countries are:

        ➢ Cheap labor;

        ➢ Availability of natural resources;

        ➢ Flexible and favorable tax arrangements; and

        ➢ New marks for their products.

        ➢ The benefits to the participant countries are:

        ➢ New job opportunities;

        ➢ Jobs with higher pay and greater challenge;

        ➢ Increase of national income;

        ➢ Transfer of advanced technology; and

> ➢ Other social benefits from sharing wealth.
> ➢ Besides business and social complications, there are several moral and ethical.

Some of the questions explaining the moral difficulties involved are

> ➢ Was this legal MNC business morally permissible?
> ➢ Who benefits more and who loses more, when MNC does 'outsourcing'?
> ➢ Are the host countries lose their resources, control over its own trade, and

political independence? In what ways? And How much?

> ➢ Which standards should engineers follow when working in foreign countries?
> ➢ What are the moral responsibilities of engineering MNCs doing business in

under developed and developing countries?

> ➢ What are the moral responsibilities of engineers working in foreign countries?

INTERNATIONAL RIGHTS

➢   The multinational corporations should recognize and strictly adhere to the international rights. The MNCs, operating their business at foreign countries, should understand the necessity and the importance of these rights.

➢   International rights are human rights, but international rights are more specific than the most abstract human rights to liberty and fairness.

➢   Thomas Donaldson, in his book 'The Ethics of International Business', has listed

the international rights. They are:

> 1. The right to freedom of physical movement.
> 2. The right to ownership of property.
> 3. The right to freedom from torture.
> 4. The right to a fair trial.
> 5. The right to nondiscriminatory treatment i.e., freedom from

discrimination on the basis of characteristics such as race or sex.

> 6. The right to physical security.
> 7. The right to freedom of speech and association.
> 8. The right to minimal education.
> 9. The right to political participation.
> 10. The right to subsistence.

WAYS OF PROMOTING MORALLY JUST MEASURES

> ➢ The activities of MNCs should provide the most good for the most people of the host

countries. That is, MNCs should accomplish more overall good than bad to the host countries.

> ➢ The MNCs should help the host countries' overall economy and their employees.

> ➢ The MNCs should also make sure that their products does not cause any harms to the customers.

> ➢ The MNCs should respect the laws and culture of the host countries without violating the basic moral right.

2. Discuss the three senses of relative values. (NOV/DEC 05 & MAY/JUNE 2006)

1. Ethical Relativism

Ethical relativism says that actions are morally right when (and because) they are approved by law or custom; they are wrong when they violate laws or customs.

This view is considered false, because it implies absurdities. Also it justifies genocide and other ridiculous behaviors.

2. Descriptive Relativism

Descriptive relativism states that beliefs about values differ from culture to culture.

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

3. Moral Relationalism (or Contextualism)

Moral relationalism views that moral judgment should be made in relation to factors that may vary from case to case, because formulating simple and absolute rules involving moral judgment is impossible.

In other words moral judgment are contextual in nature. This view is also obviously true.

It emphasis that the customs of cultures require us to adjust moral judgments and conduct.

4. Ethical Pluralism

According to this view, there may be alternative moral perspectives that are reasonable; but no one of which must be accepted completely by all rational and morally concerned persons.

Therefore it is evident that relationalism is essential in MNC, as MNCs involves/requires different cultural conventions.

But relational ism only says that foreign customs are mostly morally relevant.

But the ethical relativism says that foreign customs are self-authoritative in determining what should be done.

Above all, the ethical pluralism is very much relevant to the working nature of

3

MNCs. Because in MNCs, there may be a number of morally permissible variations in formulating, and understanding and applying basic moral principles.

3.   Compare the technology transfer and appropriate technology.

TECHNOLOGY TRANSFER

> ➢ Technology transfer is the process of moving technology to a quite new set of conditions and implementing it there.
> ➢ Technology consists both hardware such as machines and installations and technique such as technical, organizational, and managerial skills and procedures.
> ➢ The transfer of technology may be conducted by a variety of agents such as governments, universities, volunteer service organizations, consulting companies, and MNCs.

APPROPRIATE TECHNOLOGY

> ➢ Appropriate technology is a generic concept that applies under social aspects when transferring technologies.
> ➢ Appropriate technology refers identification, transfer, and implementation of the most suitable technology for a new set of conditions.
> ➢ Appropriate should be examined from scale, materials, physical environment, capital costs and above all human values.
> ➢ Appropriate technology also emphasizes that the technology should contribute to sustainable development of the host country.

INTERMEDIATE TECHNOLOGY

> ➢ Intermediate technology is a typical appropriate technology, which is found in between advanced and primitive technologies.
> ➢ The applications of intermediate technologies are more meaningful and beneficial than that of the most advanced technologies.
> ➢ Because the most advanced technologies may cause certain undesirable side effects such as mass migration from rural areas to urban cities where companies tend to locate.

ENVIRONMENTAL ETHICS

4.   Explain the meaning of environmental ethics. (OR) Is there any relationship among engineering, ecology and economics? Discuss. (OR) what are the philosophical views of nature? Explain. (APRIL/MAY 2005) (NOV/DEC 2005) (MAY/JUNE 2006) (NOV/DEC 2006) (Nov/Dec 2017)

Environmental Ethics

➢ Environmental ethics is the study to explore the ethical roots of the environmental movement and to understand what ethics tells us about our responsibility to the environment.

