

Engineering Ethics

what is Engineering Ethics ?

→ the study of moral values, issues, and decisions involved in engineering practice

includes

- responsibility
- ideals
- character traits
- social policies
- relationship from individual & corporation

why Engineering Ethics ?

receive inputs in

- basic engineering sciences
- Design
- Manufacture
- software skill
- technical problem solving ability

④ fundamental aspects of engineering ethics

- identify & enlist the type of ethical issues in his/her engineering career
- clarify the related concepts theories
- Guide & help in confronting & resolving ethical & moral dilemmas
- stimulate critical & responsible reflection and useful discussion on these issues

Ethics

Micro-ethics

→ deals with some typical & everyday problems which play an important role in the field of engineering and in the profession of an engineer.

Macro-ethics

→ deals with all societal problems which are unknown and suddenly burst out on a regional or national level

How to deals

with ethical problem

6 steps

① Recognize problem

② Gather information & define the problem

③ Generate alternative solutions

④ Implement best solution

⑤ Decision making

⑥ Evaluate benefit & cost of alternative solution

& optimization

~~18-(2²)~~ find

Moral

- ① Refers to only **personal behavior**
- ② we do it because we believe in something being **right or wrong**
- ③ **social conventions** about right or wrong conduct
- ④ Refers to **any aspects of human action**

Ethics

- ① Refers only to **professional behavior**
- ② because society **says it is the right thing to do**
- ③ **critical reflections** on what one does and why one does it
- ④ involves **defining, analyzing, evaluating & resolving** moral problems and **developing moral criteria to guide human behavior**

engineering
ethics

has

Four Sense

(1) it is an area of inquiring & activity

(2) it distinguishes between moral & non-moral problems

(3)

refers to a particular set of moral beliefs
— attitudes
— habits
that a person/group displays

(4)

refers to principles of ideas
— obligations
— rights

which are morally justified

Reasons of unethical behavior

- (1) Resource Crunch
- (2) Opportunity
- (3) Attitude

individual diversity (विविधता) —
dissent (विवाद)
input to decision making

Types of inquiries

① Normative Inquiring :-

- based on values
- identify and justify morally desirable norms

on standards that should guide individuals and groups

② conceptual Inquiring :-

- based on meaning
 - clarify the meaning of concepts / ideas / principals that are expressed by words
- on by questions & statements

③ Factual inquiry :-

→ Descriptive Inquiry

→ based in facts

→ obtain facts needed for
understanding & resolving value
issues

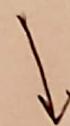
→ facts provide both reasons and
way to solve moral problems.

Three ways to solve Conflict problem

① Easy choice → one which is more significant

② Creative middle choice & important

③ Hard choice



finding out &
attempting some
kind of compromise
that will at least
partially satisfy available
choice

when
both the
choice are
not feasible

मूली-

Moral Dilemmas :-

→ refers to situations in which generally a difficult choice has to be made based on conflicting moral issues involved.

Moral Autonomy :-

→ self determining on Independence

- is a skill-habit of thinking rationally about ethical issues
- is concerned with decision making power of a person with regard to ethical issues

⑧ Skills for developing moral autonomy

- develop proficiency in recognizing moral problem issues
- able to ~~be~~ comprehend, clarify & critically assess & analyze arguments of moral issues
- Judgements should be based on moral consideration, ethical expression
- knowledge about the importance of suggestion & choosing the best available solution

what is profession ?

→ it is a life career which requires
special ~~society~~ knowledge, practically trained
and continuous in service training with
a clearly defined membership of a particular
group involving its own code of ethics.

Professional engineer

→ is one who earns a degree
in engineering at an institutions
approved and recognized by
duly constituted authority
like AICTE

Models of professional Role

An engineer has to play the role of →

- ① a **savior** → protect & safeguard society from harmful effects (waste, prevent inefficiency)
- ② a **guardian** → act as a guardian of technological advancement (knowing the best option)
- ③ a **bureaucratic servant** → receive and translate the directive of his superiors
आधिकारिक सेवक
- ④ a **social servant** → provide service with responsibilities & satisfy desire of society
- ⑤ a **social enabler & catalyst** → help & understand society needs and take decisions about technological development
- ⑥ A **game player** → play according to economic game rule successful with organization enjoy the pleasure of technological advancement

Moral Development theory

Kohlberg's theory :- (ethics of rules & rights)

According to Lawrence Kohlberg theory
of moral development has three levels.

Pne- conventional level	Conventional level.	Post - conventional level
<p>① This is the most primitive level</p> <p>② Primary motive of any individuals is to satisfy themselves → to escape punishment & obeying to authority implicitly</p>	<p>① Loyalty and identification are the hallmarks of this level</p> <p>② Primary motive of any individuals is to satisfy others → obeying to the dictates of family or group implicitly in cost of own self interest</p>	<p>① Individual at this level is able to think of principles of rights, right conduct, general good regardless of convention & individual interest</p> <p>② seek to do what is morally reasonable and to maintain integrity</p>

③

mainly this behavior seen in children.

Many of the grown ups do not raise themselves above this level

③

most adult do not cross or think beyond this stage

③

These people do not follow customs (स्वीतिनीति)

④ They are called

खात्रिमानित - autonomous

as they are not

susceptible to customs & beliefs

unless they are for public good.

④ Any conduct is taken to be right which benefits individuals.

Gilligan's Theory :- (ethics of care)

Student of Kohlberg

Pre-conventional	Conventional level	Post-conventional level
① the person involved is pre occupied with self centred reasoning	④ Instead of self centred one develops - thinking about others - not hurting them - willing to help & nurture others	⑤ Individual at this level able to find reasonable balance between caring for others & establishing their own individual rights and interests.

