

Professional Ethics in Engineering

Profession and Ethics (3 hours)

2.0 Profession and Ethics

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2.1 Definition and Characteristics

- **Profession:** An occupation carried out with a systematic knowledge acquired through specialized training or education and experience and practicing the same.
- **Professional:** A person practicing a profession in area of expertise.
- **Professionalism:** The content of profession with moral and ethical behaviours.
- Acts of a professional are evaluated by the public.
- Professionals follow their code of conduct, and standards and norms.
- Professional have their own culture
 - Through regular interactions, communications and experiences in same field



2.1 Definition and Characteristics

- Ethics: generally concerned with rules or guidelines associated with a profession.
- Ethics is normally clear; ethical and unethical behaviours are easier to distinguish, hence no ethical dilemma, as opposed to moral dilemma.
- Ethical acts are legal and moral; but a particular moral act is not necessarily ethical/professional.



2.2 Codes of ethics and guidelines for professional engineering practice

Different professional engineering societies have issued Code of Ethics for their members. Examples: ABET, IEEE, ASME, NEC, NEA, SCAEF, FCAN, CAN, ...

Accreditation Board of Engineering and Technology (ABET) Code of Ethics for Engineers:

1. Engineers shall hold paramount the safety, health, and welfare of the public in the performance of their professional duties.
2. Engineers shall perform services only in the areas of their competence.
3. Engineers shall issue public statements only in an objective and truthful manner.
4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.
5. Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.
6. Engineers shall act in such a manner as to uphold and enhance the honor, integrity, and dignity of the profession.
7. Engineers shall continue their professional development throughout their careers and shall provide opportunities for the professional development of those engineers under their supervision.

IEEE Code of Ethics:

1. to accept responsibility in making decisions consistent with the safety, health, and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;
2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;
3. to be honest and realistic in stating claims or estimates based on available data;
4. to reject bribery in all its forms;
5. to improve the understanding of technology; its appropriate application, and potential consequences;
6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;
7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. to treat fairly all persons and to not engage in acts of discrimination based on race, religion, gender, disability, age, national origin, sexual orientation, gender identity, or gender expression;
9. to avoid injuring others, their property, reputation, or employment by false or malicious action;
10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics.



NEC code of ethics

- 1. *Discipline and Honesty:*** The Engineering service/profession must be conducted in a disciplined manner with honesty, not contravening professional dignity and well-being.
- 2. *Politeness and Confidentiality:*** Engineering services for customers should be dealt with in a polite manner and professional information should remain confidential except with written or verbal consent of the customers concerned. This, however, is not deemed to be a restriction to provide such information to the concerned authority as per the existing laws.
- 3. *Non-discrimination:*** No discrimination should be made against customers on the grounds of religion, sex, caste or any other things while applying professional knowledge and skills.
- 4. *Professional Work:*** Individuals should only do professional work in their field or provide recommendation or suggestions only within the area of their study or obtained knowledge or skills. With regards to the works not falling within the subject of one's profession, such as works should be recommended to be done by an expert of the subject matter.



NEC code of ethics

- 5. *Deeds which may cause harm to the engineering profession:*** With the exception of salary, allowance, and benefits to be received for services provided, one shall not obtain improper financial gain of any kind of conduct improper activities of any kinds, which would impair the engineering profession.
- 6. *Personal responsibility:*** All individuals will be personally responsible for all works performed in connection with his/her engineering profession.
- 7. *State name ,designation and registration number:*** While signing the documents or descriptions such as the design , map , specification and estimates etc relating to the Engineering profession , the details should include, the name , designation and NEC registration No. and should be stated in a clear and comprehensive manner.
- 8. *No publicity or advertisement to be made which cause unnecessary effects:*** In connection with the professional activities to be carried out, no publicity or advertisement shall be made so as to cause unnecessary effects upon the customers.

Learn these 8 CoEs by heart

2.3 Relationship of engineering profession to other professions (e.g. fellow engineers, clients and contractors)

Relationship with fellow engineers:

- Professional relationship with all the engineers, regardless of their status, and even if the fellow engineer is a close relative
- “Engineers shall not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputations, prospects, practice or employment of other engineers, nor indiscriminately criticize the work of other engineers”
- Criticize cautiously and objectively with respect to the person’s professional status
- Have professional relationship
 - Encourage fellow engineers to follow Code of Ethics
 - Guide, train and orient freshly graduate engineers
 - Create platform for information and knowledge sharing
 - Support fellow engineers in professional development



Engineer's relationship with Client:

- Strict professional relationship, even if the client is closely familiar (relative, friend)
- No discrimination among client based on culture, race, religion, sex, ...
- Work in the best interest of the client with loyalty with legal limit
- Deliver in time, with quality
- Not expect extra favour for works performed as per an agreement
- “An engineer shall not accept financial or other compensation from more than one party for services rendered on one project unless the details are fully disclosed and agreed by all parties.”
- Supervise work and prevent misuse/abuse of client's property/trust
- Assist in decision making by providing options
- Warn potential risks of decisions
- Going beyond ToR, when professionally required
- Keep information confident, unless required by law
- Full disclosure of potential conflict of interest, if any
- Not take a client for granted: remembrance of bad experience lingers much longer than a good experience

Engineer's relationship with Contractor:

- Strict professional relationship, even if the contractor is closely familiar (relative, friend)
- Provide due respect to the contractor
- No discrimination among contractors based on belief, race, religion, culture, sex, sexual orientation, ...
- Provide all the detailed drawings, quantity and quality (including specification) of works (goods and services) to the contractor in time
- Check and approve running bills in time, as per specification
- Not expect or accept (directly or indirectly) extra favour of significant value, for works performed as per an agreement
- Supervise work and prevent use of sub-standard methods and materials being used
- Participate in co-decision making by providing options when necessary
- Assist the contractor when variations are technically needed
- Warn potential risks of decisions/actions
- Going beyond ToR, when professionally required



2.4 Moral dilemma on ethical decision making

- Ethical decision, which is legal and follows all the prevailing rules, regulations, and standards, and is beneficial to the client, may result in (a) environmental damage beyond the limit what the engineer considers to be moral, (b) reduced public safety, (c) loss to helpless, voiceless, marginalized stakeholders. Such a situation creates a moral dilemma to an engineer.



2.5 Negligence and Liabilities

Negligence in duty (dereliction of duty) results in liabilities to stakeholder whose life, health or property is damaged.

Conditions for establishment of professional negligence:

- **Duty:** Unless there is a contractual duty to perform a work there is no negligence in the performance of the work.
- **Breach:** Unless there is a breach of the terms and conditions of an agreement, professional negligence cannot be proved.
- **Damages:** Unless there is a specific damage to the claimant, professional negligence cannot be established.
- **Proximate cause:** There should be direct (one-to-one) relation between the specific action of a professional and the damage resulted by the action to the claimant.

2.5 Liabilities of engineers in project design, construction and implementation

Three sources of liability:

- a) **Liabilities due to contract:** liable to fulfill all terms of contract; if there is no contract, legally, there is no liability under this category. An engineer is liable for loss of damage due to breach of contract clauses. Contract law imposes liability on a party for promises that the first has made to another party; liability related to loss of a single person's life/property.
- b) **Liabilities due to criminal law:** liable to follow all prevailing laws of nation, breach of law related to design, construction and implementation of design can result in criminal case, whether there is damage or not. Criminal law imposes liability on a party due to illegal/ criminal acts; defendant has a liability to the government/state.
- c) **Liabilities due to tort:** liable to prevent customers/users of products and services from loss or damage; even if there is no specific contract and no laws have been breached, an engineers can be held liable for loss or damage to the customer due to the use of services and products designed, constructed, or implemented by the engineer. Pre-information or pre-warning or disclaimer can prevent an engineer from liability due to tort. Tort provision is a legal mechanism for compensating individuals injured by others, whether deliberate or not; directed toward the compensation of individuals, rather than the public.



Vicarious and Partnership Liability

Two types of liability:

- **Vicarious Liability:** A company or a contractor/sub-contractor is liable for the acts of its own and its employees. Three tests are used to ascertain the degree of vicarious liability.
 - **Control test:** degree of liability depends on level of control a company has on its staff or contractor; the more control a company has over a person (employee) the more liable the company is.
 - **Business integration test:** degree of liability depends on level of business integration; the more the work of a person is integrated into the work of a company, the more liable the company is for the acts of the person, even if the person is not a direct employee of the company.
 - **Multiple test:** Control test, business integration test, and other related factors are taken into consideration to determine the degree of liability.
- **Partnership Liability:** Liability of the partners in tort: The partners of a company are liable for the acts of one (or more) of its other partners.