Engineers and the environment

➢ It is evident that engineers are usually creators of technology that contributes to environmental degradation as well as environmental improvement;

➢ Therefore they should have a professional obligation to protect the environment.

➢ Also as agents of change and experimenters, engineers have a vital role to play in protecting the environment.

Types of Concern for Environment

➢ There are two types of concern for the environment. They are:

1.   Health-related concern

➢ Engineers can be concerned for the environment when environmental pollution poses a direct and clear threat to human health.

➢ This is called as a health-related concern for the environment.

2.   Non-health-related concern

➢ Engineers can also be concerned for the environment even when human wealth is not directly affected.

➢ This concern is termed as non-health-related concern for the environment.

Engineers' Concern for Environment

➢ While choosing a career or when taking up a new assignment/job, every engineers should ask himself the following ethical questions associated with the environment:

✓   How does and to what extent a particular industry affect   the environment?

✓   How far such ill effects can be controlled physically and/or politically?

What is the reasonable protective measures available for immediate implementation?

In what way, I can be effective as an engineer in ensuring safe and clean

environment?

✓   What are my responsibilities in this regard?

Should preserving the environment and its non-human inhabitants   be

regarded as of value for its own sake?

   ✓   Do I have obligations for the future?

   ✓   How are my obligations to the future to be balanced against my

obligations to the present?

   ✓   Do I belong to nature, or does nature belong to me?

   ✓   If animals can suffer and feel pain like humans, should I have moral

standing?

   ✓   What Does Professional Codes Of Ethics Say About The Environment?

Some of the professional codes of ethics regarding the environment are given below:

1.   . The codes of the American Society of Civil Engineers (ASCE)

➢ "Engineers should be committed to improving the environment by adherence to the principles of sustainable development so as to enhance the quality of life of the general public".

2. The codes of the Institute of Electrical and Electronics Engineers (IEEE)

➢ "Engineers have to accept responsibility in making engineering decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment".

3. The codes of the American Society of Mechanical Engineers (ASME)

➢ "Engineers shall consider environmental impact in the performance of their professional duties".

APPROACHES TO RESOLVE ENVIRONMENTAL PROBLEMS

➢ The two important approaches that can be applied to resolve environmental problems are:

1. Cost-oblivious approach; and

2. Approach based on cost-benefit analysis.

1. Cost-oblivious Approach

> ➤ In this approach, priority is given to the protection of environment than the cost of the products designed by the engineers.
>> ➤ This approach does not accept/tolerate any environmental degradation.
>> ➤ Also this approach satisfies the concept of eights and duty ethics.

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

Approach based on Cost-benefit Analysis

> ➤ In this approach, the problem is analyzed in terms of the benefits derived by reducing the pollution and 'the costs required to solve the problem.
>> ➤ In fact, this approach is derived from the concept of utilitarianism.
>> ➤ In other words, the objective is not to achieve a completely clean environment, but to achieve an economically beneficial balance of pollution with health or environmental considerations.

Drawbacks: It is very difficult to determine the true cost of a human life or the loss of a species; and also it is very difficult accurately assess costs and benefits.

INTERNALIZING COSTS OF ENVIRONMENTAL DEGRADATION

> ➤ As we know, the cost of any product usually includes direct labor cost, direct materials cost, direct expenses, factory expenses, administrative expenses, and selling and distribution expenses.
> ➤ Here, other costs incurred due to numerous indirect factors such as the effects of pollution, the depletion of energy and raw materials, and social costs are not considered.
> ➤ But in order to determine the 'true' cost of the product, all those costs should be internalized i.e., added to the price.
> ➤ Along with the economists, the scientists, the lawyers, and the politicians, engineers have to play an important role in finding acceptable mechanisms for pricing and releasing products. It should be realized that the good engineering design process can provide the answers to protect the environment without any addition of real cost.

TECHNOLOGY ASSESSMENT

> ➤ Technology assessment refers to the studies on the social and environmental effects of technology in various areas.
> ➤ The areas include nuclear war, health care, cashless trading via bank-card, and pollution.
> ➤ In the view of the economist Robert Theobald, engineers sometimes tend   to

find the right answers to the wrong questions.

➢ He also emphasized that the university curriculum should be based on the finding right answers to the right questions.

➢ When the engineers and scientists conduct experiments, they should distill the information collected through normative, conceptual, and factual inquiries, as depicted in Fig.

➢ As shown in Fig engineers should use the funnel for distilling and applying knowledge to design and build the engineering projects.

➢ The difficulty in technology assessment is to explore the extent of the effects and to prioritize the possible adverse effects.

➢ Thus it should be noted that engineers as social experimenters should do continuous monitoring even after implementing the project so that to ensure safe and clean environment.

