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POLLACHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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Department of Civil Engineering

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GE3791 Human Values and Ethics

Unit I. 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.

↳ A value is defined as a principle that promotes well-being or prevents harm.

↳ Values are our guidelines for our success or paradigm about what is acceptable.

Personal values are defined as emotional beliefs in principles regarded as particularly favorable & important for the individual. Our values associate emotions to our experiences and guide our choices, decisions and actions.

Morals:

Morals are the welfare principles enunciated by the wise people, based on their experience and wisdom. They were edited, changed or modified & 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 & ought not to be done in a give 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 ; deals involved

* Values

↳ A value is defined as a principle that promotes well being or prevents harm.

Types of Human values:

(a) Right conduct

(b) peace

(c) Truth

(d) Love and

(e) Non- violence

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.

↳ 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'

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.

↳ 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 (leiscure, hobby, and happiness), welfare (social work), environment (anti-pollution activities) and offer opportunities for all, according to their abilities, but without discrimination.

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, decision, 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.

b. 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.

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.

* Service learning

- Service learning refers to learning the service policies, procedures, norms and conditions, other than the technical trade practices. The serve 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 effectively to interact cordially with suppliers as well as the customers, and to maintain all these friendly interaction.

- 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.

Civic Virtue

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

- 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 tax

2) To keep the surroundings clean & green

3) Not to pollute the water, land & air.

4) To follow the road safety rules.

Rights

1) To vote the local, state or central governments

2) To seek a public welfare facility.

3) To accept or reject a project in their area.

Respect for others

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

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

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

Living peacefully

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

caring

- caring is feeling for others. It is a process which exhibits the interest in, and support for the welfare of others with fairness, impartiality and justice in all activities, among the employees, in the context of professional ethics.

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) Help in a way that the cared for can go on to help himself

Civil Devotion and constancy are essential elements of caring.

Sharing

↳ primarily, caring influences 'sharing'. sharing is a process that describes the transfer of knowledge, experience, commodities and facilities with others.

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

Honesty

- It is a behaviour showing high moral standard. Honesty has two aspects;

1) Truthfulness
2) Trustworthiness

Honesty is mirrored in many ways.

1) Honesty in acts
2) Honesty in Speech

3) Honesty in beliefs

4) Honesty in Discretion.

Some of the acts which lead to dishonesty are

1) Lying

2) Deliberate deception

3) withholding information

4) Not seeking the truth

5) Not maintaining confidentiality.

courage

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

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

a) physical courage

b) Social courage

c) Intellectual courage

valuing time

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

Some of the important time wasters are

1) Lack of clear goals
2) Lack of adequate planning
3) poor delegation
4) Too much socializing

Some of the time management methodlogy

1) Prioritization of tasks
2) Sticking to the tasks and plans
3) Allocate time for the same

Cooperation

- It is a team-spirit present with every individual engaged in engineering. co-operations (Synergy), while not sacrifising

the autonomy of either party. Further, working together ensures coherence, i.e blending of different skills required, towards common goals.

- The impediments to successful cooperation are
1) Clash of ego of individuals
2) Lack of leadership and motivation
3) Ignorance and lack of interest
4) Conflicts of interests

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.

- This is a basic requirement for any profession. It is the driving force to realize success.

Empathy

⇨ Empathy is social radar. Sensing what others feel about, without their open talk. It is 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 of reference or point of view of another.

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

1) Understanding others.
2) Service orientation
3) Developing others
4) political awareness

Self confidence

- Certainty in one's own capabilities values and goals, is self-confidence. These people are usually positive thinking flexible and willing to change.

- Self confidence is positive attitude, where an individual has some positive and realistic view of himself.

- The people with self confidence have the following characteristics:

1) A self assured standing

2) willing to listen to learn form others

3) Frank to speak the truth

4) Respect others efforts and give due credit.

The factors that shape self-confidence in a person are

1) Heredity

2) Friendship

3) Influence of superiors

4) Training in the organization

character :-

- The biggest workplace challenge is said to be the employee's work ethics: showing up, to work every day, showing up to

work on time, talking privately to guests
do their work.

- It is a characteristic property that
defines the behavior of an individual.
- character includes attributes, that
determine a persons moral stand and
ethical actions and responses. It is
also fed ground on which morals and
values blossom.

Spirituality

- spirituality is a way of living
that emphasizes the constant awareness
and recognition of the spiritual
dimension of nature and people,
with a dynamic balance between
the material development and
the spiritual development. This is said
to be the good virtue of Tagalog
philosophy and life Traditions.

- spirituality includes creativity,
communication recognition of the self, value
as human being, respect to others,
acceptance, vision and partnership

- spirituality is motivation of it encourages the colleagues to perform better.

- spirituality is flexibility. of wall one should not be too dominating

- Introduction to yoga and meditation for professional excellence and stress Management

- yoga is a complete process of perfection of man by developing his personality so that he may reach his ultimate good. 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 peacefully and blissful life.

- 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 to

understand its own existone and functions

purpose do yoga:

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

(2) The impressions of sins should be obliterated.

Steps used to relive the stress

1) Find a quiet, relaxing atmosphere

2) Find a comfortable position

3) Take in a deep breath

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

5) Imagine yourself in a happy place

6) close your eyes continue to breathe deeply, and imagine all your body slowing down

7) Take your Time.

Unit - III

Engineering as social Experimentation

Engineering as Experimentation

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 & 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 erdrat 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 also 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

a) Any engineering project or plan is put into practice with partial ignorance because while designing a model there are several uncertainties occured. the reason to the fact that engineers don't have all the needed facts available well in advance before starting to project.

b) The final outcomes of engineering projects are generally uncertain like that of experiments that we do in engineering. In most of the cases, the possible outcomes may not be known and even small and mild projects ; Holds 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.

