ESE 2024

Preliminary Examination

General Studies and Engineering Aptitude

Ethics and Values in Engineering Profession

Comprehensive Theory *with* Practice Questions *and* ESE Solved Questions

MADE EASY PUBLICATIONS

ESE 2024 Preliminary Examination : Ethics and Values in Engineering Profession

Preface

The compilation of this book **Ethics and Values in Engineering Profession** was motivated by the desire to provide a concise book which can benefit students to understand the concepts of this specific topic of General Studies and Engineering Aptitude section.

B. Singh (Ex. IES)

This textbook provides all the requirements of the students, i.e. comprehensive coverage of theory, fundamental concepts and objective type questions articulated in a lucid language. The concise presentation will help the readers grasp the theory of this subject with clarity and apply them with ease to solve objective questions quickly. This book not only covers the syllabus of ESE in a holistic manner but is also useful for many other competitive examinations. All the topics are given the emphasis they deserve so that mere reading of the book clarifies all the concepts.

We have put in our sincere efforts to present detailed theory and MCQs without compromising the accuracy of answers. For the interest of the readers, some notes are given in the comprehensive manner. Each chapter contains sets of practice questions with their answer keys, that will allow the readers to evaluate their understanding of the topics and sharpen their question solving skills.

Our team has made their best efforts to remove all possible errors of any kind. Nonetheless, we would highly appreciate and acknowledge if you find and share with us any printing and conceptual errors.

It is impossible to thank all the individuals who helped us, but we would like to sincerely thank all the authors, editors and reviewers for putting in their efforts to publish this book.

With Best Wishes

B. Singh

CMD, MADE EASY Group

Ethics and Values in Engineering Profession — Contents

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INTRODUCTION

Engineering is transforming science into useful products for human comfort. Engineering is something that engineers do, and what they do has profound effects on others. Ethics in engineering then is the ability as well as responsibility of an engineer to judge his decisions from the context of the general well-being of the society. It is the study of moral issues that confront engineers and engineering organizations in a dynamic world of technology and changing engineering paradigms.

Why should an engineer study ethics?

I am an ethical person. Engineers and engineering students often ask this question when the subject of professional ethics is raised, and the short and simple answer to it is, "You are not being asked to study ethics in general but your profession's ethics."

By studying engineering ethics, **the students develop awareness and assessment skill of the likely impact of their future decisions on ethical grounds.**

What are the factors that influence ethical standards in Engineering?

- _Public Interest_: Engineering decisions have a great impact not only on the technology in question but it also has the power to transform the course of human development. Therefore, it is incumbent on the engineer to consider the moral dimension of his/her decision.
- _Dilemmas & Value Conflicts_: Value conflicts that are inherently specific to engineering profession also impacts the ethical standards and behaviour.
- _Risk and safety_ of citizens as a social responsibility is a prime concern of an engineer.

What is a Profession?

The word "profession" means different things to different people. But at its core, it's meant to be an indicator of trust and expertise. Traditionally, a "professional" was someone who derived their income from their expertise or specific talents, as opposed to a hobbyist or amateur.

But given today's fast-changing environment of knowledge and expertise, it's now generally understood that simply deriving an income from a particular task might make you an "expert" or "good at your job" – but if you're a "professional", this has a broader meaning.

Meaning of "Profession"

A profession is a disciplined group of individuals who adhere to ethical standards. This group positions itself as possessing special knowledge and skills in a widely recognised body of learning derived from research, education and training at a high level, and is recognised by the public as such. A profession is also prepared to apply this knowledge and exercise these skills in the interest of others.

Who is a Professional?

A professional is a member of a profession. Professionals are governed by codes of ethics, and profess commitment to competence, integrity and morality, altruism, and the promotion of the public good within their expert domain. Professionals are accountable to those served and to society.

What is Professionalism?

Professionalism comprises the personally held beliefs about one's own conduct as a professional. It's often linked to the upholding of the principles, laws, ethics and conventions of a profession as a way of practice.

