



# ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

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ANGUCHETTYPALA YAM, PANRUTI – 607 106.

## QUESTION BANK

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**BRANCH:** ECE

**YEAR/SEM:** IV/VIII

**SUBJECT:** GE 8076 – Professional Ethics in Engineering

### *PART – A*

#### **MORALS, VALUES AND ETHICS:**

**1. What are human values? (or) Define Human Value. (A/M 2022)**

The Human values are:

- ✓ Basic moral values one has to possess to live as a citizen or as a person.
- ✓ It decides the standard of behaviour.
- ✓ Some universally accepted values are freedom justice and equality.
- ✓ Other principles of values are love, care, honesty, integrity and self-respect.

**2. Write a few key principles that compose the foundation of human values.**

The Key principles composing the foundation of human values:

- ✓ The natural dignity of human life
- ✓ Respect and consideration for the other
- ✓ The interconnection between humankind and environment and thus the need to care for and preserve the earth.
- ✓ The importance of integrity and service
- ✓ An attitude of non-violence.
- ✓ The individual and collective quest for peace and happiness.

**3. What do you understand by the term 'Moral'? (or) Define the term morality (April/May 2023)**

**Define Moral. Nov / Dec 2023**

- ✓ Moral means principles of right and wrong.
- ✓ Moral relate to duty or obligations.
- ✓ It pertains to those actions of right and wrong, virtue.
- ✓ It pertains to the rules by which such actions are to be directed towards the practice.
- ✓ Moral also mean manners or conduct of men as social being in relation to each other.
- ✓ One can perform Dharma or actions by adopting morals.

**4. Give the differences between Morality and Ethics [Nov/Dec 2022]**

S.No	Morality	Ethics
1.	More general and prescriptive based on customs and traditions.	Specific and descriptive, It is a critical reflection on morals.
2.	More concerned with the results of wrong action when done.	More concerned with the results of a right action, when not done.
3.	Thrust is on judgment and punishment, in the name of God or by laws.	Thrust is on influence, education, training through codes, guidelines, and correction.
4	In case of conflict between the two, morality is given top priority, because the damage is more, it is more common and basic.	Less serious hence second priority only. Less common, but relevant today because of complex interactions in the modern society.
5.	Example: Character flaw, corruption, extortion and crime.	Example: Notions or beliefs about manners, tastes, customs, and towards laws.

**5. Write the characteristics of moral value.**

Some distinct characteristics of moral value are as follows:

- ✓ Moral value can exist only in free personal being and in that person's voluntary or human acts.
- ✓ Moral value is universal in the sense that what one holds for all in the same conditions.
- ✓ Moral value is self-justifying.
- ✓ Moral value has pre-eminence over every other value.
- ✓ Moral value implies obligation.

**6. What do you understand about the word 'Values'? (Nov/Dec 2006, April/May 2008.) (or) What are the general characteristics of values?(Nov/Dec 2017)**

- ✓ 'Value' or 'Worth' is a term used for anything that appeals to us in any way.
- ✓ As ideals they exist in the mind but are formed by the mind's abstractive power from the date of experience.
- ✓ Values help the individuals in their mode of conduct, approach, attitude when they deal with people of different calibre in the society.
- ✓ Values form criteria for determining the level of goodness or worth and thus provide a platform to human survival.
- ✓ Some common values are freedom, equality, fraternity, empathy.

**7. Define value.**

- ✓ Value is defined as a principle that promotes well-being or prevents harm.
- ✓ Values are our guidelines for our success- our paradigm about what is acceptable.
- ✓ Values are the scales we use to weigh our actions, whether to move towards or away from something.
- ✓ Emotional beliefs in principles regarded as particularly favourable or important for the individual.

**8. How can values be classified? What are values? (May/ June 2016) List and explain any four characteristics of VALUES. Nov 2023**

Values can be classified into

- ✓ Personal Values – Related to Self

- ✓ Social Values- Related to Society
- ✓ Cultural Values – Related to culture
- ✓ Institutional Values – Related to an organization

Another classification of Values is

- ✓ Nationalistic values like secularism, Democracy and freedom.
- ✓ Human values like kindness, truth, and honesty.
- ✓ Scientific values- like discoveries, inventions, Sciences, Engineering and Technology.
- ✓ Moral Values- like virtues, not being greedy, jealousy, and tolerance.

**9. Classify the human values. What are human values ?(Nov/Dec 2016)**

Human values can be broadly grouped under the following five headings:

- ✓ Love
- ✓ Truth
- ✓ Right conduct
- ✓ Peace and
- ✓ Non-violence

**10. Name the values related to ‘love’.**

- |              |               |
|--------------|---------------|
| ✓ Acceptance | ✓ Affection   |
| ✓ Care       | ✓ Compassion  |
| ✓ Dedication | ✓ Devotion    |
| ✓ Empathy    | ✓ Forbearance |
| ✓ Generosity | ✓ Forgiveness |
| ✓ Gentleness | ✓ Patience    |

**11. Enumerate the values related to truth?**

Values related to truth are as follows:

- |                |                       |
|----------------|-----------------------|
| ✓ Accuracy     | ✓ curiosity           |
| ✓ discernment  | ✓ fairness            |
| ✓ Fearlessness | ✓ Honesty             |
| ✓ integrity    | ✓ Intuition           |
| ✓ Justice      | ✓ Optimism            |
| ✓ Purity       | ✓ quest for knowledge |
| ✓ Reason       | ✓ Self-analysis       |
| ✓ Sincerity    | ✓ Trust               |
| ✓ Truthfulness | ✓ Determination       |

**12. Write the values related to right conduct.**

Values related to Right Conduct are:

- ✓ Self-Help skills: Care of possessions, diet, hygiene, modesty, posture, self-reliance and tidy appearance.
- ✓ Social Skills: Good Behaviour, good manners, good relationships, helpfulness, No wastage, and good environment.
- ✓ Ethical skills: Code of conduct, courage, dependability, duty, efficiency, Ingenuity, initiative, perseverance, punctuality, resourcefulness, respect for all and responsibility.