- 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 lives. A hair dryer may give damage to the unknowing a wrong users from asbestos insulation from its board.

3) Good and effective engineering depends upon the knowledge possessed about the products at the initial and end stages.

contrasts with standard Experiments

- Engineering is entirely different from standard experiments in few aspects. Those difference 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.

2. Informed consent

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

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

Essential conditions for a "valid informed consent"

(i) The consent must be given voluntarily and not by any force.

(ii) The consenter must be capable to processing the information and to make rational decisions in quick manner.

(iii) The experimenter's consent has to be offered in absentia of the experimenter by a group which represents many experiments.

Knowledge gained

- Scientific experiments have been conducted to acquire new knowledge. Whereas engineering projects are conducted as experiments not for getting new knowledge.

Learning from the past

- It has been expected that the engineers have to learn not only from their own design and the production system but also the results of others.

1) The tragedy of 'Titanic', the most disaster took place in the steamship the world some years before, because of his; Some problem:

2) The fall down of "the sunshine skyline Bridge' in the bay of Tacoma at Swedan in 1980, this could have been avoided if the engineers had known about the striking of the ships with the Maracaibo Bridge of venezuela in 1964.

Engineers as Responsible Experimentors:

- The engineer have so many responsibilities for saving the society.

1) A primary duty is to protect the safety of human Beings and respect their right of consent.

2) Unrestricted free personal involvement in all the steps of a project

3) Being accountable for the results of a project

Conscientiousness -

- Conscientiousness implies consciousness. 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 social experimentation that involved in engineering should be restricted by the participants consent.

- Relevant information

- Without relevant 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 fulfilment of one's moral obligations.

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's nothing wrong in that. But at the same time, if he forgets the fact that the heat exchanger will be used in the manufacture of an illegal product, then he is said to be showing a lack of moral concerns. So a person must be aware of the wider implication of his work that makes participation in a project.

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

Codes of Ethics

- 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.

Roles of codes and its functions

- Codes give a convinced motivation for ethical conduct and provide a helpful guidance for achieving the obligation of engineers in their work.

1. Inspiration and Guidance

- The following engineering societies have published codes of ethics

AAES - American Association of engineering societies

ABET - Accreditation Board for engineering and Technology (USA)

IEEE - Institute of Electrical and electronics engineering (USA)

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.

2. 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. protecting the Status quo

- codes determine ethical conventions which help

unit - 2

Engineering ethics

introduction

ethics or moral philosophy is that branch of philosophy which has morality as its subject matter

the term ethics is concerned with norms for the conduct of people as member of society

ethics and morality

ethics and morality were generally used interchangeably. ethics from the Greek word ethikos which in turn means ethos customary way to acting means the character or customs of a social group

definitions of ethics

ethics is concerned not only with distinguishing right from wrong and good from bad but also with commitment to do what is right or what is good

ethical value : A belief of principle rooted in moral behaviour based on the sense of what is right

unethical value : A belief of principle rooted
in immoral or amoral
behaviour based on a sense of
what is wrong or at least of
consciously disregarding what
is right

nonethical value : A belief or preference that
is not related to right of
consciously ~~disregarding~~ wrong

engineering ethics

engineering ethics is defined as "The study
of the moral issues and decision confronting
individuals and organization engaged in
engineering

sense of engineering ethics

engineering ethics mainly refers to the
specific moral problems and issue related
to engineering activity

moral and Amoral agents

acts, agents and the character or
motives of agents are the objects of moral
evaluation however only certain agents have
their acts character or motives morally evaluated

moral rights

a right is a justified claim entitle
. ment or association of what a rights
holder is due for a person to have the
moral right to have get or do something
three must be moral justification for the
claim