Fig. 7.1. Technology assessment
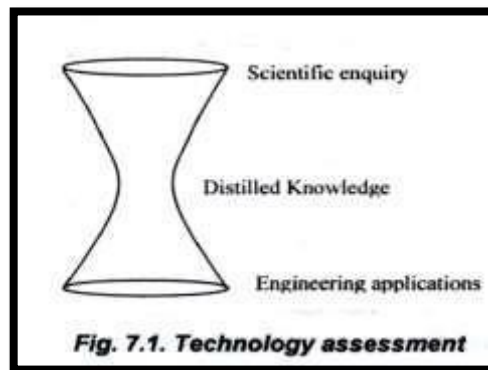
PHILOSOPHICAL VIEWS OF NATURE

➢ Though there are various views on environment, now we shall brief four important' views of it

1. Sentient-Centered Ethics

➢ This view acknowledges the inherent worth of all sentient animals. Sentient animals are those that feel pain and pleasure and have desires.

➢ Peter Singer, in his book Animal Liberation, emphasizes that moral judgments must take into account the effects of our actions on sentient animals.

➢ For example, while constructing a dam or a plant engineers should consider the impact on animals living there.

➢ According to Tom Regan, conscious creatures have inherent worth not only because they can feel pleasure and pain, but also because they are subjects of experiences who form beliefs, memories, intentions, preferences, and can act purposefully.

➢ Both Singer and Regan felt that the sentient animals need not to be treated in the,

identical way we treat humans, but their interest should be weighed equally with human interests in making decisions.

2.   Bio centric Ethics

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

➢ According to Albert Schweitzer, all organisms have the 'reverence for life'   to survive and to develop.

3. Eco centric Ethics

➢ In contrast to the individualistic approaches of sentient-centered and bio centered ethics, Eco centered ethics emphasizes inherent value in ecological systems.

➢ According to the naturalist Aldo Leopold, a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community.

4. Human-Centered Environmental Ethics

➢ Human-centered ethics environmental ethics extends traditional ethical theories in the aspect of the threats to human beings presented by the destruction of nature.

➢ 'Virtue ethics' draws attention to humility, appreciation of beauty, love, and affection and gratitude towards the world of nature.

➢ 'Right ethics' stresses that the fundamental right to life enforces a right for livable environment in a particular period of time, when pollution and depletion of resources has reached a dangerous proportion.

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

➢ 'Utilitarianism' stresses that human pleasures and self-interests are linked to nature in so many ways apart from the stage the engineering products are produced from natural resources.

5.   Write a note on 'acid rain'.   (NOV/DEC 2009)

➢ Consider, for example, the damage currently being caused by acid rain and acid deposition. Normal rain has a pH of 5.6, but the typical rain in the northeastern areas of North America is now 3.9 to 4.3. This is 10 to 100 times more acidic than it should be, about as acidic as lemon juice.

➢ In addition, the snowmelt each spring releases huge amounts of acid that were in frozen Storage during the winter months, Soil that contains natural buffering agents counteracts the acids. But large parts of the northeastern United States and eastern Canada lack sufficient natural buffers to counteract additional onslaughts.

➢ The results? "Acid shock" from snowmelt is thought to cause annual mass killings of fish. Longer-term effects of the acid harm fish eggs and food sources. Deadly quantities of aluminum, zinc, and many other metals leached from the soil by the acid rain also take a toll as they wash into streams and lakes.

➢ In the higher elevations of the Adirondack Mountains, more than half the lakes that were once pristine can no longer support fish. Hundreds of other lakes are dying in the United States and Canada. Forests have also been steadily killed, larger animals have suffered dramatic decreases in population, and some farmlands and drinking-water sources are damaged.

➢ These results have occurred during only a few decades. The next decades will multiply them many times over. It is believed that North America is just slightly behind Scandinavia, where thousands of lakes have been "killed" by acid rain. In both locations the cause is now clear: the burning of fossil fuels that release large amounts of sulfur dioxide (S02)--the primary culprit-and nitrogen oxides (NOx).

➢ In both instances major sources of the pollutants are located hundreds and even thousands of miles away, with winds supplying a deadly transportation system to the damaged ecosystems. Much of Sweden's problem, for example, is traceable to the industrial plants of England and northern Europe.

➢ Acid rain problems in Canada and the northeastern United States derive in large measure from the utilities of the Ohio Valley, the largest source of sulfur dioxide pollution this country. As we know now, pollution does not stop at national borders, necessitating international control to control it.

➢ Much remains to be learned about the mechanisms involved in the processes pictured in Fig. It is still impossible to link specific sources with specific damage. More research into shifting wind patterns and the air transport of acids is needed. Nor is there a reliable estimate of current damage.

➢ For example, many believe that microorganisms in soil are being affected in ways that are potentially devastating, but no one knows for sure. Groundwater is undoubtedly being polluted, but it is unclear what that means for human health. Much underground water currently being used was deposited by rainfall over a hundred years ago, and current acid rain may have its main effects on underground water a century from now.

➢ Effects on human food sources are also largely unknown. In some areas certain trees do well; perhaps for them the acid rain acts as a fertilizer.

➢ Other examples can be given of amorphous patterns of ecological damage, like those of acid rain. Worldwide use of fossil fuels by industrial nations is causing a buildup of carbon dioxide in the atmosphere, which could result in a greenhouse effect damaging the entire earth. Similarly, damage to the protective ozone layer of the earth's atmosphere resulting from the release of Freon is related to technological products used by the populations of those same nations.

➢ And rivers amass pollutants as they wind their way through several state or countries, eventually to dump their toxic contents into an ocean. The Rhine is such a river, and the North Sea, now a "special protection area," is such an ocean.