**13. Define Professionalism. (April/May 2015)/ What is professional ethics? (April/May 2023)**

Professionalism is often defined as the strict adherence to courtesy, honesty and responsibility when dealing with individuals or other companies in the business environment. This trait often includes a high level of excellence going above and beyond basic recruitments.

**14. What are ethical values?**

Six core ethical values are:

- ✓ Trustworthiness,
- ✓ respect,
- ✓ responsibility,
- ✓ fairness,
- ✓ caring, and
- ✓ citizenship

Using core ethical values as the basis for ethical thinking can help detect situations where we focus so hard on upholding one value that we sacrifice another - e.g., we are loyal to friends and so do not always tell the truth about their actions.

**15. Give the factors which evolve human values.**

Human values evolve because of the following factors:

- ✓ The impact of norms of the society on the fulfilment of the individual's needs or desires.
- ✓ Developed or modified by one's own awareness, choice and judgment in fulfilling the needs.
- ✓ By the teachings and practice of Preceptors or Saviors or religious leaders.
- ✓ Fostered or modified by social leaders, rulers of kingdom, and by law (government).

**16. How is ethics classified? Bring out the difference between personal ethics and Business ethics. Nov 2023**

Ethics can be classified into:

1) Engineering ethics

- Related to engineers, engineering practice and industries.

2) Professional ethics

- Related to various professionals like Doctors, Lawyers.

3) Business Ethics

- Business ethics is concerned with truth and justice and has a variety of aspects such as the expectation of society, fair competition, advertising, public relations, social responsibilities, consumer autonomy, and corporate behavior. It involves choices on an organization level rather than a personal level.

4) Personal Ethics

- Personal ethics is concerned with the rules by which an individual lives his or her personal life. It also deals with how we treat others in our day-to-day lives.

**17. Distinguish values from ethics and culture.**

- ✓ **Values** are mainly related to individuals and since they are related to justice, they remain the same for everyone. E.g. truth, honesty, empathy, self-respect Values do not change from individual to individual.

- ✓ **Ethics** is common to a group of individuals; the group may be religious or professional. Ethics is mostly based on some code or law and judgment of any action is based on code of conduct or law. Ethics change from individual to individual.
- ✓ **Culture** commonly refers to conduct of a group. E.g. system of worship, it may differ from society to society, nation to nation or religion to religion.

**18. Differentiate between Morals and Ethics. (A/M 2022)**

Moral:

- ✓ Refers only to personal behaviour.
- ✓ Refers to any aspect of human action
- ✓ Social conventions about right or wrong conduct.

Ethics:

- ✓ Involves defining, analyzing, evaluating and resolving moral problems and developing moral criteria to guide human behaviour.
- ✓ Critical reflection on what one does and why one does it.
- ✓ Refers only to professional behaviour.

**INTEGRITY:**

**19. Define the term ‘Integrity’. ( AU Nov/Dec 2006) (or) What is meant by integrity? How is it related to work ethics? (Nov/Dec 2018, 2021, Nov/Dec 2022)**

- ✓ Integrity refers to a quality of a person’s character.
- ✓ Integrity means “soundness of moral character”.
- ✓ Integrity means the good qualities like honesty, loyalty, honour, incorruptibility, rectitude, righteousness, uprightness and similar virtues.
- ✓ Integrity reveals one’s state of mind attitude and behaviour.

**Relation to work ethics:** Integrity is one of the fundamental values that employers seek in the employees that they hire. It is the hallmark of a person who demonstrates sound moral and **ethical** principles at **work**. Honesty and trust are central to **integrity**. Acting with honour and truthfulness are also basic tenets in a person with **integrity**.

**20. What are the fundamental institutions of integrity?**

Integrity involves two fundamental intuitions. They are:

- ✓ Integrity is a formal relation one had to oneself, or between parts or aspects of one’s self;
- ✓ Integrity is connected in an important way to acting morally.

**21. Name the accounts of integrity.**

A number of accounts of integrity being:

- ✓ Integrity as self-integration
- ✓ Integrity as maintenance of identity
- ✓ Integrity as standing for something
- ✓ Integrity as moral purpose and
- ✓ Integrity as a virtue.

**22. Write on Integrity as Self-Integration.**

Integrity as Self-Integration

- ✓ It is a matter of persons integrating various parts of their personality into a harmonious, intact whole.
- ✓ Integrity of persons is analogous to the integrity of things: Integrity is primarily a matter of keeping the self-intact and uncorrupted.

**23. What is Integrity as maintenance of identity?**

Integrity as maintenance of identity:

- ✓ Person's acting according to their commitments, rather than ordering and endorsing desires.
- ✓ 'Commitment' is different kinds of intentions, promises, convictions and relationships of trust and expectation.

**24. What do you understand by 'Integrity as standing for something'?**

Integrity as standing for something:

- ✓ It is a social virtue, one that is defined by a person's relations to others.
- ✓ The social character of integrity is a matter of a person's proper regard for their own best judgment.
- ✓ Persons of integrity do not just act consistently with their endorsements, they stand for something, and they stand up for the best judgment within a community of people trying to discover what in life is worth doing.

**25. Write on Integrity as moral purpose.**

Integrity as moral purpose

- ✓ A person's dedication to the pursuit of a moral life and their intellectual responsibility in seeking to understand the demands of such a life.
- ✓ Persons embrace a moral point of view that urges them to be conceptually clear, logically consistent, appraised of relevant empirical evidence.
- ✓ They are careful about acknowledging as well as weighing relevant moral considerations.
- ✓ Persons of integrity impose these restrictions on themselves.
- ✓ They pursue a commitment to do what is best.

