Engineering Ethics
Engineering professionals are required to serve the general public by strictly adhering to the codes of conduct, and giving utmost importance to the health, safety and welfare of the public.

Engineering Ethics is a textbook that explores the moral issues and decisions encountered by practicing engineering professionals, and the study of related questions about the moral ideals, character, policies and relationships of people and corporations involved in technological activities.

The main objective of this fourth and revised edition of Engineering Ethics is to prepare students for their professional responsibilities as Engineers. To help them recognise and think through ethically significant problem situations that are common in the field of engineering, and to evaluate the existing ethical standards for engineering practice.

A disaster during an engineering project can occur due to many factors such as overconfidence, negligence, poor maintenance, etc. If the necessary codes of Engineering Ethics are followed, most of the disasters can be avoided.

The understanding of human character and values is ethics. Values provide a unique, personal and moral template to assess the intentions and actions of ourselves and others. It also differentiates the right from the wrong.

Starting from the very basic concepts of Ethics and Values, this book condenses and maps all important discussion on Ethical Theories, Professional Ethics, Principles of Ethics, Human Values and Psychology, and Ethical Governance in a manner that it all interlinks as one reads para, pages, and chapters. Thus, one gets a vivid picture of the moral issues and dilemmas faced by engineers. And the book also gives a critical insight into the major global issues concerning Environmental Ethics, Intellectual Property Rights (IPRs), Computer Ethics and Internet, etc.

Further, to acclimatise students with engineering ethics, and to build their analytical and reasoning skills in solving problems, this revised and updated book includes more than 285 questions for self practice and grasping the essence of Engineering Ethics.

Any constructive ideas, suggestions, feedbacks for improving the content of future editions will be greatly appreciated.

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*Additional Practice Questions* | 150 – 159
The given chapter deals in detail with the basic understanding of the concepts of values, morals and ethics. It also talks about various ethical theories in depth. Then, it culminates into the concept of ethical and moral autonomy.

After going through this chapter, the reader would have a crisp understanding of the basic concepts and theories related to values, morals and ethics.

### 1.1 EPISTEMOLOGY

It is the philosophical study of the nature, origin and limits of human knowledge. It is derived from the Greek word ‘episteme’ i.e., knowledge and ‘logos’ i.e., reason.

It is referred to as the theory of knowledge, especially with regard to its methods, validity and scope, and the distinction between justified belief and opinion.

It addresses the questions:

- "What is knowledge?"
- "How is it acquired?"
- "What do people know?"

#### 1.1.1 OBJECTIVIST EPISTEMOLOGY

It assumes that reality exist independent or outside of the individual mind. Objectivist seeks methods to test reality by collecting and analysing evidence to explore assertions, corroborate claims, and provide correspondence with the real world.

#### 1.1.2 CONSTRUCTIONIST EPISTEMOLOGY

It rejects the idea that objective truth is waiting to be discovered. It assumes that truth comes into existence in and out of one’s engagement with the
realities of the world. Different people in different societies may have different or even opposite sets of truth.

1.1.3 SUBJ ECTIVIST EPISTEMOLOGY
It assumes that reality is pluralistic (i.e., reality can be expressed in many ways) and plastic (i.e., reality is stretched and shaped to fit the purposes of individuals.
If objectivism implies seeing is believing, then subjectivism implies believing determines what is seen.

Example 1

The philosophical study of beliefs and knowledge is better known as
(a) Ontology (b) Epistemology (c) Entomology (d) Etymology

Ans. (b)

1.0 ONTOLOGY: What exists in the human world that we can acquire knowledge about?

- Native realism
  Reality can be understood using appropriate methods

- Structural realism
  Reality is described by scientific theory, but its underlying nature remains uncertain

- Critical realism
  Reality captured by broad critical examination

- Bounded relativism
  Mental constructions of reality are equal in space & time within boundaries (e.g., cultural, moral, cognitive)

- Relativism
  Realities exist as multiple, intangible mental constructions; no reality beyond subjects

2.0 EPISTEMOLOGY: How do we create knowledge?

- Objectivism
  Meaning exists within an object; an objective reality exists in an object independent of the subject

- Constructionism
  Meaning created from interplay between the subject & object; subject constructs reality of object

- Subjectivism
  Meaning exists within subject; subject imposes meaning on an object

3.0 THEORETICAL PERSPECTIVE: What is the philosophical orientation of the researcher that guides their action/research?
Knowledge acquisition is deductive, ‘value-free’, generalizable ↔ Knowledge acquisition is inductive, value-laden, contextually unique
3.1 Positivism  
Natural science methods (posit, observe, derive logical truths) can be applied to the social sciences.