6. **Describe**

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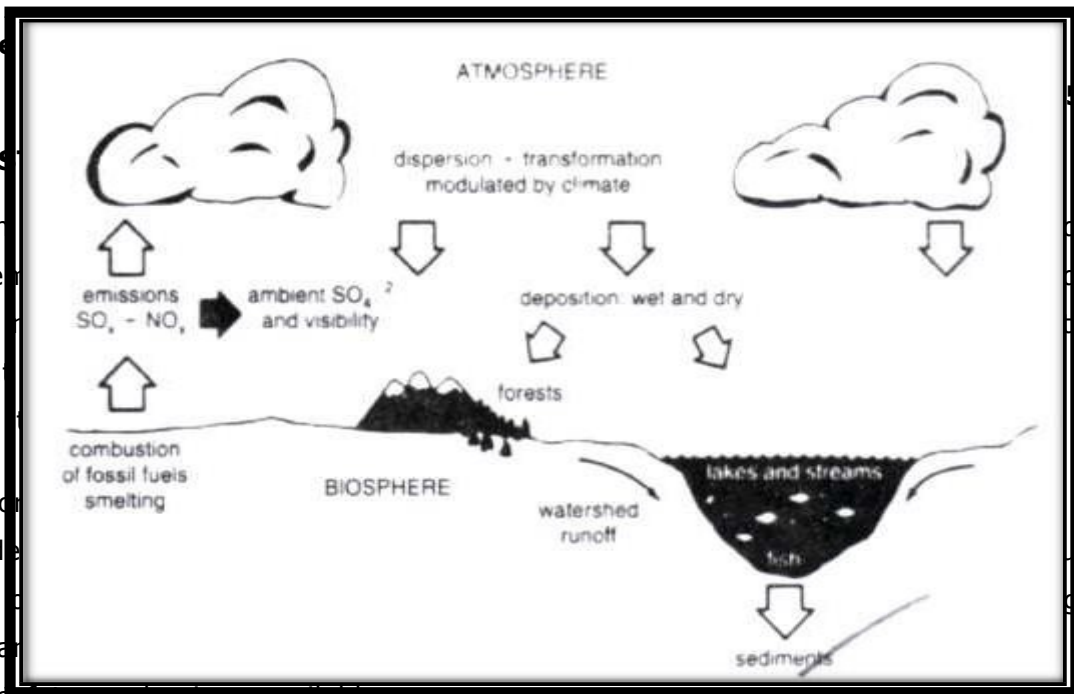
➢ For example, whereas computerized instruments controlled the safety systems and detected leaks at the West Virginia plant, Bhopal's safety controls were all manual and workers were asked to detect leaks with their eyes and noses.

➢ The government of India required the Bhopal plant to be operated entirely by Indian workers. Hence Union Carbide at first took admirable care in training plant personnel, flying them to the West Virginia plant for intensive training. It also had teams of U.S, engineers make regular on-site safety inspections.

➢ But in 1982 financial pressures led Union Carbide to relinquish its supervision of safety at the plant, even though it retained general financial and technical control.

➢ The last inspection by a team of U.S. engineers occurred that year, despite the fact that the team warned of many of the hazards that contributed to the disaster.

➢ During the following two years safety practices eroded. One source of the erosion was personnel: high turnover of employees, failure to properly train new employees, and low technical preparedness of the Indian labor pool.

➢ Workers handling pesticides, for example, learned more from personal experience than from study of safety manuals about the dangers of the pesticides.

➢ But even after suffering chest pains, vomiting, and other symptoms they would sometimes fail to wear safety gloves and masks because of high temperatures in the plant, the result of lack of air-conditioning.

➢ The other source of eroding safety practices was the move away from U.S. standards (contrary to Carbide's written policies) toward lower Indian standards. By December of 1984 several extreme hazards, in addition to many smaller ones, were present (Fig.).

➢ First, the tanks storing the methyl isocyanate gas were overloaded. Carbide's manuals specified they were never to be filled to more than 60 percent of capacity in emergencies the extra space could be used to dilute the gas. The tank that caused the problem was in fact more than 75 percent full.

➢ Second, a standby tank that was supposed to be kept empty for use as an emergency dump tank already contained a large amount of the chemical.

➢ Third, the tanks were supposed to be refrigerated to make the chemical less reactive if trouble should arise. But the refrigeration unit had been shut down five months before the accident as a cost-cutting measure, making tank temperatures three to four times what they should have been.

➢ Six weeks before the catastrophe, production of methyl isocyanate had been suspended because of an oversupply of the pesticides it was used to make. Workers were engaged in routine plant maintenance.

➢ According to one account, a relatively new worker had been instructed by a new supervisor to flush out some pipes and filters connected to the chemical storage tanks.

➢ Apparently the worker properly closed valves to isolate the tanks from the pipes and filters being washed, but he failed to insert the required safety disks to back up the valves in case

they leaked. (He knew that valves leaked, but he did not check for leaks: "It was not

my job." The" safety disks were the responsibility of the maintenance department, and the position of second-shift supervisor had been eliminated.)

➢ Two of four valves that should have been open to allow water flow were clogged. The resulting extra pressure was enough to force water to leak into a tank.