**WORK ETHIC:**

**26. Define work ethics.( April 2014)**

Work Ethics:

- ✓ Work ethic is a characteristic attitude of a group of persons or workers towards morality of work.
- ✓ It is being personally accountable and responsible for the work that one does.
- ✓ It is based on a belief that work has a great value.
- ✓ Work ethics is usually associated with people who work hard and do a good job.
- ✓ Workers, working in a team, are not supposed to cause harm to others. Any worker cannot escape accountability
- ✓ Worker has the moral responsibility to see that no other person's right, private or freedom is impaired or transgressed.

**27. Name the elements of work ethics.**

Elements of work ethics:

- ✓ Many characteristics of work ethic can be summarized using the following three elements:
- ✓ Interpersonal skills : habits, attitudes, manners, appearance, and behavior we use around other people
- ✓ Initiative: initiative is very important characteristics for information age workers.

- ✓ Being dependable: authoritative and limitations given to us have to be remembered.

**28. Write notes on Interpersonal skills.**

Interpersonal skills:

- ✓ Interpersonal skills include habits, attitudes, manners, appearance, and behaviour. We use around other people, which affect how we get along with other people.
- ✓ The development of interpersonal skills begins early in life and is influenced by family, friends, and our observations of the world around us.
- ✓ Most of these characteristics are passed along to us by our parents or guardians.
- ✓ Some aspects of interpersonal skills are even inherited. Appearance and some personality traits are largely influenced by our genes.
- ✓ To improve our interpersonal skills we must first be aware of what we are like from the perspective of other people who interact with us.

**29. Define the term 'initiative'**

Initiative:

- ✓ Initiative is a very important characteristic for information age workers.
- ✓ Direct supervision is often not a feature of the modern workplace.
- ✓ Without initiative, procrastination and missed opportunities can become a real problem.
- ✓ Sometimes poor performance results and leads to loss of a job, without any second chances.

**SERVICE LEARNING:**

**30. Define the term 'Service Learning'.(April/May 2008) (or) What is Service Learning (A/M 2022)**

- ✓ Service Learning is a method of learning by which students learn from their past services rendered to their communities.
- ✓ It is a teaching and learning strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility and strengthen communities.
- ✓ Service learning tells that one has moral responsibility to increase the desirable effects and to decrease the harmful effects. Any service should increase the desirable result.

**31. Give an illustration for service learning.**

Illustration for service learning:

- ✓ Example -College students collecting trash out of an urban streambed.
- ✓ They provide a service to the community as volunteers and are highly valued and important.
- ✓ When the students analyze the trashed and possible sources, they can share the results with residents of the neighbourhood along with suggestions for reducing pollution, thus engaging in service – learning.
- ✓ In the service-learning, the students are providing an important service to the community and at the same time, learning about water quality and laboratory analysis, developing an understanding of pollution issues, learning to interpret science issues to the public, and practicing communication skills by speaking to residents.
- ✓ They may also reflect on their personal and career interests in science, environment, public policy or other related areas.

**32. Why is service learning important?**

Effective service learning programs

- ✓ Improve grades of students
- ✓ Increase attendance in school/college
- ✓ Develop students' personal and social responsibility.
- ✓ Integrate learning into a service
- ✓ Students gain knowledge in analysis and evaluation.

**33. Justify that Service-Learning strengthens both education and local communities.**

Service-Learning strengthens both education and local communities by:

- ✓ Building effective collaborative partnerships between schools or colleges and other institutions and organizations
- ✓ Engaging parents and other adults in supporting student learning
- ✓ Meeting community needs through the service projects conducted
- ✓ Providing engaging and productive opportunities for young people to work with others in their community.

**34. Write down a few characteristics of Service-Learning.**

Characteristics of Service-Learning:

- ✓ Service learning links to academic content and standards.
- ✓ It involves young people in helping to determine and meet real, defined community needs.
- ✓ It is reciprocal in nature, benefiting both the unity and the service providers by combining a service experience with a learning experience.
- ✓ It can be used in any subject area so long as it is appropriate to learning goal.
- ✓ It works at all ages, even among young children.
- ✓ It is positive, meaningful and real to the participants.

**CIVIC VIRTUE:**

**35. What is a civic virtue? ( AU Nov/Dec 2008)**

- ✓ Civic virtue is morality or standard of righteous behaviour in relationship to a citizen's involvement in society.
- ✓ It is comprised of actions and attitudes associated with democratic governance and social participation.
- ✓ An individual may exhibit civic virtue by voting, volunteering, organizing a book group, or attending a public-oriented meeting
- ✓ 'Civic' means "of relating to or belonging to a city, a citizen, or citizenship, municipal or civil society".

**36. Mention some civic virtues. What are the civic virtues? Nov / Dec 2023**

- ✓ Good citizen demand civic virtue.
- ✓ It is the principle of not harming the surroundings.
- ✓ It also includes living peacefully, letting others live peacefully, and caring, sharing, respect for others, protecting the environment and being normally and ethically good.

**37. What are the duties of an individual exhibiting civic virtue?**

The duties are:



- ✓ To pay taxes to the local government and state, in time.
- ✓ To keep the surroundings clean and green.
- ✓ Not to pollute the water, land, and air by following hygiene and proper garbage disposal. For example, not to burn wood, tyres, plastic materials, spit in the open, even not to smoke in the open, and not to cause nuisance to the public, are some of the civic (duties) virtues.
- ✓ To follow the road safety rules.

**38. What are the rights of an individual exhibiting civic virtue?**

The rights are:

- ✓ To vote the local or state government.
- ✓ To contest in the elections to the local or state government.
- ✓ To seek a public welfare facility such as a school, hospital or a community hall or transport or communication facility, for the residents.
- ✓ To establish a green and safe environment, pollution free, corruption free, and to follow ethical principles. People are said to have the right to breathe in fresh air, by not allowing smoking in public.
- ✓ People have unalienable right to accept or reject a project in their area. One has the right to seek legal remedy, in this respect, through public interest petition.