Elements of Profession

Greenwood, claimed that a profession must have the following elements:

- A systematic body of theory or knowledge
- Authority and credibility
- Community sanction, or regulation and control of its members
- Code of ethics
- Professional culture, or a culture of values, norms and symbols.

Professions are those forms of work which involve advanced expertise, self-regulation, and concerted service to the public good.

- **Advanced expertise:** Professions require sophisticated skills (knowing-how) and theoretical knowledge (knowing-that) in exercising judgment that is not entirely routine or susceptible to mechanization. Preparation to engage in the work typically requires extensive formal education, including technical studies in one or more areas of systematic knowledge. Generally, continuing education and updating knowledge are also required.

- **Self-regulation:** Well-established societies of professionals are allowed by the public to play a major role in setting standards for admission to the profession, drafting codes of ethics, enforcing standards of conduct, and representing the profession before the public and the government. Often this is referred to as the "autonomy of the profession," which forms the basis for individual professionals to exercise autonomous professional judgment in their work.

- **Public good:** The occupation serves some important public good, or aspect of the public good, and it does so by making a concerted effort to maintain high ethical standards throughout the profession. For example, medicine is directed towards promoting health, law towards protecting the public's legal rights and engineering towards technological solutions to problems concerning the public's well-being, safety, and health. The aims and guidelines in serving the public good are detailed in professional codes of ethics.

WHAT IS ETHICS?

Ethics has sometimes been viewed by engineers as a somewhat vague theoretical aspect of philosophy having little relevance to their practical activities in the world. Ethics certainly involves philosophical activities such as careful conceptual analysis and reflection. However, ethics is in essence practical, for the way in which we choose to act and live, is the primary objective of such analysis and reflection.

Ethics at its core is about how we relate to others. In such relationships, problems may arise for several reasons, including limited resources and limited sympathy generating competition and conflict rather than mutually beneficial cooperation; limited agreement on goals and different conceptions of "good"; inadequate rationality, insufficient information and limited understanding and poor communication.

In everyday use, "ethics" often refers to principles of action that implement or promote moral or ethical values. Morals (derived from the Latin mores, or customs) refers to standards of right conduct. For the purpose of the exam, we will be using ethics and morals interchangeably.

What makes ethics so important to public service engineering is that it goes beyond thought and talk to performance and action. As a guideline for action, ethics draws on what is right and important. Rooted in the idea of responsibility, ethics implies the willingness to accept the consequences of one's actions.

Definitions of Ethics

- "A body of prescriptions and prohibitions, do's and don'ts"
- "Ethics may be styled as the art of self-government."
- "The standards of conduct derived from the philosophical and religious traditions of society"
- "Ethics is concerned about what is right, fair, just, or good; about what we ought to do, not just about what is the case or what is most acceptable or expedient"

ETHICS

Ethics is a branch of philosophy that aims to answer the basic question, "What should I do?" It's a process of reflection in which people's decisions are shaped by their values, principles and purpose rather than unthinking habits, social conventions or self-interest.

Our values, principles and purpose are what give us a sense of what's good, right and meaningful in our lives and serve as a reference point for all the possible courses of action we could choose. On this definition, an ethical decision is one made based on reflection about the things we think are important and that is consistent with those beliefs.

LAW

The law is different. Law tries to create a basic, enforceable standard of behaviour necessary in order for a community to succeed and in which all people are treated equally.

Because of this, the law is narrower in focus than ethics or morality. There are some matters the law will be agnostic on but which ethics and morality have a lot to say. For example, the law will be useless to you if you're trying to decide whether to tell your competitor their new client has a reputation for not paying their invoices, but our ideas about what's good and right will still guide our judgement here.

There is a temptation to see the law and ethics as the same – so long as we're fulfilling our legal obligations, we can consider ourselves 'ethical'. This is mistaken on two fronts. First, the law outlines a basic standard of behaviour necessary for our social institutions to keep functioning. For example, it protects basic consumer rights. However, in certain situations the right thing to in solving a dispute with a customer might require us to go beyond our legal obligations.

Secondly, there may be times when obeying the law would require us to act against our ethics or morality. A doctor might be obligated to perform a procedure they believe is unethical or a public servant might believe it's their duty to leak classified information to the press.