variety of moral issues

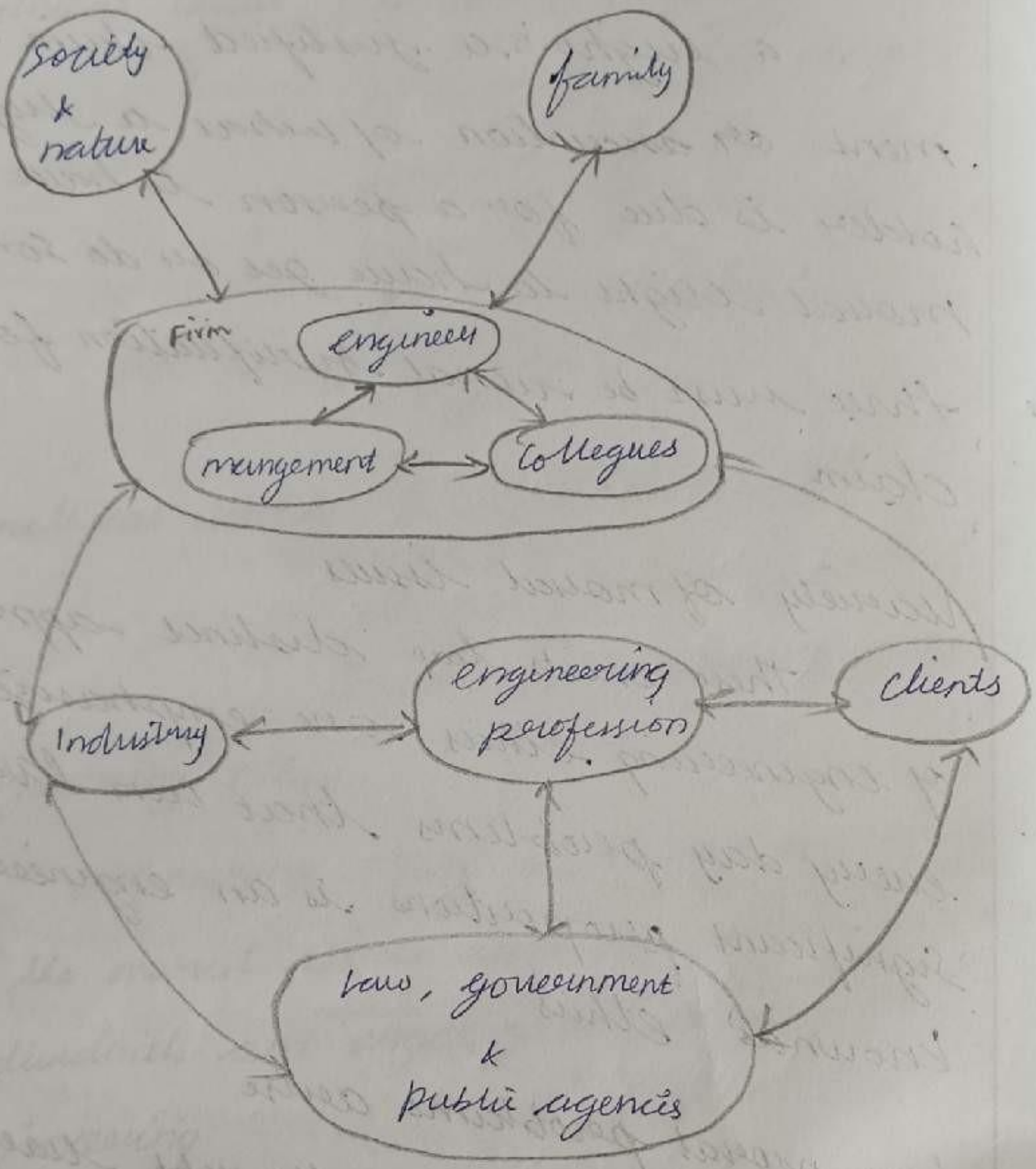
These exists two distinct approaches
of engineering ethics one emphasizes typical
every day problems that can have on
significant proportions is an engineers life
knowns as ethics

how moral problems arise

a product goes throught various
engineering stages like design manufacture
testing sales and service

Example engineering ethics

an inspector declares a instrument not
to be used from safety point of view by his
his superior may view



Types of inquiry

* normative inquiry
* conceptual inquiry
* factual inquiry

moral Rules or Rules of ethical Conduct

moral rules or rules of ethical conduct

Conduct specify the acts or omits of action required

why study engineering ethics

engineering ethics is a means to increase ability of concerned engineers managers and other citizens: to face moral issues caused by technology activity

moral dilemma

There may be some situations where two or more clearly applicable moral peinciples come into conflict or a peinciple

moral autonomy

The meaning of autonomy is independent or self determining and moral autonomy is defined as the skills and hapits of thinking rationally about ethical issues based moral concern

Kohlberg's theory

* preconventional level
* Conventional level
* post conventional level

Gilligan's theory

Carol Gilligan in her book on a Difference Voice presented new approach to moral developement

Theories about Right action

it is the view that we ought do produce the most good for the most people giving equal consideration to every one affected

self-interest, customes and Religion

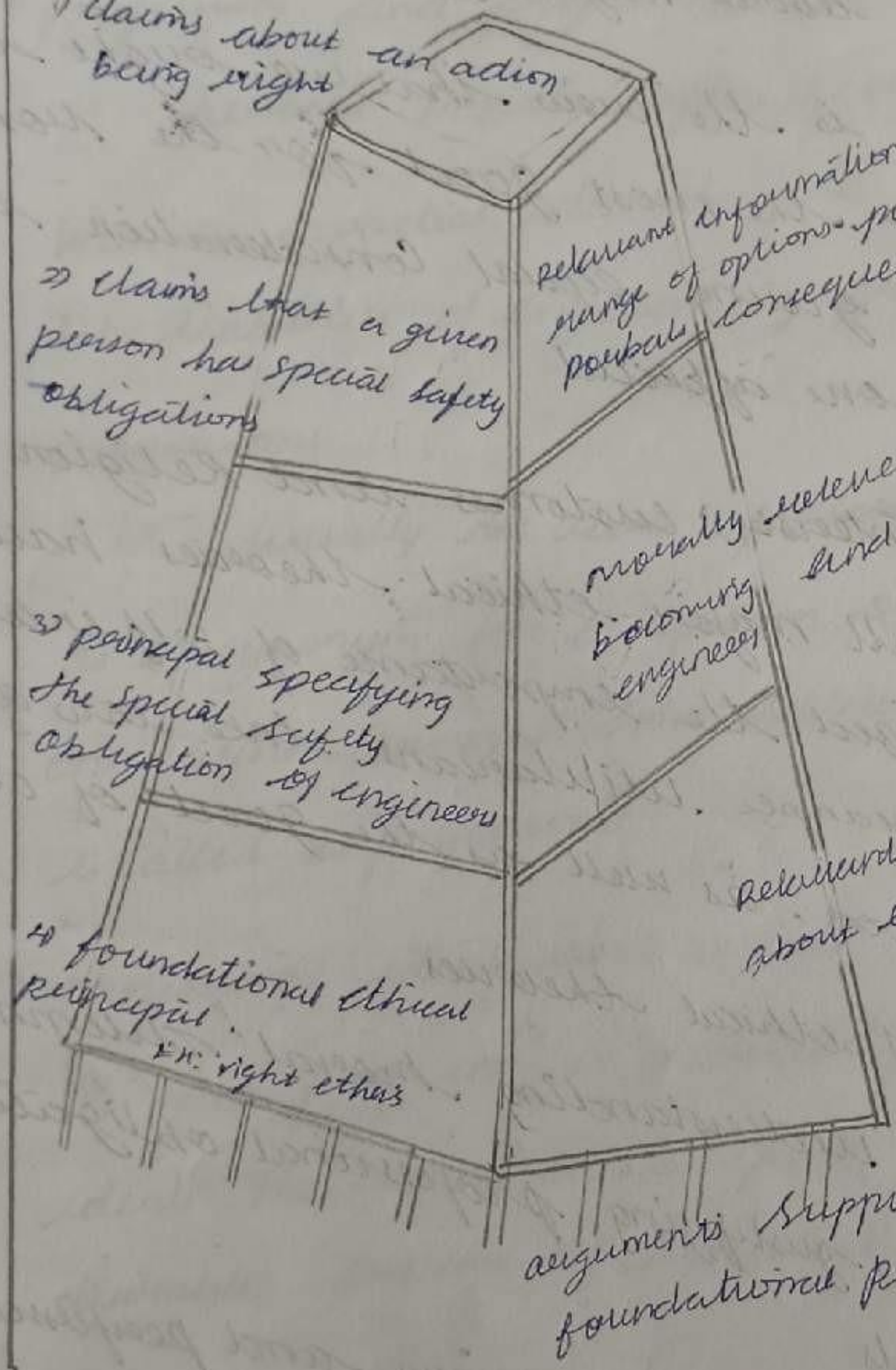
all major ethical theories have recognized the importance of self interest for example. utilitarians take into account good. as well as the good of others