3.2 Post-Positivism  
Multiple methods are necessary to identify a valid belief because all methods are imperfect.

3.3 Structuralism  
The source of meaning comes from the formal structure found in language & can apply to all aspects of human culture.

3.4 (Social) Constructivism  
Meaning making of reality is an activity of the individual mind.

3.5 Interpretivism  
Natural science methods cannot apply to social science; interpretations of reality are culturally derived & historically situated.

3.5a Hermeneutics  
Hidden meaning (of language) exists in text, practices, events & situations, beneath apparent ones.

3.5b Phenomenology  
The essence of human experience of phenomena is only understood when the researcher separates their own experiences.

3.5c Symbolic interactionism  
The researcher must take the position of those researched (interaction) by sharing language & other tools (symbols).

3.6 Critical theory  
Research & theory should be used to change situations (focuses on power relations, critiques assumptions & evolves).

3.6a Emancipatory  
The subjects of social inquiry should be empowered.

3.6b Advocacy or participatory  
Politics & political agendas should be accounted for.

3.6c Feminism  
The world is patriarchal & the culture it inherits is masculine.

3.7 Post-structuralism  
Different languages & discourses divide the world & give it meaning.

3.8 Post-modernism  
Truth claims are socially constructed to serve interests of particular groups, methods are equally distrusted; might not be possible to arrive at any conclusive definition of reality.

3.9 Pragmatism  
All necessary approaches should be used to understand research problem.

Application: to predict

Application: to understand

Application: to emancipate or liberate

Application: to deconstruct

Application: any or all

1.2 VALUES

1.2.1 Defining Values

“Values are a set of beliefs which help an individual, organisation or a society to make preferences for certain things or in certain issues or events”.

eg. Tolerance is a value which is very unique to Indian society.

or, Empathy is a value held by someone who shows concern with others by putting oneself in other's place.

In general, values have a positive connotation but in a cultural/contextual approach towards studying ‘values’, a society or an organisation may profess negative values too. eg - ISIS. (Islamic state of Iraq and Syria), a terrorist outfit, which values killing innocent people. Values are a set of beliefs (not conviction) because they are byproduct of cognitive (reason) and affective (emotions, feelings) processes.

![Diagram showing the relationship between values, beliefs, cognitive, and affective processes.](attachment:image1.png)
1. Consider the following statements regarding definition of ‘moral’:
   1. Being or acting in accordance with standards and precepts of goodness
   2. Arising from conscience or a sense of right and wrong
   3. A concisely expressed precept or general truth, a maxim
   4. The principles of conduct governing an individual or a profession, standards of behaviour

   Which of the above statements are correct?
   (a) 1, 2, 3 and 4  (b) 1, 2 and 4 only
   (c) 3 and 4 only  (d) 1, 2 and 3 only

2. Which is/are the levels of study of ethics?
   1. At the level of individual
   2. At the level of engineering
   3. At the level of Government
   4. At the level of society

   (a) only 1, 2 and 3  (b) only 2, 3 and 4
   (c) only 1, 2 and 4  (d) All of the above

3. Which of the following does not constitute the foundation of ethics?
   (a) Honesty  (b) Justice
   (c) Integrity  (d) Courtesy

4. What refers to situations in which moral reasons come into conflict, or in which the application of moral values is problematic?
   (a) Silo mentality  (b) Preventive ethics
   (c) Ethical issues  (d) Moral dilemmas

5. Ethics is synonymous to .
   (a) Morality  (b) Money
   (c) Standards  (d) Conduct

6. The general and abstract concepts of right and wrong behavior culled from philosophy, theology, and professional societies

   (a) Ethics  (b) Morals
   (c) Etiquette  (d) Law

7. The ethical dilemma of choosing between two rights refers to
   (a) Choosing between the lesser of two evils
   (b) Deciding which of two employee rights is the most important
   (c) Deciding to offer a bribe or lose out on an important opportunity
   (d) Choosing between the two types of sexual harassment

8. The cultural, organizational, community, interpersonal, or personal dynamics that should be considered when making ethical and professional issues are referred to as:
   (a) Personal considerations.
   (b) Contextual considerations.
   (c) Environmental considerations.
   (d) Ethical considerations.

9. Which of the following parameters are evaluated in definition of “Moral Agents”?
   (a) whose actions and intentions can be morally evaluated
   (b) whose personal character can be morally evaluated
   (c) Both of the above
   (d) None of the above

10. In ‘Normative Enquiry’, norms are to be identified for which of the following reasons?
    (a) What is the reason behind work conflict?
    (b) Which is the most desirable standard of behavior?
    (c) What are the errors which resulted in unintended failures?
    (d) What is the best principle in work ethics?