**RESPECT FOR OTHERS:**

**39. Why should we respect others?**

- ✓ Treating people with respect makes this world a nice place to live in.
- ✓ All one has to do is, "treat people the way you like others to treat you".
- ✓ We live in a country of many languages, culture, races and backgrounds.
- ✓ In order to make all our lives a lot more fun and interesting, we have to get along with each other.
- ✓ To achieve "unity in diversity", we have to respect each other.

**40. How can we show respect to others?**

Some of the ways to treat people are:

- ✓ Don't insult people or make fun of them.
- ✓ Value other people's opinion
- ✓ Be considerate of people's likes and dislikes.
- ✓ Don't tease or harness people.
- ✓ It is not good to talk about people behind their back.
- ✓ Have respect to other people's feelings.
- ✓ Don't compel anybody to do something he/she does not want to do.
- ✓ We have to learn something from the other persons.
- ✓ We have to show interest and appreciation for other people's cultures and backgrounds.
- ✓ We should not have prejudices and racist attitudes.

**LIVING PEACEFULLY:**

**41. Write on 'living peacefully'.**

Living Peacefully:

- ✓ To lead a peaceful life one requires "Peace of mind".
- ✓ Peace of mind leads to "living peacefully" by all.

- ✓ Peace can be achieved by rational thinking and adhering to strict moral values.
- ✓ Mind should be controlled and directed towards constructive thinking, ideas and working.
- ✓ In this direction, study of good books, lives of great men, self-respect, attitude of responsibility towards society and the nation will help a great deal.
- ✓ Peace should be our way of life.

**42. What are the principles one has to follow to live peacefully?**

If one wants to live peacefully, he/she has to follow certain principles in his /her life. They are:

- ✓ One has to believe in God.
- ✓ Home has to be made a place of friendliness, refreshment and peace.
- ✓ One has to be patient and considerate towards others.
- ✓ We have to work towards removal of social injustice.
- ✓ Work towards reconciliation between individuals, groups and nations, is needed.
- ✓ One has to behave in a loving way towards all men and women.
- ✓ We have to have a caring and loving attitude towards others.
- ✓ We have to serve others in avoiding any form of violence.

**CARING:**

**43. Why is ‘caring’ an important human value in relation to engineering work?**

(AU Nov/Dec 2008)

- ✓ Caring knows the feeling and acting in the interest of others. Considering the experimental nature of engineering work, and that it can have unexpected negative consequences on the public, caring becomes an important human value in relation to engineering work.
- ✓ Caring is reflected in activities such as friendship, membership in social clubs and professional societies, and through various transactions in the family, fraternity, community, country and in international councils.

**44. Give a few points of Milton Mayer off on ‘caring’.**

Milton Mayer off has emphasized a deeper level of caring between two persons – the career and the cared-for.

- ✓ The goal of caring is to help the other actualize himself.
- ✓ Caring is an extension of one’s self.
- ✓ Devotion and constancy are essential elements of caring.
- ✓ Caring for another helps the other to care for and about others.
- ✓ Help in a way that the cared for can go on to help himself.
- ✓ Learning and living a life of caring involves all other values.

**SHARING:**

**45. What is sharing?**

Sharing:

- ✓ Sharing is one of a noble act of mankind and a high virtue.
- ✓ Sharing with others should be a part of human nature and life.
- ✓ Sharing should be the motto of good help.
- ✓ This implies sharing of feelings, ideas or thoughts and also materials, resources and profit.

- ✓ Sharing is always mutually beneficial.
- ✓ Whatever possible within our capacity could be shared with sincerity, affection, and kindness?

**46. Write briefly on Civic Knowledge as exemplified by George Washington.**

Civic Knowledge:

- ✓ Citizens must understand what the constitution says about how the government is working, and what the government is supposed to do and what not to do.
- ✓ We must understand the basis of our responsibilities as citizens, besides duties and rights.
- ✓ We must be able to recognize when the government requires the participation of the enlightened citizens, to serve and survive.

**47. What is Self-Restraint as exemplified by George Washington?**

Self-Restraint:

- ✓ For citizens to live in a free society with limited government each citizen must be able to control or restrain himself otherwise, we would need a police state – that is a dictatorial government to maintain safety and order.
- ✓ Morality was advocated and, he declared that happiness is achieved and sustained through virtues and morals.
- ✓ Self-restraint was advocated and demonstrated several times in his private and public life, and naturally he was a great leader.

**48. What is Self-Assertion as exemplified by George Washington?**

Self-Assertion:

- ✓ Self-assertion means that citizens must be proud of their rights, and have the courage to stand up in public and defend their rights.
- ✓ Sometimes, a government may usurp the very rights that it was created to protect.
- ✓ In such cases, it is the right of the people to alter or abolish that government (e.g., voting rights, rights call back.)

**49. Write brief notes on Self-Reliance as exemplified by George Washington.**

Self-Reliance:

- ✓ Citizens who cannot provide for themselves will need a large government to take care of them,
- ✓ Once citizens become dependent on government for their basic needs, the people are no longer in a position to demand that government act within the confines of the Constitution.
- ✓ Self-reliant citizens are free citizens in the sense that they are not dependent on others for their basic needs.
- ✓ They do not need a large provider- government, which has the potential; to become an oppressive government to meet those needs.
- ✓ Only a strong self-reliant citizenry will be able to enjoy fully the blessings of liberty.
- ✓ These civic virtues applicable to local state and central governments nourish freedom and civil liberty at the root of democracy.

**HONESTY:**

**50. What is honesty? ( AU Nov/Dec 2006)**

- ✓ Honesty means expressing one's true feelings.