2.5 Liabilities of engineers in project design, construction and implementation

Liabilities of an engineer in project design

- **Fitness for purpose:** The design of a project (overall and component-wise) should be proper to serve the purpose of the project.
- **Negligent misstatement:** The designers and professionals are expected not to make any negligent or unsubstantiated misstatements.
- **Statutes, bylaws and building regulations/codes:** It is the duty of the designers and professionals to make themselves fully aware of the statutes, bylaws and codes related to their professional practice.
- **Examination of site above and below the ground:** Before finalizing a design, a designer should know the conditions of the site above and below the ground.
- **Public and private rights:** The design of a project should not contradict with the public and private rights of the client and others who may be affected by the design implementation.
- **Plans, drawings and specifications:** The design should include detailed plan, drawing, and specification of each component of the project and equipment
- **Materials (quantity, quality and availability):** The details of the quantity and quality of materials to be used in a project should be specifically mentioned. The availability of the materials should be kept in mind while selecting the material types.
- **Novel, risky design and employers' interference in design:** A designer may choose to use novel and risky design, and may decide to incorporate employer/client's idea in the design. However, the designer is ultimately responsible for the safety & fitness for purpose of the design implementation.
- **Revision of design during construction:** Even if the design is revised during construction, the designer is ultimately responsible for the safety & fitness for purpose of the design implementation.

Liabilities of engineers in project construction and implementation

- Completion of project in time, within budget
- With quality: material, workmanship, method of construction
- Consistency: in quality, form
- Safety and welfare of project workers, people living in and around project area, and people travelling through or visiting the project area
- Follow applicable laws, rules, regulations, guidelines, conventions, codes and bylaws
- Meet social obligations

...engineer must struggle to design in such a way as to avoid failure, and, more importantly, catastrophic failure which could result in loss of property, damage to the environment of the user of that technology, and possibly injury or loss of life...

<http://www.matscieng.sunysb.edu/disaster/>

समयमै काम पूरा नगरेपछि पप्पु कन्स्ट्रक्सनलाई एडिबीले तिरायो ५ करोड

साउन ६, २०७४ बाँके:

एसियाली विकास बैंक (एडिबी) ले जमुनहा-राँझा सडक खण्ड निर्माणको जिम्मा पाएको पप्पु कन्स्ट्रक्सन जेभीलाई ५ करोडभन्दा बढी रुपैयाँ हर्जाना तिराएको छ। सम्झौता अनुसारको काम समयमा पूरा नगरेपछि एसियाली विकास बैंकले पप्पु कन्स्ट्रक्सन जेभीलाई करिब ५ करोड ५० लाख रुपैयाँ हर्जाना तिराएको मध्यपश्चिम क्षेत्रीय सडक निर्देशनालय डिभिजन कार्यालय नेपालगन्जका डिभिजन प्रमुख अर्जुनकुमार बमले जानकारी दिए। 'हर्जाना लगाउनु भनेको कारबाही नै हो, यसले अन्य योजनाको ठेक्कापट्टामा पनि असर पार्न सक्छ,' उनले भने। उनले पप्पु कन्स्ट्रक्सनको ठेक्का जुलाई, २०१६ सम्म मात्र भएकोले अब पप्पु र एसियाली विकास बैंकबीच कुनै सम्बन्ध नरहेको बताए। पप्पुले ५७ करोड रुपैयाँमा राँझा-जमुनहा सडकखण्ड कालोपत्रे गर्ने ठेक्का लिएको थियो। मापदण्डअनुसार निर्माण नगरेको प्रमाणित भएपछि एसियाली विकास बैंकले उसलाई एक करोड रुपैयाँ मात्र दिने निर्णय गरेको थियो। हर्जानाबापतको रकम असुली हर्जाना बापतको रकम एडिबीले असुली गरिसकेको छ। काम गरेबापत उसले पाउने रुपैयाँ हर्जानामा कटाइएको छ। सडक निर्माणका लागि ठेक्का लिने क्रममा जम्मा गरेको रकम पनि राजस्व कार्यालयमा पठाइएको सडक डिभिजन कार्यालय नेपालगन्जले जनाएको छ। बाँकी रकम पिभिसीलगायत पप्पुको बैंक खाताबाट असुली गरिएको डिभिजन प्रमुख बमले बताए।

Read more at: <http://thahakhabar.com/news/20256>



Potential Questions

- What are the essential elements of a professional person?
- What are the characteristics of an ethical decision making?
- Discuss Nepal Engineering Council's code of ethics.
- What should be the nature of the relationship between an engineer and a client?
- What are the conditions necessary to prove professional negligence in engineering practice?
- Discuss, with examples, three basic sources of liability of an engineer.
- Discuss the objectives of tort liability.
- Discuss the vicarious liability and partnership liability, with examples from electronics and/or electrical engineering applications.
- Discuss, with an example, a case of moral dilemma when making ethical decisions.
- Discuss the liabilities of an engineer in project design and project implementation.