11. Ethics is needed for practising engineers because:
    (a) Every decision engineer makes are not settled by rules.
(b) Organizations function best when, the values implicit in the rules are widely known by all.
(c) Engineers who understand the ethical climate of the organization can contribute to social interest better.
(d) All of these

12. The capacity to recognize situations and circumstances which have implications for the welfare or well being of another is referred to as
(a) relational dimension.
(b) ethical sensitivity.
(c) spirituality.
(d) multicultural dimension.

13. Which of the following terms refers to the ideals, beliefs, norms, and ethos that arouse an emotional response for or against them in a given community?
(a) Personal ethics
(b) Ethical climate
(c) Organizational ethics
(d) Community values

14. Which is/are correct?
(a) Legal rights are the entitlements and permissions given by the law.
(b) Moral rights are not a matter of law but of ethics and generally apply to everyone equally
(c) All the moral rights may not be legal rights.
(d) All of the above

15. Which is true regarding virtue ethics?
(a) It is ethical if the act is good
(b) It is ethical if the consequence of the act is good.
(c) It is ethical if the character of the agent is good
(d) None of these

16. Legal rights are
(a) The system of rules established by authority, society, or custom
(b) The lack of clarity as to whether a particular act violates a law, rule or policy
(c) The “just claims” given to all humans within a government’s jurisdiction
(d) The act of informing authorities of harmful, dangerous, or illegal activities

17. A moral theory that seeks to create the most good for the most people
(a) Whistle blowing
(b) Utilitarianism
(c) Morals
(d) Rights analysis

18. The accepted standards of right and wrong that are usually applied to personal behavior
(a) Morals
(b) Law
(c) Etiquette
(d) Ethics

19. If you believe in making decisions for the good of most people, you can be described as following which school of thought?
(a) utilitarianism
(b) teleology
(c) deontology
(d) egoism

20. Which statement is/are true?
(a) Ethics is not synonymous to religious morality or moral theology
(b) Ethics is the principle that guide the human behaviour
(c) The terms ‘ethics’ and ‘morality’ are not synonymous terms
(d) All of the above

21. A teleological approach to business ethics proposes that the guiding principle should be
(a) Practice
(b) People
(c) Purpose
(d) Power

22. The form of ethics which reflects an individual’s internal sense of how he should live, what he should strive for, and serves as the basis for moral decisions or judgments and guiding behavior is referred to as
(a) ethical virtues
(b) ethical values
(c) personal ethics
(d) ethical principles

23. The ethical theory which considers the intention of the person choosing, the means, and the nature of the act itself is
(a) rights ethics
(b) care ethics
(c) consequentialism
(d) duty ethics
### UNDERSTANDING THE BASIC CONCEPTS OF ETHICS AND VALUES

#### ANSWER KEY

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#### EXPLANATIONS

1. **(d)** Statement 3 is wrong as a general truth or maxim can not always be moral or immoral. eg. the sun rises in the east is a general truth but it is not related to being moral or immoral.

3. **(d)** Courtesy is an aspect of behaviour and personality not related to ethical or moral aspect.

4. **(d)** Silo mentality is related to concealing or inhibiting information flow in a department or between department of an organisation due to competition given an incentive based system of remuneration.

5. **(a)** Though they are not same, both are used interchangeably. Morality is based on principles of what ought to be and ethics evaluates whether we have followed the principles or not.

6. **(a)** Ethics as a subject is taken from the principles of philosophy, religion and profession.

7. **(a)** When we are faced by ethical dilemma, i.e., choosing between two good choices, we will go for the one which has least negative.

8. **(b)** Context of work involves the equation of both organizational and environmental considerations.

9. **(c)** Moral Agents are those whose actions, character and intentions can be morally evaluated. A competent and reasonably mature human being is the most suitable example of a “Moral Agent”. Personal characters is outcome of his value system which is inheritable from family.

10. **(b)** Normative enquiry is to identify what ought to be i.e. what is good, and what is the most desirable norm or standard.

12. **(b)** The ability to understand the situation and know the consequences of a particular action is ethical sensitivity. It ensures that the actions that are taken should be done in the best interest of the society and its members.

13. **(d)** How members of the community behave with each other and what they feel is important mode conduct, is community value. It is a generally held belief amongst the members the members of the community.

15. **(c)** Virtue ethics tries to promote good/ethical habits & qualities in individuals, so that they become good persons, so what thy will do will also be ethical. it promotes goodness in individuals, who will make good society.

16. **(c)** These are right available through the law given by the government. In our society it is the political system, i.e., the government which makes the laws to be followed by everyone.
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