- ✓ To be able to be emotionally honest we must first be emotionally aware.
- ✓ This emotional awareness is related to our emotional intelligence.
- ✓ It is our emotional intelligence may also give us the ability to decide when it is in our best interest to be emotionally honest by sharing our true feelings.

**51. Give the two aspects of Honesty. ( Nov/ Dec 2016)**

Two aspects of Honesty:

- ✓ Truthfulness – meeting responsibilities concerning truth -telling.
- ✓ Trustworthiness – Meeting responsibilities concerning trust.

Truthfulness is to face the responsibilities upon telling truth. One should keep one’s word or promise. By admitting one’s mistake committed it is easy to fix them. Reliable engineering judgment, maintenance of truth, defending the truth, and communicating the truth, only when it does well to others are some of the reflections of truthfulness.

Trustworthiness is maintaining integrity and taking responsibility for personal performance.

**52. List some of the actions of the engineer that leads to dishonesty.**

Some of the actions of an engineer that leads to dishonesty are:

- ✓ Lying
- ✓ Deliberate deception
- ✓ Withholding the information
- ✓ Not seeking the truth
- ✓ Not maintaining confidentiality
- ✓ Giving professional judgment under the influence of extraneous factors
- ✓ Such as personal benefits and prejudice

**COURAGE:**

**53. What is courage as a value?**

- ✓ Courage is the tendency to accept and face risks and difficult tasks in rational ways.
- ✓ Courage implies self-respect and governs confrontations with danger and risk.
- ✓ It is not excessive rashness or cowardice, but it is the middle ground.
- ✓ Taking calculated risks and boldness in facing crises are the hallmarks of courage as a human value.
- ✓ It defines the mental makeup of an individual in taking bold decisions even under adverse situations.

**54. Write the classification of courage.**

Courage is classified into three types, based on the types of risks, namely

- ✓ Physical courage
- ✓ Social courage
- ✓ Intellectual courage.

**55. What are the expressions of courage? Illustrate.**

The expressions of courage are:

- ✓ Facing the criticism
- ✓ Owning responsibility
- ✓ Accepting the mistakes or errors when committed and exposed.

**56. What are the two important ways of building courage? (Nov/Dec 2017)**

- ✓ Follow your authentic purpose
- ✓ Predict your future by creating it
- ✓ Do things that others don't
- ✓ Bend, but don't break
- ✓ Turn every obstacle into an asset

**57. What is meant by civic virtue? How is it related to respect for others? (April/May 2018)**

- ✓ Civic virtue is morality or standard of righteous behaviour in relationship to a citizen's involvement in society.
  - ✓ It is comprised of actions and attitudes associated with democratic governance and social participation.
  - ✓ An individual may exhibit civic virtue by voting, volunteering, organizing a book group, or attending a public-oriented meeting
  - ✓ 'Civic' means "of, relating to or belonging to a city, a citizen, or citizenship, municipal or civil society"

**58. Differentiate moral courage and physical courage.**

.No	Moral Courage	Physical Courage
.	It is the quality of mind which enables one to encounter danger and difficulties with firmness, or without fear, or fainting of heart.	It is the willingness to face serious risk to life or limb instead of fleeing from it.
.	It is about facing mental challenges that could harm one's reputation, emotional well-being, self-esteem, or other characteristics.	It is facing physical challenges that could harm the body.

**VALUING TIME:**

**59. What is 'time' and 'time management'?**

Time: Time is a measure of one's usefulness and success; it is a moral value.

Time Management: Time management is the rational way to ensure that our limited time is always used effectively.

**60. List some of the common time wastes identified by engineers.**

Some common time wastes identified by engineers are:

- ✓ Unscheduled and scheduled meetings
- ✓ Lack of adequate planning
- ✓ Poor delegation
- ✓ Too much socializing
- ✓ Ineffective communication
- ✓ Assuming unnecessary public responsibilities
- ✓ Lack of goals and objectives
- ✓ Poorly organized supervision

- ✓ Poor use of telephone.

### **CO-OPERATION:**

#### **61. What do you understand by the term ‘co –operation’?**

- ✓ Co -operation means extending help to others, for a good cause. Co -operation may be through an idea, a suggestion, an assistance or physical work which extends to others for common benefit
- ✓ Willingness to understand others think and act together and putting this into practice is cooperation.

#### **62. What are the benefits of cooperation?**

- ✓ Cooperation promotes co-linearity, coherence (blend), co-ordination (activities linked in sequence or priority) and the synergy (maximizing the output, by reinforcement). The whole is more than the sum of the individuals.
- ✓ It helps in minimizing the input resources (including time) and maximizes the outputs, which include quantity, quality, effectiveness, and efficiency.

#### **63. List the impediments to successful cooperation.**

The impediments to successful cooperation are:

- ✓ Clash of ego of individuals
- ✓ Lack of leadership and motivation
- ✓ Conflicts of interests, based on region, religion, language, and caste
- ✓ Ignorance and lack of interest.
- ✓ By careful planning, motivation, leadership, fostering and rewarding team work, professionalism and humanism beyond the ‘divides’, training on appreciation to different cultures, mutual understanding ‘cooperation’ can be developed and also sustained.

### **COMMITMENT:**

#### **64. What is commitment?**

- ✓ Commitment means alignment to goals and adherence to ethical principles during the activities.
- ✓ One must believe in one’s action performed and the expected end results(confidence), i.e.,the conviction without an iota of doubt that one will succeed.
- ✓ Holding sustained interest and firmness, in whatever ethical means one follows, with the fervent attitude and hope that one will achieve the goals, is commitment.

### **EMPATHY:**

#### **65. Define the term empathy and how is it related to emotional quotient. (April/May 2018)**

- ✓ Empathy means putting self in a position of someone else and thinking as the later and reasoning suitable action.
- ✓ It is also defined as the ability to put one’s self into the psychological frame or point of view of another, to know what the other person feels.
- ✓ It includes the imaginative projection into other’s feelings and understanding other’s background such as parentage, physical and mental state, economic situation and association.