Professional Ethics

Professional ethics is the set of standards adopted by professionals as they view themselves acting as professionals. Engineering ethics is that set of ethical standards which applies to the profession of engineering.

Professional ethics is distinguished from common morality and personal ethics.

- Common morality is the set of moral beliefs shared by almost everyone.
- Personal ethics or personal morality is the set of moral beliefs that a person holds.

There are several important characteristics of professional ethics:

- Unlike common morality and personal ethics, professional ethics is usually stated in a formal code.
- The professional codes of ethics of a given profession focus on the issues that are important in that profession.

- When one is in a professional relationship, professional ethics is supposed to take precedence over personal morality.

Professional ethics, like ethics generally, has a negative and a positive dimension. **Being ethical has two aspects: preventing and avoiding evil, and doing or promoting good**. On the one hand, we should not lie, cheat, or steal, and in certain circumstances we may have an obligation to see that others do not do as well. On the other hand, we have some general obligation to promote human well-being. This general obligation to avoid evil and do good is intensified and made more specific roles and have special relationships with others.

Professional ethics is another example of role morality. Role morality is the name given to moral obligations based on special roles and relationships. One example of role morality is the set of special obligations of parents to their children. Parents have an obligation not only not to harm their children but also to care for them and promote their flourishing. Another example of role morality is the obligation of political leaders to promote the well-being of citizens.

Professionals have both an obligation not to harm their clients, patients, and employers, and an obligation to contribute to their well-being.

The negative aspect of professional ethics is oriented toward the prevention of professional malpractice and harm to the public. Let us call this dimension of professional ethics as **preventive ethics** because of its focus on preventing professional misconduct and harm to the public.

Professionals also have an obligation to use their knowledge and expertise to promote the public good. Let us call this more positive dimension of professional ethics as **aspirational ethics** because it encourages aspirations or ideals in professionals to promote the welfare of the public.

Branches of Ethics

The four main branches of ethics are applied ethics, normative ethics, meta-ethics, and descriptive ethics; each is a potential tool for analysing ethical problems and making ethical decisions.

- **Applied ethics** is the branch of ethics that consists of the analysis of specific, controversial moral issues such as genetic manipulation of foetuses, euthanasia, whistle blowing, mandatory screening for HIV and so on. It helps professionals to identify relevant issues and ask what is right or wrong in the particular situation and attempts to provide an objective answer.

- **Normative ethics** looks for an ideal litmus test of reasonable behaviour. Fieser states that it provides 'The Golden Rule' of doing to other as we want them do to us. For example, since we do not want our neighbours to throw stone through our glass window, then it will be wise not to first throw stone through the neighbour's window. Based on this type of reasoning, one could theoretically determine whether any possible action is good, bad, right, or wrong.

- **Meta-ethics** differs remarkably from applied and normative ethics. It does not concern with determining what is right or wrong but instead it asks questions about the nature of morality, rather than the specifics of right or wrong. For example, meta-ethics questions whether morals as we know it exist in the world naturally or are invention of men, and if so, can they be objective.

- **Descriptive ethics** concerns what one believes to be right or wrong, and holds, condemns or punishes in law or custom. It is sometimes referred as comparative ethics because it involves comparing ethical systems, comparing the ethics of the past and present, comparing the ethics of one society against another, and comparing the ethics which people claim to follow with the actual rules of behaviour that explain their conducts.

Micro-ethics and Macro-ethics

Engineering ethics can be considered in three frames of references: Individual, Professional and Social– which can be further divided into:

1. **Micro-ethics:** It is concerned with individuals and internal relations of the engineering profession.
2. **Macro-ethics:** It is concerned with the collective social responsibilities of the engineering profession with societal decision about technology.

Table: Some Macroethical and Microethical issues in Science and Engineering

Particular	Engineering Practice	Scientific Research
Micro-ethics	Health, safety, bribes and gifts, etc.	Integrity, fair credit, etc.
Macro-ethics	Sustainable development, product liability, etc.	Human cloning, Nanoscience, etc.