➢ For nearly three hours chemical reactions occurred, generating enormous pressure and heat in the tank.

➢ According to Union Carbide's account, a disgruntled employee unscrewed a pressure gauge on a storage tank and inserted a hose into it.

➢ He knew and intended that the water he poured into the tank would do damage, but he did not know it would cause such immense damage."

➢ By the time the workers noticed a gauge showing the mounting pressure and began to feel the sting of leaking gas, they found their main emergency procedures unavailable.

➢ The primary defense against gas leaks was a vent-gas scrubber designed to neutralize the gas.

➢ It was shut down (and was turned on too late to help), because it was assumed to be unnecessary during times when production was suspended.

➢ The second line of defense was a flare tower that would bum off escaping gas missed by the scrubber. It was inoperable because a section of the pipe connecting it to the tank was being repaired.

➢ Finally, workers tried to minimize damage by spraying water 100 feet into the air. The gas, however, was escaping from a stack 120 feet high. Within two hours most of the chemicals in the tank had escaped to form a deadly cloud over hundreds of thousands of people in Bhopal.

➢ As was common in India, desperately poor migrant laborers had become squatters-by the tens thousands-in the vacant areas surrounding the plant.

➢ They had come with hopes of finding any form of employment, as well as to take advantage of whatever water and electricity was available.
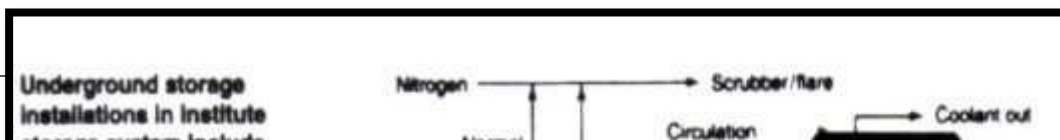
COMPUTER ETHICS

7.   Discuss the ethical issues related to computer ethics.(NOV/DEC 2015)(Apr/May 2017) (or) What is meant by Computer Ethics? State and Explain the categories of ethical problems and the unethical acts computer as an instrument of unethical behavior. (Nov/Dec 2017)

COMPUTER ETHICS

> Computer ethics is the study of ethical issues that are associated primarily with computing machines and the computing profession.

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

CATEGORIES OF COMPUTER ETHICS PROBLEMS

> The three board categories of computer ethical problems are:

✓   Those ethical problems for which the computer is the instrument of the unethical act. For example, the use of a computer to defraud the bank.

✓   Those problems for which the computer is the object of the unethical act. For example, stealing computer software and installing it on one's own computer to access others information.

✓   Those problems associated with the autonomous nature of computers.

Computers as the Instrument of Unethical Behavior

> Computers are sometimes used as an instrument for carrying out some unethical activities. The two important unethical acts under this category are:

1. Bank robbery; and

2. Privacy

1. Bank Robbery

> Computers can be used to steal from an employer; outsiders can got into a system and steal from an institution such as a bank.

> In the same way, a company can use the computer to steal from its clients and customers.

> Computers are used more efficiently to steal money in a bank.

> The robber simply sits at a computer terminal, invades the bank's computer system and directs some of the bank's assets be placed in a location accessible to him.

> The use of computer makes the crime impersonal.

➢ The criminal never comes face to face with the victims.

2. Privacy

➢ Privacy means the basic right of an individual to control access to and use   of information about himself.

➢ Computers make privacy more difficult to protect, since large amounts of data on individuals and corporations are centrally stored on computers where an increasing number of individuals can access it.

➢ Invasions of privacy can be harmful to an individual in two ways, asgiven below: blackmailed.

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

2. Personal information can also be considered personal properly.   Any unauthorized use of this information is theft.

Computers as the Object of Unethical Acts

➢ When the computers are used as the objects of the unethical acts, ethical issues may arise. This act is prevalently known as 'hacking'.

Hacking

➢ Hacking is nothing but gaining unauthorized access to a database, implanting false information in a database or altering existing information, and disseminating viruses over the Internet.

➢ In other words, hacking is a crime in which a person cracks a system and gains unauthorized access to the data stored in them.

➢ Accessing private information violates the private rights of individuals and corporations.

➢ Hacking has thrown a challenging threat to the internal security of a nation when hackers develop illegal access to the secret military information.

➢ Computer viruses: Viruses are programs introduced deliberately for destroying or altering the operating systems and database of computer.

➢ Transmission of computer viruses leads to the complete destruction of files and data stored in the computers.

➢ This type of destruction frequently occurs in the records of financial institutions, corporations, government offices, and taxpayers.

Autonomous Computers

➤ Autonomous nature of computers creates other ethical problems.

➤ Computer autonomy refers to the ability of computer to make decisions with but the intervention of humans.

➤ This autonomous function of computers creates a lot of negative implication.

➤ Example illustrating negative implication of computer autonomy: An autonomous computer, responsible for running a spaceship, wrongly directed the spaceship against the human designed it, instead of heading towards Jupiter.

➤ Example illustrating positive implication of computer autonomy: Autonomous computers are valuable for automatic monitoring of certain manufacturing processes.

➤ However, the autonomous computer application creates unethical activities in most cases.

➤ For example, autonomous computers are used in trading of some major stock market exchanges. Some brokers and institutional investors utilize computers to sell stocks automatically for their favor.