**66. Give the benefits of empathy.**

The benefits of empathy include:

- ✓ Good customer relations (in sales and service, in partnering).
- ✓ Harmonious labour relations(in manufacturing)
- ✓ Good vendor –producer relationship (in partnering).
- ✓ Empathy heals
- ✓ Builds trust.
- ✓ Empathy closes the loop

**SELF –CONFIDENCE:**

**67. What is meant by self-confidence? (May/June 2016) (or) Define the term self- confidence. How is it related to character development?(Nov/Dec 2018, 2021)**

- ✓ Certainty in one’s own capabilities, values, and goals, is self-confidence.
- ✓ People with self-confidence are usually positive thinking, flexible and willing to change.
- ✓ They respect others so much as they respect themselves.
- ✓ People with self-confidence exhibit courage to get into action and unshakable faith in their abilities, whatever may be their positions.
- ✓ They are not influenced by threats or challenges and are prepared to face them and the natural or unexpected consequences.
- ✓ The self confidence in a person develops a sense of partnership, respect, and accountability, and this helps the organization to obtain maximum ideas, efforts, and guidelines from its employees.

**68. What are the qualities of self-confident people? (Nov/Dec 2015)**

The people with self-confidence have the following characteristics:

- ✓ A self – assured standing
- ✓ Willing to listen to learn from others and adopt(flexibility)
- ✓ Frank to speak the truth
- ✓ Respect others efforts and give due credit.

**69. Name the factors that shape self-confidence in a person.**

The factors that shape self-confidence in a person are:

- ✓ Heredity (attitudes of parents) and family environment (elders)
- ✓ Friendship (influence of friends/colleagues)
- ✓ Influence of superiors/role models
- ✓ Training in the organization (e.g./training by Technical Evangelists at Infosys Technologies).

**70. What are the effective methodologies in developing self-confidence in a person?**

The following methodologies are effective in developing self-confidence in a person:

- ✓ Encouraging SWOT analysis. By evaluating their strength and weakness, they can anticipate and be prepared to face the results.
- ✓ Training to evaluate risks and face them (self-acceptance)
- ✓ Self-talk. It is conditioning the mind for preparing the self to act, without any doubt on his capabilities. This makes one accepts himself while still striving for improvement
- ✓ Study and group discussion, on the history of leaders and innovators(e.g., Sam Walton of Wal-Mart,

USA).

### **CHARACTER:**

#### **71. What is character?**

- ✓ Character is the expression of the personality of a human being, and it reveals itself in one's conduct.
- ✓ It is the pattern of virtues (morally desirable features).
- ✓ Character includes attributes that determine a person's moral and ethical actions and responses.
- ✓ It is also the ground on which morals and values blossom.

#### **72. List the tendencies by which people are divided into categories.**

People are divided into categories according to common tendencies such as:

- ✓ Ruthlessness
- ✓ Aggressiveness
- ✓ Ambition
- ✓ Constricting selfishness
- ✓ Stinginess
- ✓ Cheerfulness
- ✓ Generosity
- ✓ Goodwill

#### **73. Write briefly on developed social and unformed social character.**

- ✓ The character is exhibited through conduct.
- ✓ Character is determined by the expectations of society.
- ✓ Many act and live within the social norms refusing to fall below the required social minimum, failing to rise above the maximum expected of a normal member of the group.

##### **Developed social Character:**

- ✓ People whose lives are determined and directed by the prevailing habits, fashions, beliefs, attitudes, opinions and values of the society in which they live have at best a developed social character.

##### **Unformed social character:**

- ✓ People whose lives do not even conform to the minimum standards, and fail to acquire the socially – required behaviour, attitudes and values have an unformed social character.

#### **74. What is an individual character?**

Individual Character:

- ✓ They are the people whose beliefs, attitudes and values are determined internally by the strength of their own convictions.
- ✓ These are individuals with developed minds and formed characters of their own.
- ✓ The concept of character can imply a variety of attributes including the existence or lack of virtues such as empathy, courage, fortitude, honesty, loyalty or of good behaviors or habits.
- ✓ Moral character primarily refers to the assemblage of qualities that distinguish one individual from another.

#### **75. Name the four main types of temperaments recognized from the times of Hippocrates.**

From the times of Hippocrates, the four main types of temperaments distinguished are:

- ✓ The Sanguine



- ✓ The Choleric
- ✓ The Phlegmatic
- ✓ The Melancholic

From the time of Hippocrates, the four main types of temperaments distinguished are proto – psychological theory that suggest that there are four fundamental personality types, sanguine (enthusiastic, active and social), choleric (short-tempered, fast or irritable), melancholic (analytical, wise and quiet) phlegmatic (relaxed and peaceful).

**76. Enumerate the ‘pillars of character’.**

The ‘pillars of character’ are six. The six pillars of character are the ethical values. They are:

- ✓ Trustworthiness
- ✓ Respect
- ✓ Responsibility
- ✓ Firmness Caring
- ✓ Citizenship

**SPIRITUALITY:**

**77. Define spirituality? ( AU Nov/Dec 2006)**

- ✓ Spirituality refers to the way of living. It emphasizes a constant awareness and recognition of the spiritual dimension (mind and its development) of nature and people, with a dynamic balance between the material development and the spiritual development.
- ✓ It is a sense of meaning and purpose, ‘a sense of self’.
- ✓ Spirituality includes creativity, communication, recognition of the individual as human being, respect to others, acceptance, vision, and partnership.

**78. How is spirituality promoted in workplaces?**

Spirituality is promoted in workplaces by adhering to the following activities:

- ✓ Verbally respect the individuals as humans and recognize their values in all decisions.
- ✓ Get to know the people with whom you work and know what is important to them. Know their goals, desires, and dreams.
- ✓ Support causes outside the business.
- ✓ Encourage leaders to use value-based discretion in making decisions.
- ✓ Demonstrate your own self –knowledge and spirituality in all your actions.
- ✓ Do unto others as you would have them do unto you.