Ethical theories

There are four types of theory of morality

- ① Virtue Ethics → virtues
- ② Utilitarianism → most good for most people
- ③ Duty Ethics → duty
- ④ Right Ethics → Human rights

→ oldest ethical theory

→ wisdom is most import. virtue

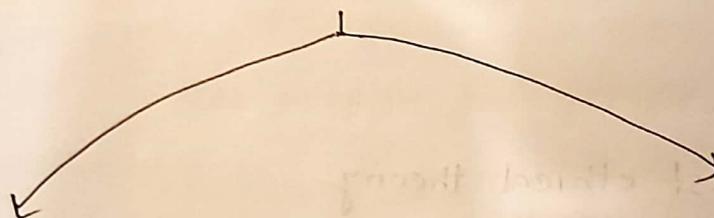
it enables good judgement

→ to active life, one has to follow ~~moral~~ moral virtue

→ Virtues → integrity, honesty
selfrespect, responsibility

utilitarianism

- it means maximizing the utility which again points to producing most good for most people
- Utility of action; a product/project by professional is overall balance of good over bad consequence



Act-utilitarianism

- to attain maximum utility one has to maximize goodness

Rule-utilitarianism

- acts are morally right when they are done under accepted rule which produce most good for most people

According to
→ John Stuart

→ based on moral
codes not
individual
actions

only happiness
is intrinsic good
desire (desirable)
all other goods are
Instrumental good
(way to happiness)

→ based on individual
action

→ friend, love,
ship
understanding,
appreciation of
beauty

even if they do not
lead to happiness

they satisfy rational
desire

so they are

intrinsically
good

अनुत्तीर्ण

व्यक्ति

Uses of ethical theories

① help us to understand and resolve
moral dilemma

→ identify moral considerations
& moral reasons

→ help to rank moral considerations
and reasons according to
importance

→ help to categorize the
full moral ramifications

→ help to use appropriate
moral term with
meaning

→ provide the basis of
moral reasoning

→ strengthen the ability
of moral judgement

② help to

③ help

②

help to justify moral obligations

→ justify the general obligations
of professionals

→ points to direct link between
basic human rights & moral
obligation of professionals

→ law, codes & employment agreement
provides safety of obligation

③

help to relate professional morality
and general morality

ordinant



ordinant

ordinant

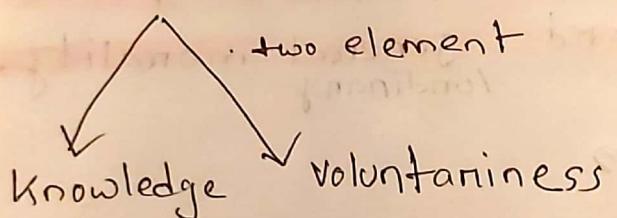
(বিষয়) - contrast of engineering projects
with standard experiments:-

① Experimental control :-

→ No experimental group in standard experiment

→ ~~Human~~ Human being are experimental subject
in Engineering project

② Informed Consent :-



* Engineer as responsible experimenter :-
(प्राचीनता+)

Conscientious :- (विवरकवान्)

- exhibit a 'conscientious' commitment to live by moral values
- act as guardians of public interest
- guard the welfare and safety to those affected by engineering project
- should force his view upon society

↗

(व्यापक)

A comprehensive perspective :-

- aware of experimental nature of any project
- should bear in mind that solution to the problem is achieved by adopting preventive technology

Moral Autonomy :-

- ability to make own choices
- capacity to make rational decisions
- capacity to make informed decisions
- capacity to make free will choices

- capacity to hold one's own opinions for one's self
- professional staff have autonomy &
- autonomy of professionals of hospitals

- financial managers have autonomy &
Accountability :-

- accountability of employees
- accountability of companies
- accountability of employees

- accountability of employees
- accountability of employees

- accountability of employees
- accountability of employees
- accountability of employees
- accountability of employees

Code of Ethics

18 Final

- a code serves as a statement from the profession to public as to what to expect from its members, promoting trust in the professional
- it's established by Professional engineering Organization, & Professional Society
- it emphasizes commitments to safety, public health, environmental protection
- it provides a framework & serves as a guideline for ethical judgement to a professional
- it helps to resolve ethical issue.

~~A code of ethics~~ A code of ethics is a set of principles and rules used by individuals & organization to govern their decision making process as well as to distinguish right from wrong.

- ① **Integrity** → honesty & clean communication
- ② **Objectivity** → don't make career decisions on whom you like
- ③ Professional competences
- ④ **Confidentiality** → maintain client confidence
- ⑤ Professional behavior

Roles of codes

- ① Inspiration and guidance → code provides healthy framework & guidelines so that engineers are inspired & motivated
- ② Support → act as legal support against the odds of organization
- ③ Deterrence & discipline (恐吓) → forms the basis for identifying unethical acts & facilitates possible action
- ④ Education & mutual understanding
- ⑤ Contributing to profession's public image → help engineers to acquire positive image amongst public about the ethically committed profession
- ⑥ Protecting the status quo → promote agreed minimum level of ethical conduct
- ⑦ Promoting business interests → prevent from quoting for doing a job

Limitations of code

① New developments in technology and transition of social / organization structure into new ones ; which result is unpredictal conditions in overall.

∴ the codes are restricted to general & specific situations
সাধারণ -
বিশেষ -
অস্থায়ী -
নির্মাণ -

② Different entries in conflicts with each another which lead to professional sometimes in dilemma.
ত্রুট্য -

③ Code cannot serve as the final moral authority for professional conduct