uses of ethical theories

+ in understanding moral dilemmas
+ in justifying professional obligations and ideals
+ in relating ordinary and professional morality

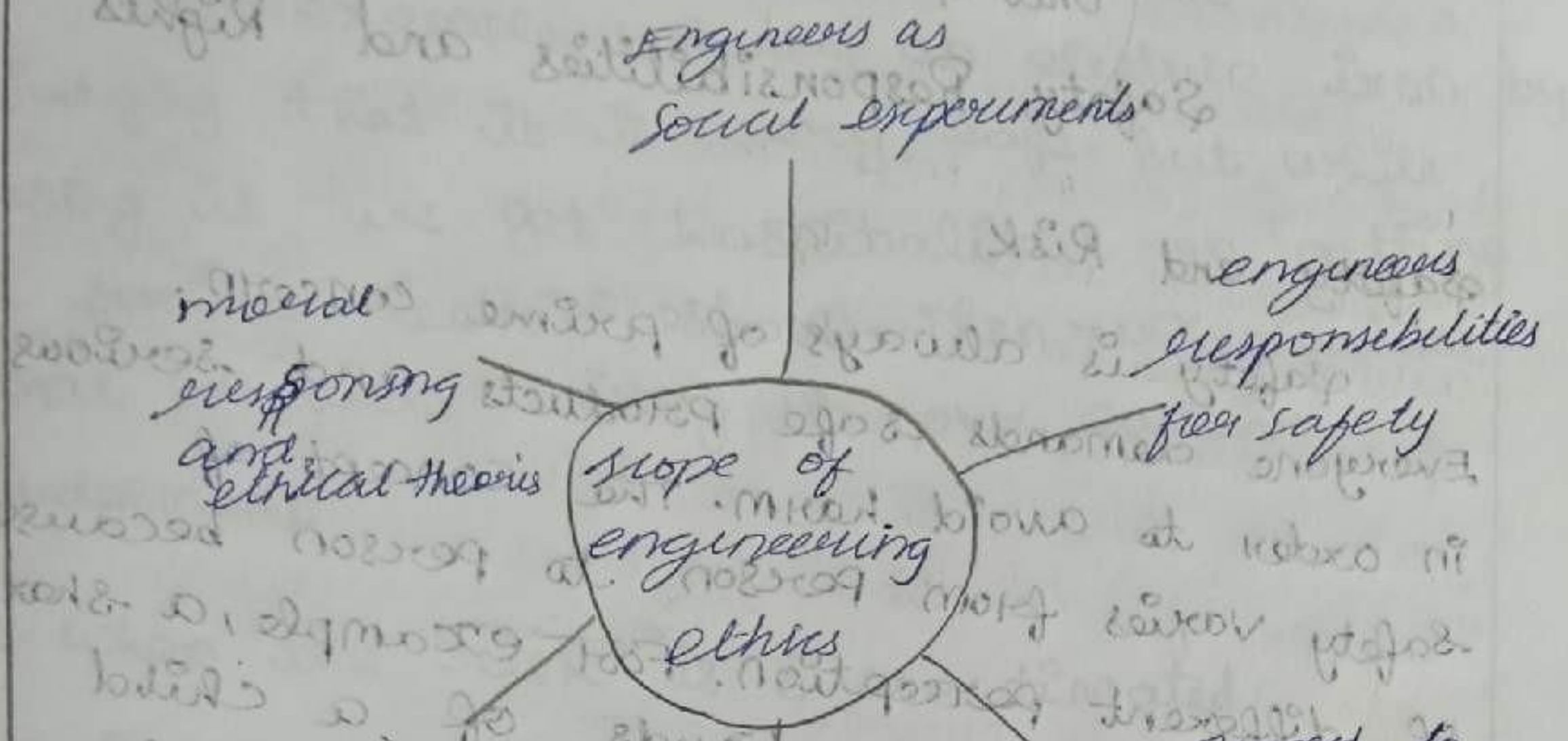
Justifying professional obligation

ethical theories also used in justifying general obligation to engineers and all those enmolved in technological development safety involved in most of the issues of engineering ethics



Scope of professional ethics in engineering

engineering ethics plays a vital role in overall development of an engineering profession that examins & sets the obligations by engineers to society, Client and to their professions



Importance of professional ethics in engineering

Regardless of profession or the field of work one belongs to ethics is an important part of work. The success or the expected results depend on how the workers deal with the Side situations whether ethically or unethically. If they are dealt ethically the chances are positive for growth and developement.