**79. List some of the spiritual traits to be developed for excellence in corporate activities.**

The spiritual traits to be developed for excellence in corporate activities are:

- ✓ Self-awareness
- ✓ Alertness in observation and quickness in decision making
- ✓ Being visionary and value based
- ✓ Holism
- ✓ Compassion
- ✓ Respect for diversity
- ✓ Moral Autonomy

- ✓ Creative thinking and constant reasoning
- ✓ Ability to analyze and synthesize
- ✓ Positive views of adversity
- ✓ Humility
- ✓ Sense of vocation

## YOGA AND MEDITATION FOR PROFESSIONAL EXCELLENCE AND STRESS

### MANAGEMENT:

#### **80. Write briefly on Yoga. (Nov/Dec 2016)**

- ✓ Yoga is considered a mind-body type of complementary and alternative medicine practice.
- ✓ Yoga brings together physical and mental disciplines to achieve peacefulness of body and mind, helping you relax and manage stress and anxiety.
- ✓ Yoga has many styles, forms and intensities. Hatha yoga, in particular, may be a good choice for stress management. Hatha is one of the most common styles of yoga, and beginners may like its slower pace and easier movements. But most people can benefit from any style of yoga — it's all about your personal preferences.
- ✓ The core components of hatha yoga and most general yoga classes are:
- ✓ **Poses:** Yoga poses, also called postures, are a series of movements designed to increase strength and flexibility. Poses range from lying on the floor while completely relaxed to difficult postures that may have you stretching your physical limits.
- ✓ **Breathing:** Controlling your breathing is an important part of yoga. In yoga, breath signifies your vital energy. Yoga teaches that controlling your breathing can help you control your body and quiet your mind.

#### **81. What are the health benefits of Yoga?**

The potential health benefits of yoga include:

- ✓ **Stress reduction:** A number of studies have shown that yoga can help reduce stress and anxiety. It can also enhance your mood and overall sense of well-being.
- ✓ **Improved fitness:** Practicing yoga can lead to improved balance, flexibility, range of motion and strength. And this means you're less likely to injure yourself in other physical endeavours or in your daily activities.
- ✓ **Management of chronic condition:** Yoga can help reduce risk factors for chronic diseases, such as heart disease and high blood pressure. Yoga might also help alleviate chronic conditions, such as depression, pain, anxiety and insomnia.

#### **82. Compare Yoga with other stress reduction methods.**

- ✓ As yoga combines several techniques used for [stress reduction](#), it can be said to provide the combined benefits of breathing exercises, [stretching exercises](#), fitness programs, [meditation practice](#), and [guided imagery](#), in one technique.
- ✓ However, for those with great physical limitations, simple [breathing exercises](#), [meditation](#) or [guided imagery](#) might be a preferable option and provide similar benefits.
- ✓ Yoga also requires more effort and commitment than taking [pills or herbs](#) for stress reduction.

#### **83. Differentiate value from cost. (A/M 2023)**

Cost is the amount a seller incurs to produce and offer the product or service for sale. Value is the perceived worth of the product or service to the buyer.

## **PART-B**

1. Explain in detail about

- (i) Work ethics
- (ii) Honesty. (April/May 2008 & Nov/ Dec 2016) Write short notes on Honesty.(Nov/Dec 2021)
- (iii) What is meant by work ethics? List and explain elements of work ethics? Nov 2023

2. Write short notes on the following human values (i) Civic virtue (ii) Empathy (iii)

Commitment (iv) Integrity (April/May 2008) (Nov/Dec 2016, 2021) (or) Define empathy. State and explain the elements and benefits of empathy. Compare empathy and sympathy (Nov/Dec 2017) (or) what is integrity? How integrity plays a major factor in work ethics? Discuss with suitable examples. (April/May 2018). (or) What is empathy? Discuss its role in the spiritual development for excellence in an organization with suitable examples. (Nov/Dec 2018) (or) State and explain the elements and benefits of Empathy. (A/M 2022, N/D 2022) (April/May 2023) List any four core human values. Further classify/explain values related to each. Nov 2023 what is integrity? Mention different types of integrity. Nov 2023

3. Explain in detail about

- i) Service learning
- ii) Respect to others

What is service learning? Why service learning is important? Explain the characteristics of service learning. (Nov/Dec 2017)

What is service learning? Discuss its role in caring and sharing in society with suitable examples. (Nov/Dec 2018)

Enumerate on the importance and characteristics of service learning. (A/M 2022, N/D 2022)

4. Illustrate the ethical aspect principle of caring and sharing, with an example.

5. Explain the following in details; i) write briefly on the human value Courage. ii) Explain various actions of an engineer leading to dishonesty.

i) Write briefly on the human value Courage.

6. Explain 'valuing time' and 'Co-operation' in detail.

7. Write explicitly on the ethical value 'self-confidence'. (Or) Explain the importance of 'self-confidence' in ethics (May /June 2016)

8. Differentiate human values with disvalues. (Nov/Dec 2006)

9. i) Explain why the study of human values is very essential to engineers and list some important human values.

ii) Write a short note on 'work ethic'?

iii) List some important time wasters. How can one manage his/her time properly? (Nov/Dec 2008)

10. i) Write in detail on the value 'Character'.

ii) Write briefly on 'Spirituality' (May /June 2016)

What is spirituality? What are the spiritual traits to be followed for excellence in an organisation? Discuss with suitable examples. (April/May 2018)

11. Discuss the role and importance of ethics in engineering (Nov / Dec 2021) (or) Detail on the scope and importance of professional ethics in engineering. (A/M 2022)(N/D 2022) what is ethics? List and explain the ethics in relation to other studies. Nov 2023What is Ethics?
- 12.Explain the role of Yoga in professional ethics. (Nov / Dec 2021). (or) Analyze the significance of yoga and meditation for professional excellence and stress management. (A/M 2022) (A/M 2023)

## **UNIT-2**

### **PART-A**

#### **PART – A (2 Marks)**

##### **SENSES OF ‘ENGINEERING ETHICS’**

**1. What is ethics?[Nov/Dec 2022]**

- ✓ Ethics is the study of the characteristics of morals.
- ✓ Ethics is the “art of human living.”
- ✓ Ethics intends to form good men.
- ✓ Ethics is the “science to form good men.”
- ✓ Ethics is the systematic analysis of morality

Ethics is defined as the discipline dealing with what is good and bad and with moral duty and obligation.