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

➤ Many of the weapons used by military sources depend greatly on computer sensors and computer controls.

➤ Sometimes the instability of computer sensors and controls may create an unstable situation, which may lead to the serious conflicts.

➤ Thus although autonomous computers are productive and more efficient in more areas, eventually there should be some human control over them in order to prevent disasters.

COMPUTER CODE OF ETHICS

➤ Many organizations have developed codes of ethics for computer use.

➤ In order to overcome the various ethical issues of computer ethics, the Computer Society of India has developed the 'Ten Commandments' of computer ethics.

➤ 'Ten Commandments' of computer ethics are:

   1. Don't use a computer to harm other people.
   2. Don't interfere with other people's computer work.
   3. Don't snoop around in other people's computer files.
   4. Don't use a computer to steal.
   5. Don't use a computer to bear false witness. ..
   6. Don't copy or use proprietary software for which you have not paid.
   7. Don't use other people's computer resources without authorization or proper compensation.

8. Don't appropriate other people's intellectual output.

9. Think about the social consequences of the program you are writing or the system you are designing.

10. Use a computer in ways that insure consideration and respect for your fellow humans.

WEAPONS DEVELOPMENT

8.   Describe in details about the global issues of weapons development. (MAY/JUNE 2016) APR/MAY 2018

INTRODUCTION

> The Military or Defense industry uses most of world's latest technological

activity. weapons.

☐

The entire world spends much of its money in the new development of military Engineers involve either

☐

directly or indirectly in designing and developing of these new weapons.

> There are several reasons for an engineer to join the military services.
> The first and foremost reason is that of patriotism and prudential interest.

> The latter can be Threats or compulsion from the government or the ruler of the country.
> There are also several reasons for an engineer to refuse the war work.
> Because fundamentally the purpose of designing war weapons is to kill human beings. Therefore many reasonable engineers feel that the activity of weapons development as unethical.
> Every engineer has to decide by examining his or her own conscience whether to work or not to work in defense-related industries.

ROLE OF ENGINEERS IN DEFENSE INDUSTRY

> Defense industry is one of the areas, which provide number of jobs opportunities to engineers.
> Engineers are capable of innovating and developing new weapons.
> Weapons are designed for one purpose to kill human beings.
> On the one hand, many of the rational engineers feel that they cannot work on designing weapons, which are ultimately used to kill the human beings.
> Even though they are not the ultimate users of those weapons, they find it morally

unacceptable to work on such areas.

❯ On the other hand, similar morally responsible engineers feel that working in defense industry is ethical. Because they feel it as an honor to work for their nation/government.

❯ In fact, the above two different views about working in defense industry are well justified by various ethical theories.

❯ Also the engineers should not be attracted by incentives and advancements that are being offered in the defensive industries, they must have the potential judgments to serve in defense works that would jeopardize the human community.

THE ENGINEERS INVOLVEMENT IN WEAPONS WORK

❯ Engineers, who have engaged themselves in manufacturing of war weapon and antipersonal bombs, have developed compromising attitudes about their involvement, though there are aware of consequences of war weapons.

❯ Sometimes engineers are forced to involve in weapons work for their survival and livelihood of their family members.

❯ Thus every engineer who accepts job in a war-related industry should seriously consider his or her motives in doing so.

❯ They should think morally before getting involved in weapon's production.

DEFENSE INDUSTRY PROBLEMS

❯ Many nations give privileges to defense industry, without even thinking, on serious problems that arise in large military build-ups. Some of the problems are:

industry.

1. The problem of waste and cost overruns is a major one in the   defense

2. Another problem faced by the defense industry is the 'technology creep'.

The technology creep refers to the development of new weapons, such as the cruise missile, which can change diplomatic arrangements even as they are being negotiated. Thus it affects the political stability of a country.

3. Secrecy creates problems for the defense industry. If the secrets of planned funding were leaked to prospective contractors, then it may lead to high cost and poor quality of defense materials and weapons.

4. Many countries allocate funds for the defense sector than that of the other public welfare schemes.

ENGINEERS AS MANAGERS – CONSULTING ENGINEERS – ENGINEERS AS EXPERT WITNESSES AND ADVISORS

9. Discuss the following in detail. (i).
Engineers as managers
(ii). Engineers as consulting engineers (APR/MAY 2018)
(iii). Engineers as expert witnesses
(iv). Engineers as advisors   (Apr/May 2017) Nov/Dec 2018

(I). ENGINEERS AS MANAGERS

> Engineers move into management roles, because of the following two reasons.

1. Many corporate managements prefer engineers as their managers.
Because they believe that:

✓ To manage technological corporation, the technical understanding is necessary; and

✓ The engineers have potential of understanding the business techniques of any corporate bodies than any non-engineers. Also it is comparatively easier to teach the business techniques than to teach non-engineers the engineering techniques.

2. Engineers are attracted by various corporate incentives such as higher pay, greater authority, wider responsibility, and increased prestige and recognition.

Responsibilities of Engineers-Managers

> Though there are many responsibilities, there are two important responsibilities of engineer-managers. They are:

1. Promoting an ethical climate; and
2. Resolving conflicts.

1. Promoting an Ethical Climate

> A favorable working atmosphere required to achieve a morally responsible conduct is called 'an ethical climate'.