Unit-4

Safety, Responsibilities and Rights

Safety and Risk

Safety is always of prime concern. Everyone demands safe products and serious in order to avoid harm. The concept of safety varies from person to person because of different perception. For example, a sharp cutting tool in the hands of a child will never be safe as it can be in the hands of an adult. of- course one has to pay for safety. Absolute which satisfies all individual under all conditions is not at all possible.

concept of Safety

There are various approached for defining concept of safety.

According to william W. Lowrence" A thing is safe if its risks are judged to be acceptable". The judgement about safety are value judgement.

The lawerence definition of safety can be modified after considering these conditions.

1. when the risk is underestimate

For example, we buy an electric iron by judging that it is very safe. But while using it we get hospitalized on getting a serious electric shock. Then we realize that we were wrong in our earlier judgement

2. When the risk is overestimated

For example, we unnecessary think that fluoride in drinking water will kill us. As per lawrance definition the fluoride water is unsafe hence judge its risks to be unacceptable. But our ordinary concept of safety allows us to consume water inspite of such irrational judgements

3. when the no judgement about risks are made

For example, we never think about the safety of vehicle we drive ie. we simply do not think about it. By lawrance definition the vehicle is neither safe nor unsafe.

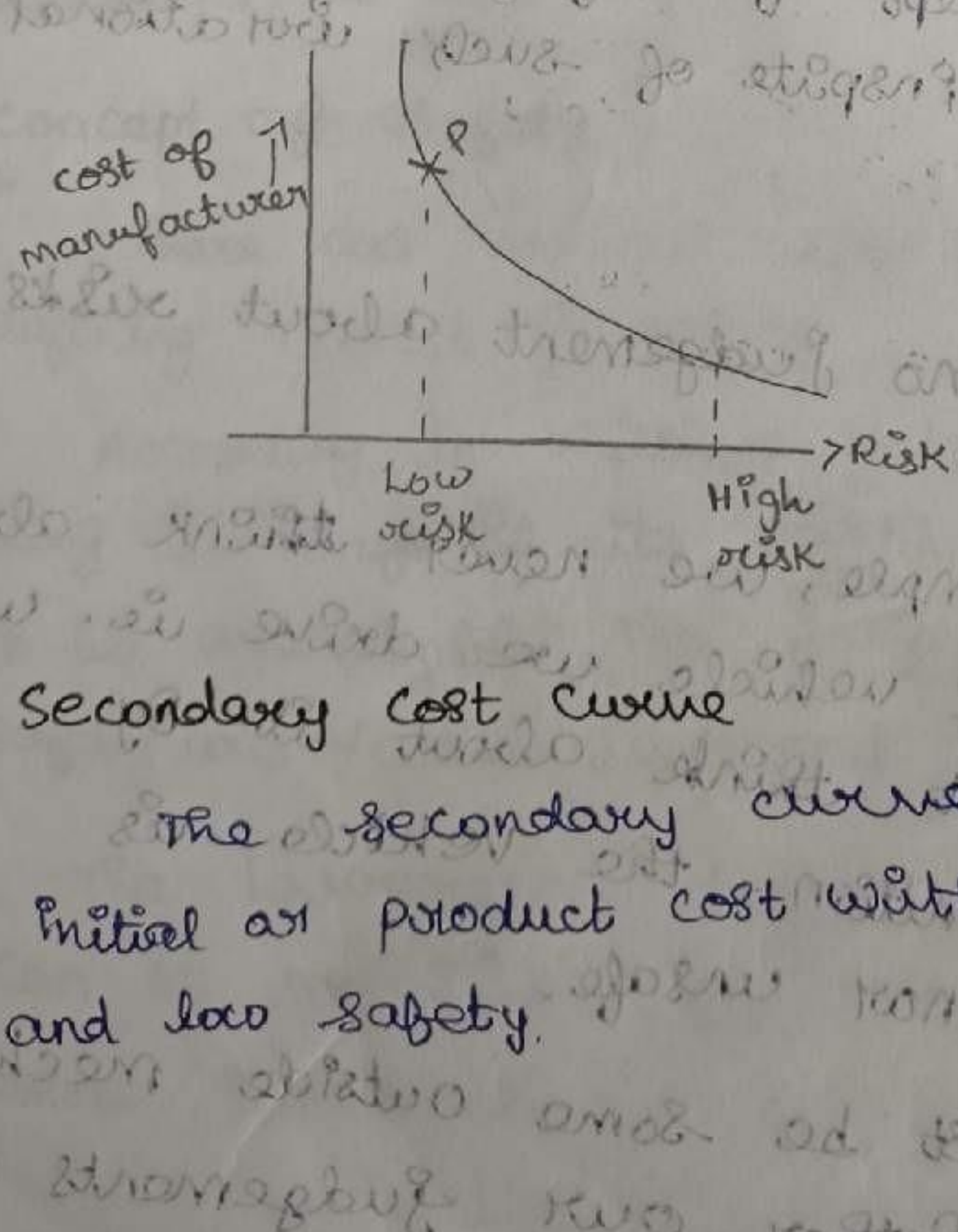
These must be some outside mechanism to decide whether our judgements about safety are correct and about acceptable risk.

Assessment of Safety and Risk

Absolute safety can not be achieved and of course improved safety in engineering costs more. Besides the products which are not safe costs more in terms of warranty expenses, loss of customer and goodwill losses due to injuries, losses because of downtime of machines etc.

