ESE 2027

UPSC ENGINEERING SERVICES EXAMINATION

PRELIMINARY EXAMINATION

General Studies & Engineering Aptitude

Ethics and Values in Engineering Profession

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

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ESE 2027 Preliminary Examination

Ethics and Values in Engineering Profession

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Preface

The book **Ethics and Values in Engineering Profession** has been compiled with the objective of providing a concise yet comprehensive resource for aspirants of the Engineering Services Examination (ESE). It is specifically designed to help students develop a clear understanding of the concepts covered under the General Studies and Engineering Aptitude section of ESE.

This textbook offers detailed and descriptive, step-by-step theoretical explanations presented in lucid and easy-to-understand language. It ensures thorough coverage of fundamental concepts along with well-structured objective-type questions. The concise and systematic presentation enables readers to grasp the subject with clarity and apply their knowledge effectively to solve objective questions with speed and accuracy.

The book covers the complete ESE syllabus in a holistic manner and is equally useful for other competitive examinations. Each topic has been given due emphasis so that a careful reading of the text itself is sufficient to build strong conceptual clarity.

Special effort has been made to include solved practice questions and previous years' solved questions from the General Studies and Engineering Aptitude (ESE Prelims) section. These solutions are explained in a clear, step-by-step manner to strengthen problem-solving skills. At the end of every chapter, practice question sets with answer keys and detailed explanations are provided to help readers assess their understanding and enhance their exam readiness.

We have made sincere efforts to ensure accuracy and eliminate errors. However, we would greatly appreciate it if readers bring to our notice any printing or conceptual errors.

Though it is not possible to acknowledge everyone individually, we extend our heartfelt gratitude to all the authors, editors, and reviewers whose valuable contributions made this publication possible.

With Best Wishes

B. Singh (Ex. IES)

CMD, MADE EASY Group

Ethics and Values in Engineering Profession

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1 Meaning of Ethics

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.

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.10 An engineering ethics is the study of
(a) Decisions, policies and values that are morally desirable in engineering practice and research
(b) Policies, time-management and values that are morally desirable in engineering practice and research
(c) Decisions, time-management and values that are morally desirable in engineering practice and research
(d) Policies, human resource management and values that are morally desirable in engineering practice and research **[ESE Prelims : 2025]**

Ans. **(a)**
- Engineering ethics is the study of:
  Decisions: Ethical decision-making in engineering projects.
  Policies: Codes of conduct and regulatory frameworks guiding ethical behavior.
  Values: Principles like honesty, integrity, fairness, safety, and responsibility.
- These elements help ensure that engineers act in ways that protect public welfare, safety, and the environment, and uphold professional integrity.

Q.11 Consider the following statements regarding ethics :
1. Ethics is to provide us with moral principles or universal rules that tell us what to do.
2. The fundamental question of ethics is not "What should I do ?" but "What kind of person should I be ?"

Which of the above statements is/are correct ?
(a) 1 only (b) 2 only
(c) Both 1 and 2 (d) Neither 1 nor 2 **[ESE Prelims : 2026]**

Ans. **(c)**

Objective Brain Teasers

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