> Several factors such as nature of organization, informal traditions and practices, and personal attitudes directly contribute to the ethical climate.

2. Resolving conflicts.

> The second important responsibility of engineer-managers is to resolve conflicts that arise within the organization.

> The managers have authority and responsibility to resolve the conflicts.

> They have to create health-working atmosphere in which conflicts are

addressed positively.

➥ Many studies revealed that there are seven most common conflicts reported to managers. They are:

1. Conflicts over schedules;
2. Conflicts over human resources available for the business;
3. Conflicts over technical issues;
4. Conflicts over administration procedures;
5. Conflicts of personality;

Principles of conflict resolution

➥ The Harvard Negotiation Project has generated four principles for conflict resolution. They are

1. *"People: Separate the people from the problem".*

➥ This principle distinguishes the personal aspect of conflicts from the problem, so as to enhance better deal with both.

2. *"Interests: Focus on interests, not positions".*

➥ This principle refers to the welfare measures and personnel interest shown to employees irrespective of their positions.

3. *"Options: Generate a variety of possibilities before deciding what to do".*

➥ This principle emphasizes on generation of many alternatives before taking any crucial decisions.

4. *"Criteria: Insist that the result of conflict resolution be based on some objective standard".*

➥ This principle insists on certain standard principles and objectives which are required to evaluate results.

II. ENGINEERS AS CONSULTANTS

➥ Consultants are persons who give expert advice in engineering, business, law, etc.

➥ Consulting engineers generally exercise their consulting activities as independent.

➥ They are paid for their services by fees, not by salaries.

➥ Since they are the sole employer for their practice, therefore they have greater freedom than most salaried engineers to make decisions about the projects.

➥ Corresponding to their greater freedom, the consulting engineers should also deal with a wider variety of moral concerns than salaried engineers.

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

1. Advertising,
2. Competitive bidding,

3. Contingency fees,

4. Safety and client needs, and

5. Provisions for resolution of disputes.

1. Advertising

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

Consulting engineers are responsible for advertising properly their services. As a consultant, engineers should not release misleading advertisements or endorse false claims of a product.

This misleading advertising can be achieved by many ways. They are

- ✓ By openly telling lies;
- ✓ By telling half-truths;
- ✓ By making wrong references or suggestions;
- ✓ Through exaggeration;
- ✓ Through the confusion deliberately created by ambiguity or vagueness;

2. Competitive Bidding

Competitive bidding means the process of offering of prices at an action or in business to achieve something.

In other words, it is the process of competing for projects on the basis of submitting priced proposals.

3.   Contingency Fees

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

4.   Safety and Clients Needs

Since the consulting engineers enjoy greater freedom than the salaried engineers, therefore they have greater responsibility in decision-making concerning safety.

Most of the times, consulting engineers are offered 'design-only projects'.

- ➢ In a 'design-only projects' the consultant's contracts only to design the project, not to have any other roles even a supervisory work.

Provision for Resolution of Disputes

Since the large engineering projects require responsibilities from different levels within the organizations representing owner, the consulting engineer, and the construction

company, therefore it is obvious that there may be chances for overlapping responsibilities, misplaced control, indecision, delays and inability to solve disputes quickly.

Since litigation is time-consuming, costly, and laborious process, therefore the consulting engineer should be prepared to have contractual provisions to resolve conflicts.

III. ENGINEERS AS EXPERT WITNESSES

➢ At times, engineers serve as consultants for resolving disputes in adversarial problems. Some of the adversarial duties of engineers as experts include

✓ Finding the causes of accidents, malfunctions, and other events;

✓ Public planning, policy making that involves technology.

Engineers as Expert Witness in the Courts

➢ The Plaintiff or the dependent in civil or criminal cases may hire an engineer to serve as an expert witness.

➢ Engineers may act as witness in a wide variety of cases such as' concerning defective products, personal injury, damage to properties, traffic accidents, and airplane crashes.

➢ In fact, the engineers' evidences are considered seriously while awarding 'compensatory damages' for injuries, loss of property, or violation of rights.

Eye witness Vs. Expert witness

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

➢ But as an expert witness, engineers are given greater freedom to present evidences on facts in their areas of expertise, on explaining facts, in commenting on the views of the expert witness of the opposite side and also in reporting on the professional standards.

Abuses of Engineers as Expert Witness

1. Hired Guns

➢ When engineers are hired by attorneys to help them to establish the facts in a way favorable to their clients. Then they become 'hired guns'.

➢ The hired guns violate the standards of honesty and also due care in conducting investigations.

2. Financial Biases

➢ When engineers are paid by one party, then it will create a financial bias. This bias can influence one's investigation, testimony and the presentation of one's qualifications.

➢ It is obvious that the bias would increase when engineers were fired on the basis of contingency fees i.e., fees will be paid only if case is won.

➢ Thus even the concept of contingency fees is legal, the contingency fees arrangement is considered unethical as it leads to bias.

3. Ego Biases

➢ Ego means an individual's idea of himself or herself, especially in relation to other people or to the outside world.

➢ This egoistic bias of engineers can also influence the nature of judgment. Thus engineers have to safeguard themselves against this kind of bias.