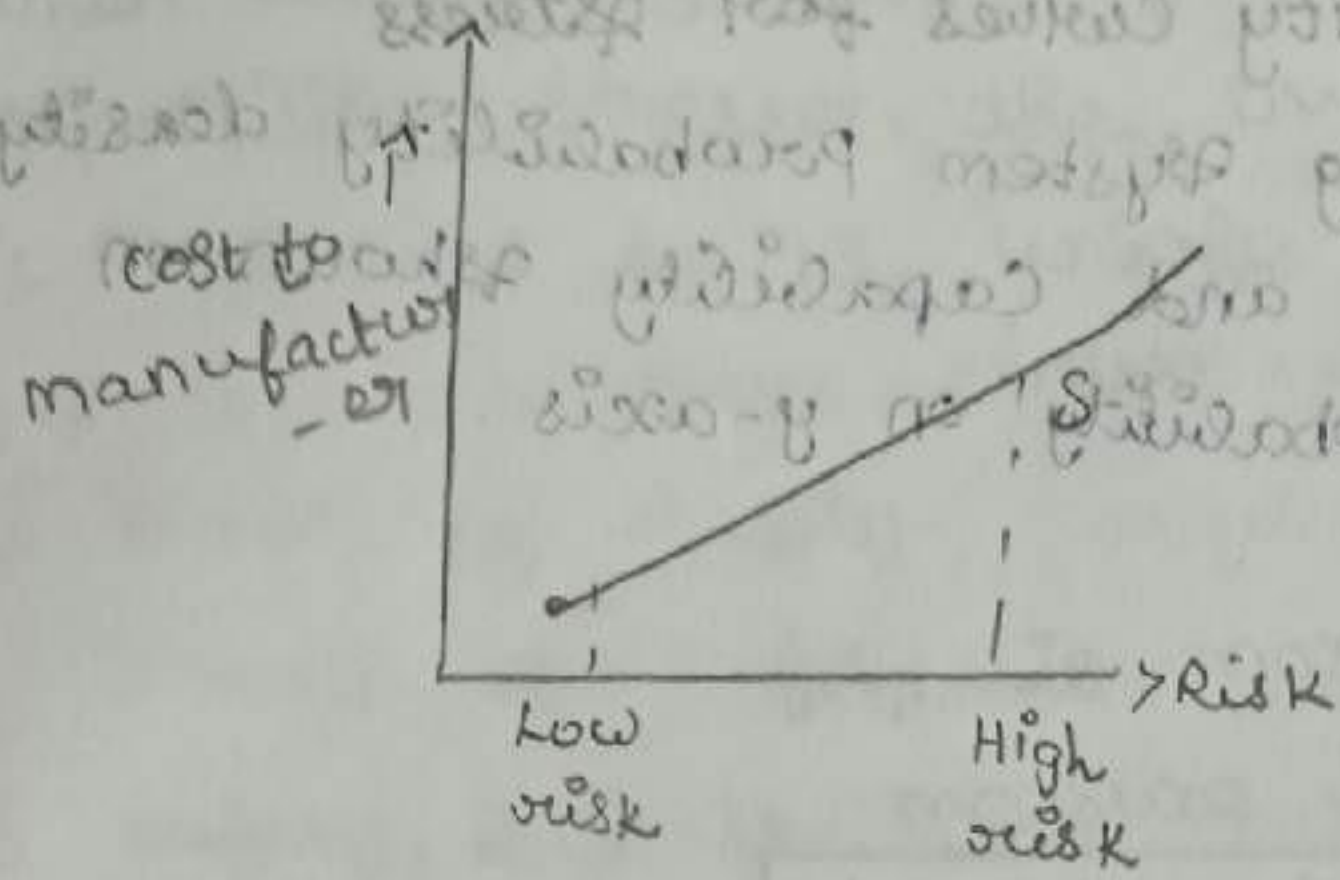
primary cost curve:

Primary cost course. It is a curve between risk and cost to manufacturer. Initially, the cost of manufacturer higher risk is low and it increases with reductions in risk.