WHAT SHOULD I DO? WHAT IS GOOD? WHAT IS RIGHT?

What's your definition of ethics? A lot of people struggle to put it in words despite considering ethics a crucial part of our careers, personal lives, identities and society.

This is probably because the word ethics is used in a lot of different contexts. These range from professional codes of conduct, social practices and the law to personal conscience, customs we inherit from our culture and family or religious beliefs.

Most of us are comfortable labelling products, people and businesses 'ethical' and 'unethical'. So let's get a clear understanding of what the term means.

Here's an easy way of breaking ethics down into THREE areas.

1. Ethics is a process of reflection. We 'do ethics' every time we try to answer the question, "What should I do?"

    Ethics doesn't discount emotional responses but it does require us to be thoughtful when weighing up a decision. So rather than acting on instinct alone, ethics asks us to reasonably consider our options, what we know, what we assume and what we believe so we choose a course of action most consistent with what we think is good and right.

    While ethics is a branch of philosophy concerned with what's right and wrong, it doesn't seek to produce a list of rules to apply to all people at all times. Two people can both think 'ethically' about a situation and come up with very different decisions about what they should do.

2. VALUES – 'WHAT'S GOOD'

    When faced with a decision every person is going to choose the option they believe is best. It might still be self-destructive, mean or foolish, but the decision maker will always see more good in their chosen action than in any other option.

    Values are what help us define what's good. Some of these will be unique to the individual but many values are held in common by cultures all around the world because they speak to the basic needs of human beings.

    For example, freedom, safety, community, education and health are all valued by people from very different walks of life. Each culture might express their values differently – norms of friendship will differ between cultures – but the basic value is still the same.

    We tend to value lots of different things and prioritise them differently depending on our circumstances. In our youth we might rank excitement and fun over safety but later in life those values may shift in the other direction. This reflects changing beliefs about how much good is preserved by each value and how much they matter to us.

3.   PRINCIPLES – 'WHAT'S RIGHT'

Knowing what's 'good' is an important step to making an ethical decision but most of us believe there are better and worse ways of getting the things we value. We might value honesty but still be careful with how we give criticism to colleagues – even if it would be more honest to be blunt.

This is the role of **principles** – they help us identify the right or wrong way to achieve the things we value. Some common examples are:

- **The Golden Rule:** Treat other people the way you'd like to be treated.

- **Universality:** Don't ask other people to act in a way you wouldn't be willing to act in the same situation.

- **Machiavellian:** I'll do what works and gets me what I want, no matter how it affects other people.

Notice how these principles are value-neutral? This means you can use them no matter what your values are – some might even seem unethical to you. Different people might want to be treated in different ways – for example, some might want to be treated gently and others with 'tough love' – but everyone can use the Golden Rule as a way to guide their decisions.

WHY ENGINEERS NEED ETHICS?

First, many of the ethical decisions that individual engineers must make are not settled by rules. After all, rules do not encompass every situation: often the rules only set limits within which decisions must be made, and some situations are not covered at all. In addition, rules require interpretation. In some cases, it may be easy to see which interpretation of a rule is best, but in others it is not so easy. No set of rules or policies can anticipate every ethical problem that may arise, and even the sincerest engineers may need help in understanding the ethical aspects of some situations. So, only ethically aware engineers can correctly apply ethical rules to complex situations, keeping to the spirit as well as the letter of ethical rules.

Second, engineers should be sensitive to ethical questions because engineers who understand the ethical dimension of engineering are better and happier engineers.

Third, good ethical behaviour usually leads to good consequences, both for ourselves and for society.

Fourth, engineers make decisions crucial to society at large, and therefore shoulder an enormous burden of public trust. When important and complex questions of right and wrong confront engineers in their professional work, they sometimes find themselves inadequately prepared about how to approach the issues or to communicate their advice clearly. Formal study of ethics can help to overcome these problems.