4. Sympathy Biases

➢ It is a human nature that engineers feel sympathetic towards a particular party and identifies themselves with that party's situation.

➢ This sympathy bias can greatly influence the honest investigation about the facts of the legal disputes.

IV.ENGINEERS AS EXPERT ADVISERS

➢ Like economists, sociologists, urban planners, and other professionals, engineers also play a vital role of expert advisers in planning and public policy-making.

➢ Technology advancements always require decisions about public planning i.e. forming projects that affect communities and public policy-making i.e., forming general strategies for society.

➢ As expert advisers, engineers are involved in both public planning and public policy-making.

➢ As expert advisor, the engineers should have the public honesty, respect for the common public and good knowledge about the contributory role of professional consultants for the successful implementation of both planning and policy-making processes.

➢ Because these decisions often involve public at large and also the impact of wrong decisions would be on the public.

Normative Models of Advisers

1. Hired Guns

➢ This models discussed earlier, insists that engineers should give primary importance to the obligations of the clients.

➢ As per this model, the responsibilities of engineers to the public regarded as the minimal ones; the engineers must focus to the desires of the clients.

2. Value-Neutral Analysts

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

➢ As per this model, the engineers' role is to identify all options and analyze the

factual implication of each option. Also they should remain neutral while making cost-benefit and other analyses.

3. Value-Guided Advocates

> ➢ This model insists that engineering consultants should remain honest and independent in their professional judgment.

> ➢ Unlike hired guns, value-guided advocates consider the responsibility to the public is of paramount importance.

> ➢ Unlike value-neutral analysts, they understand that values are interwoven with

Facts.

Core Qualities Required For an Expert-Adviser

> ➢ Honesty - the quality of being honest; truthfulness.

> ➢ Competence - the thorough knowledge of the work they undertake to do.

> ➢ Diligence - to carry out the given tasks carefully and promptly.

> ➢ Loyalty - the quality of being true and faithful in one's support.

CORPORATE SOCIAL RESPONSIBILITY

10. What is Corporate Social Responsibility?

Corporate social responsibility (CSR) refers to business practices involving initiatives that benefit society. A business's CSR can encompass a wide variety of tactics, from giving away a portion of a company's proceeds to charity, to implementing "greener" business operations.

The concept of Corporate social responsibility
The concept of corporate responsibility or corporate social responsibility has acquired broad support in various international for a.

Corporate responsibility on be used interchangeably with corporate social responsibility. While there is no universally accepted definition of the concept, there is however a consensus that it implies a demonstration of certain responsible behaviours on the part of governments and the business sector toward society and the environment.

Three **important international institutions** have underlined the need for governments and companies to **adhere to the principles of corporate social responsibility.**

These are World Business Council for Sustainable Development **(WBCSD),** The
Organization for Economic Cooperation and Development **(OECD),** The Dow
Jones Sustainability Indexes **(DJSGI).**

We will review their polices and guidelines are representing a global consensus on the imperative of corporate social responsibility.

There are a few **broad categories of social responsibility** that many of today's businesses are practicing:

1. **Environmental efforts:** One primary focus of corporate social responsibility is the environment. Businesses regardless of size have a large carbon footprint. Any steps they can

take to reduce those footprints are considered both good for the company and society as a whole.
2. **Philanthropy:** Businesses also practice social responsibility by donating to national and local charities. Businesses have a lot of resources that can benefit charities and local community programs.
3. **Ethical labor practices:** By treating employees fairly and ethically, companies can also demonstrate their corporate social responsibility. This is especially true of businesses that operate in international locations with labor laws that differ from those in the United States.
4. **Volunteering:** Attending volunteer events says a lot about a company's sincerity. By doing good deeds without expecting anything in return, companies are able to express their concern for specific issues and support for certain organizations.

Why CSR matters

- CSR is becoming more mainstream as forward-thinking companies embed sustainability into the core of their business operations to create shared value for business and society.
- "More practically, [CSR] often represents the policies, practices and initiatives a company commits to in order to govern themselves with honesty and transparency and have a positive impact on social and environmental wellbeing
- As consumers' awareness about global social issues continues to grow, so does the importance these customers place on CSR when choosing where to shop. But consumers aren't the only ones who are drawn to businesses that give back.
- "The next generation of employees is seeking out employers that are focused on the triple bottom line: people, planet and revenue.

Examples of corporate social responsibility

While many companies now practice some form of social responsibility, some are making it a core of their operations.

1. Ben and Jerry's, for instance, uses only fair trade ingredients and has developed a sustainability program for dairy farms in its home state of Vermont.
2. Starbucks has created its C.A.F.E. Practices guidelines, which are designed to ensure the company sources sustainably grown and processed coffee by evaluating the economic, social and environmental aspects of coffee production.
3. Tom's Shoes, another notable example of a company with CSR at its core, donates one pair of shoes to a child in need for every pair a customer purchases.
4. However, Stevens said companies need to really understand what their core social purpose is and how that aligns with their stated mission, to create a cohesive CSR strategy.
5. For example, Stevens said that Kashi, a Kellogg's brand, wants to increase organic farming and is one of the few certified organic cereals. Since only 1 percent of U.S. farmland is actually organic, the breakfast brand worked with Quality Insurance International to help certify new organic farmers across the nation.