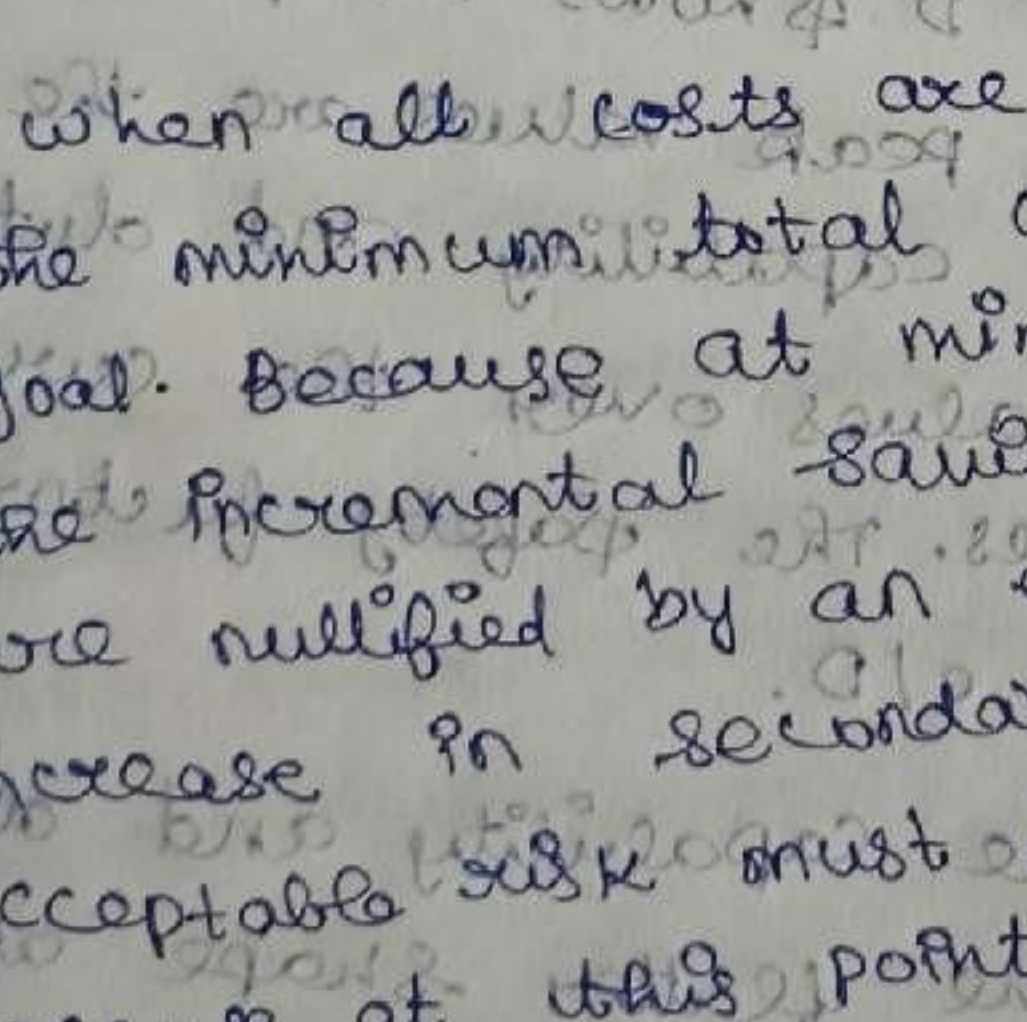
Secondary cost curve

The secondary curve had low initial as product cost with high risk and loo safety.



Total cost

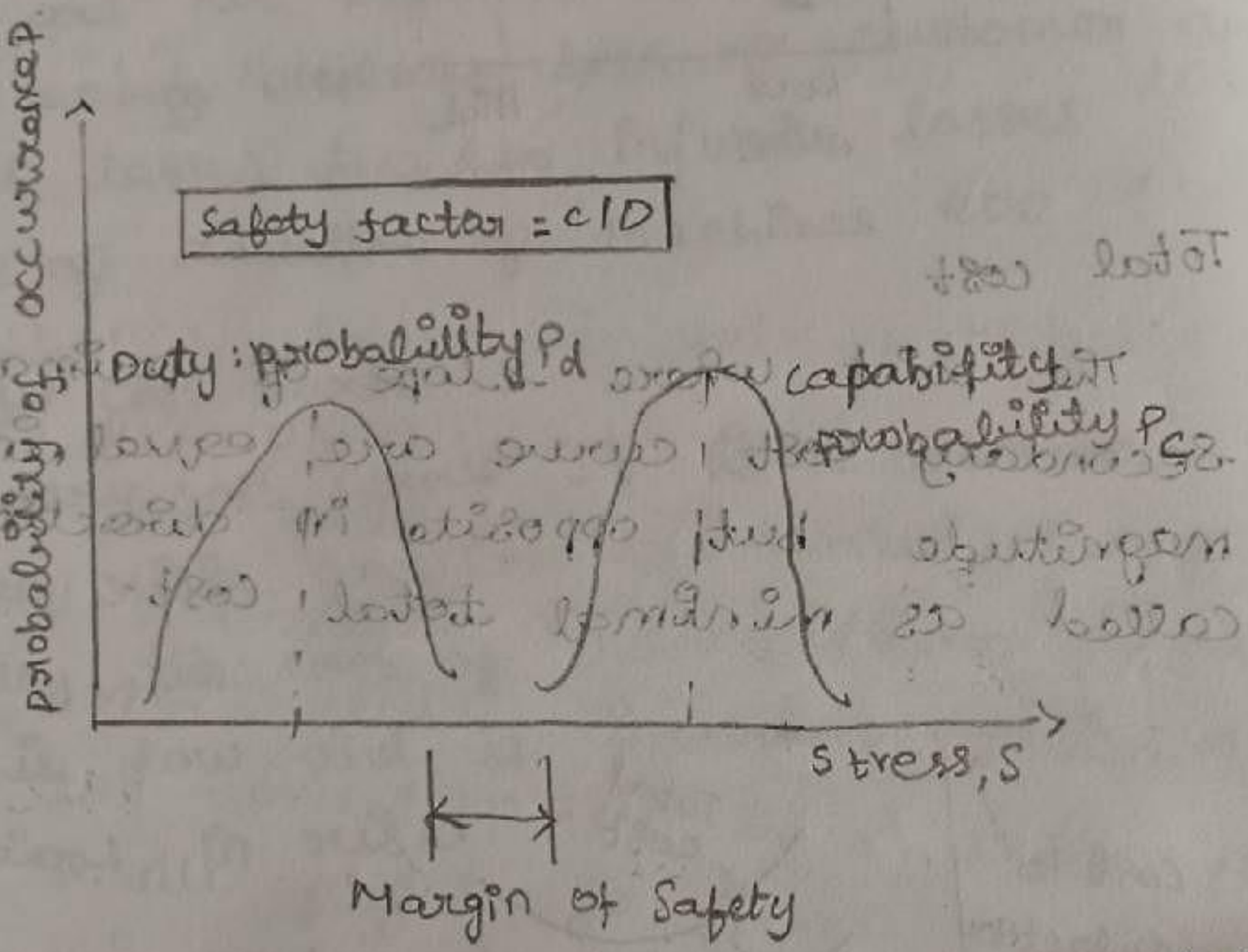
The point where slope of primary and secondary cost curve are equal in magnitude but opposite in direction is called as minimal total cost.