CHECK YOUR ✓ **PROGRESS**

True & False Statements:

Q.1   Changing engineering paradigms necessitates engineers to study ethics.   [True/False]

Q.2   To be a complete engineer, one must be aware of the ethical competencies involved in engineering as a profession.   [True/False]

Q.3   A professional is prepared to apply the knowledge and skills so that the practitioner benefits the most from such activities.   [True/False]

Q.4 A professional is accountable to himself and profession's codes of conduct only.   [True/False]

Q.5 Self-regulation and service to the public form a major part of one being a professional.   [True/False]

Q.6 A person has to be good at his job to make him a professional in that area.   [True/False]

Q.7 Ethics can guide one only in human relationships and may not be useful in solving professional problems effectively due to its vague nature.   [True/False]

Q.8 Ethics is rooted in ideals and values that might not always help a professional meet his goals.   [True/False]

Q.9 Professional codes of conduct also regulate personal relationships.   [True/False]

Q.10 Role morality is an extension of one being a professional.   [True/False]

Answers

1. True   2. True   3. False   4. False   5. True   6. False   7. False

8. False   9. False   10. True

Example 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

[Sample Question for ESE 2017 : Released by UPSC]

Ans: (b)

ESE Prelims Questions

Q.1 The Ethical skills are:
(a) Care of possessions, modesty, posture, self-reliance, tidy appearance
(b) Good behaviour, good manners, good relationships, good environment
(c) Attention, calmness, concentration, self-confidence, self-esteem
(d) Code of conduct, responsibility, efficiency, perseverance, punctuality

[ESE Prelims : 2017]

Ans. (d)

Q.2 Ethical issues that can affect an Engineer's professional and personal life are termed as
(a) Macro-ethics   (b) Micro-ethics
(c) Morals   (d) Rights

[ESE Prelims : 2017]

Ans. (b)

Q.3 Which one of the following statement is correct with respect to the '*societal development*'?
(a) Behaviour grows into habits, habits into tradition and tradition becomes custom
(b) Customs grow into mores and mores grow into custom
(c) Behaviours grow into customs and customs grow into traditions
(d) Folkways grow into tradition and traditions grow into customs

[ESE Prelims : 2019]

Ans. (a)

Q.4 One branch of ethical philosophy-claims that it is possible to know right from wrong or good from bad in a very clear and objective manner, is called
(a) Non-Cognitivism   (b) Ethical Pluralism
(c) Cognitivism   (d) Utilitarianism

[ESE Prelims : 2019]

Ans. (c)
The above statment defines Cognitivism.

Q.5 Consider the following statements regarding '*Engineering Ethics*':
1. It is the activity of understanding moral values
2. It resolves the moral issues and justifies moral judgments
3. It would refer to the set of specifically moral problems and issues related to Engineering
Which of the above statements are correct?
(a) 1, 2 and 3   (b) 1 and 2 only
(c) 1 and 3 only   (d) 2 and 3 only

[ESE Prelims : 2019]

Ans. (a)
All the chosen statements are in coherence with scope of Engineering Ethics.

Q.6 The philosophical study of beliefs and knowledge is better known as
(a) Ontology   (b) Epistemology
(c) Entomology   (d) Etymology

[ESE Prelims : 2019]

Ans. (b)
The above statement forms the definition of Epistemology.

Q.7 The basic difference between a professional and an amateur is
(a) a professional is someone who is connected with a job that needs special training or skill, while an amateur is someone who works in multi-dimensions without any specialization
(b) a professional is clear in thinking and focused on the job, while an amateur is confused and distracted from the job
(c) a professional does high quality work/job in a specific area, while an amateur is associated with specific area with lowest pay
(d) a professional remains positive and achieves despite facing grievances, while an amateur does work efficiently due to many imagined grievances

[ESE Prelims : 2020]

Ans. (b)

Q.8 'Euthanasia' refers to the
   (a) loyalty of the people that take pride in being part of their organization and care for the organization above their own well-being
   (b) ills in the society that are caused by ignorance and lack of respect for the laws of the land
   (c) emotional intelligence to understand how people perform various functions
   (d) killing of a terminally ill person suffering acutely with no hope of survival

[ESE Prelims : 2020]

Ans. **(d)**

Q.9 Which one of the following does NOT come under business ethics?
   (a) Avoid breaking the law   (b) Avoid actions that are bad for one's image
   (c) Avoid action   (d) Avoid conflict

[ESE Prelims : 2022]

Ans. **(c)**
   Business Ethics doesn't include Avoid Action, as it is essential pre-requisite for Ethics.