When all costs are quantifiable, then the minimum total cost is the ultimate goal. Because at minimum total cost (M), the incremental saving in primary cost are nullified by an equal incremental increase in secondary cost. The highest acceptable risk must be below this point M because at this point minimum risk occurs at minimum cost.

Probability Density Curves for Stress

The engineering system probability density (PD) curves for duty and capability shown on x-axis and probability on y-axis.



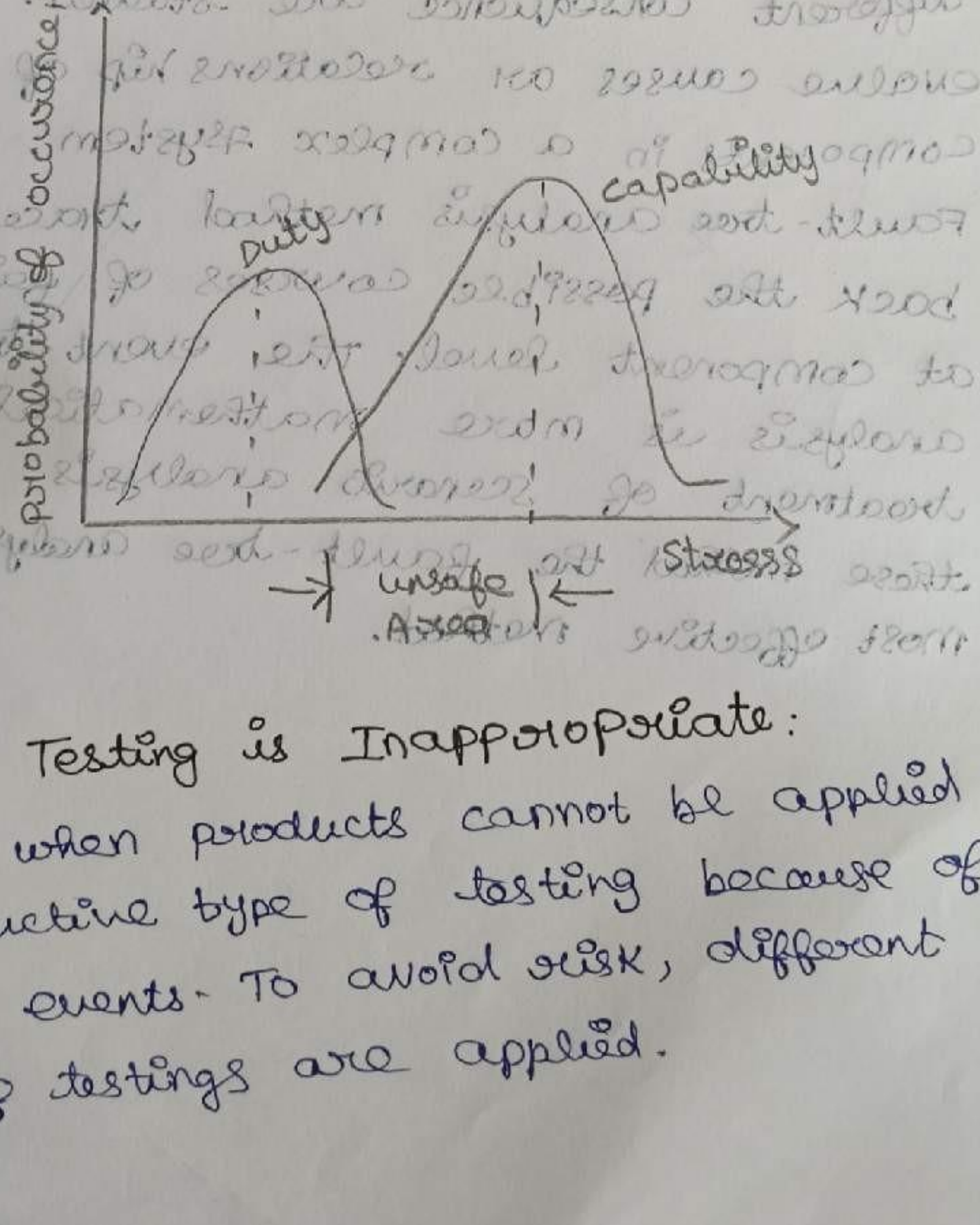
The capability curve shows the relation between probability of capacity to corresponding stress, while the duty curve shows the stress under various load.

The points C and D shows the peak values of the curves. The peak values are the expected values of capability and duty, while all other values over the curve are nominal values. The safety factor is curve defined as c/D.

In reality the capability and duty curves takes some flatter shape at its peak because of increased variances.

when their is overlap in duty and capability stresses, the overlap portion is referred to as unsafe area and the gap between these curves is referred to as margin of safety.

Margin of safety is more exact measure of safety, But to measure it is difficult task, shows duty and capability curves when both curves over lap and unsafe area.



when Testing is Inappropriate:

All when products cannot be applied to destructive type of testing because of risky events. To avoid risk, different type of testings are applied.

a) Simulation

b) Scenario analysis

c) Failure mode

d) Effect analysis

e) Fault-tree analysis.

f) Event-tree analysis

Simulation gives hypothetical results. In scenario analysis, the process starts at any given point and from here the different consequence are studied. That evalue causes an relationship of components in a complex system. Fault-tree analysis method traces back the possible courses of failure at component level. The event-tree analysis is more mathematical treatment of scenario analysis. Amongs these method the fault-tree analysis is the most effective method.