Q. Questions for Practice

Q.1 Ethics has connections with:
   (a) professional codes
   (b) religious norms
   (c) philosophical theories
   (d) all are correct

Q.2 Which of the following statement/s is/are correct:
   Professional ethics focuses on:
   (a) professional behaviour in private spaces
   (b) interpersonal and social practices
   (c) providing an ethical identity to the profession
   (d) all are incorrect

Q.3 Engineering ethics focusses on:
   1. rights & responsibilities of the profession
   2. social commitments & responsibilities of an engineer
   3. public interest responsibilities of an engineer
   Select the correct answer from the following codes:
   (a) 1, 2 are correct   (b) 2, 3 are correct
   (c) 1, 3 are correct   (d) all are correct

Q.4 An action is ethical:
   1. when it is in conformity with existing norms
   2. when it is in conformity with conscience
   3. when decision is made without considering ethical factors

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

Q.5 A profession implies the presence of:
   (a) a systematic body of norms and conventions
   (b) regulatory mechanisms
   (c) political sanctions & control
   (d) all the above are correct

Q.6 Which of the following are correctly matched?
   1. **Common morality**: personal standards
   2. **Personal ethics**: individual sense of right & wrong
   3. **Professional Ethics**: standards established by professional associations
   Select the correct answer from the following:
   (a) 1, 3 are correct   (b) 2, 3 are correct
   (c) all are correct   (d) only 2 is correct

Q.7 Engineers need to study ethics because:
   1. they make socially crucial decisions
   2. they are invested with public trust
   3. they have some social obligations
   Select the correct answer from following codes:
   (a) 1 is correct   (b) 1, 2 are correct
   (c) 3 is correct   (d) all are correct

Q.8 The word "Profession":
1. implies discipline
2. implies certification standards
3. implies adherence to conduct rules

Select the correct answer from the following codes:
(a) 1, 2 are correct   (b) 2, 3 are correct
(c) all are correct   (d) Only 2 is correct

Q.9 Which of the following pairs are correctly matched?
(a) Skills: Knowing that
(b) knowledge: knowing how
(c) self-regulation: autonomy of the profession
(d) all the above are correctly matched

Q.10 Engineers need to study ethics because:
1. engineering decisions have socio-economic impact
2. it helps in understanding moral issues confronting the profession
3. it can aid in resolving personal moral issues
4. engineering is a value-neutral profession

Select the correct answer from the following codes:
(a) 1, 2, 4 are correct
(b) 1, 2 are correct
(c) all are correct
(d) only 1 & 4 are correct

Q.11 Ethical behaviour by engineer is of considerable importance because:
(a) it contributes to the image of the profession
(b) it ensures self-growth & development
(c) it helps in better handling of professional conflicts
(d) none of the above

Q.12 Which of the following pairs are correctly matched?
(a) Applied ethics: nature of morality
(b) Aspirational ethics: ideals to be achieved
(c) Meta-ethics: compares ethical systems
(d) none of the above are correct

Q.13 Ethics is referred to as:
(a) amoral way of living as a human
(b) the way to achieve enlightenment
(c) balancing rights & duties
(d) None of the above are correct

Q.14 Which of the following statements are true?
(a) what is ethical has to be legally correct
(b) what is ethical may not be legally acceptable
(c) being intelligent and being ethical are closely interconnected
(d) none of the above is correct

Q.15 Which of the following are not ethical skills?
(a) ability to collaborate
(b) ability to empathise
(c) ability to concentrate
(d) none of the above are correct

Answers				
1. (d)	2. (c)	3. (c)	4. (a)	5. (b)
6. (b)	7. (d)	8. (c)	9. (c)	10. (b)
11. (a)	12.(b)	13. (c)	14. (b)	15. (d)

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