Some of the uniersally accepted ethical principles are: integrity, honesty, accountability, etc.

**2. What are the senses of engineering ethics?(AU Nov/Dec 2013)**

Some of the universally accepted ethical principles are:

- |                  |                   |
|------------------|-------------------|
| ✓ Integrity      | ✓ Honesty         |
| ✓ Accountability | ✓ confidentiality |
| ✓ Discipline     | ✓ loyalty         |
| ✓ Courage        | ✓ Competency      |
| ✓ Diligence      | ✓ Wisdom          |
| ✓ Humanity       | ✓ Responsibility  |

**3. What are the various discipline of ethics? (A.U. Nov./Dec. 2011)**

The various disciplines of ethics include:

- ✓ Personal ethics;
- ✓ Business ethics;
- ✓ Engineering ethics;
- ✓ Medical Ethics;
- ✓ Legal ethics; and
- ✓ Accounting ethics.

Personal ethics is concerned with the rules by which an individual lives his or her personal life.

Legal ethics is concerned with the codes that guide the professional conduct of lawyers, judges, etc.

Accounting ethics is concerned with the codes that guide the professional conduct of accountants.

**4. Contrast personal ethics and business ethics.**

- ✓ Personal ethics is concerned with the rules by which an individual lives his or her personal life. It deals with how we treat others in our day-to-day lives.
- ✓ Business ethics is concerned with truth and justice and has a variety of aspects such as the expectation of society, fair competition, advertising, public relations, social responsibilities, consumer autonomy and corporate behavior. It involves choices on an organisation level rather than a personal level.

5. What is accounting ethics, medical ethics and legal ethics? Define accountability. Nov 2023

- ✓ Accounting ethics is concerned with the codes that guide the professional conduct of accountants.
- ✓ Medical ethics is concerned with the rules and standards governing the conduct of doctors and other medical practitioners in their role as professionals. It is mainly concerned in medical fields.
- ✓ Legal ethics is concerned with the codes that guide the professional conduct of lawyers, judges, etc. The lawyers should be loyal to their work in which they are doing to their clients.
- ✓ Accountability is a concept of responsibility or answerable for a system.

6. What is Engineering ethics? (A.U. Nov./Dec 2004, Nov./Dec.2005, May/June 2006, Nov/Dec 2022)  
(A/M 2023)

Engineering ethics is concerned with:

- ✓ The study of the moral issues and decisions confronting individuals and organizations engaged in engineering field.
- ✓ The study of related issues about the moral ideals, characters, policies and relationships of people and corporations involved in technological activity.
- ✓ It refers to the ethical obligation that engineers have to follow because of their professional status.

7. Define Engineering ethics (April/May 2016) (A/M 2022)

- ✓ Engineering ethics may be defined as the identification, study and resolution of ethical problems occurring in the practice of the engineering profession.
- ✓ The concept of engineering ethics is not applicable only for engineers. It can also be applied to others who engage in any technological enterprises, such as scientist technicians, technical writers, production staffs, supervisors, sales staffs, doctors, lawyers, and general public.

8. Are engineering ethics and professional ethics same?

- ✓ No. The professional ethics is wider in scope than the engineering ethics. In fact, the engineering ethics is a part of professional ethics.
- ✓ Professional ethics is the discipline aimed at understanding the moral values that ought to guide all professional practices, including engineering, medicine, law and other practices.
- ✓ But the engineering ethics refers to the set of specific moral problems and issues related to engineering profession only.

9. What are the aims/objectives of studying engineering ethics? (A.U. Nov./Dec.2005, April/May 2011 )

The aims in studying engineering ethics are:

- ✓ To stimulate the moral imagination;

- ✓ To recognize ethical issues;
- ✓ To develop analytical skills;
- ✓ To engage a sense of responsibility; and
- ✓ To address unclarity, uncertainty, and disagreement.

**10. What is morality? (A/M 2023)**

The word 'morality' is concerned with:

- ✓ What morally should or should not be given in a given situation;
- ✓ What is morally right or wrong about the handling of the situation
- ✓ What is morally good or bad about the people, policies and ideals involved in it?
- ✓ According to Oxford dictionary, morality means principles concerning right and wrong or good and bad behavior.

**11. Distinguish between micro-ethics and macro-ethics.**

(What are two different approaches to engineering ethics?)

There are two different approaches to engineering ethics, They are:

**Micro-ethics:** This approach addresses typical, everyday problems that the Engineers face in their personal life. In other words, micro- ethics describes ethical issues that may affect Engineer's professional and personal life.

**Macroethics:** This approach deals with all societal problems that Engineers encounter during their career. In other words, macroethics discusses ethical issues concerning all societal problems that engineers might encounter.

**TYPES OF INQUIRY**

**12. Classify the types of inquiry. (A.U. April/May 2005) (Nov/Dec 2017)**

- ✓ Engineering ethics combines inquiries into values, meanings and facts.
- ✓ In engineering ethics, the three types of inquiry are:

- ❖ Normative inquiries: for identifying and establishing the morally desirable norms or standards

- ❖ Conceptual inquiries :to clarify the meaning of key ideas and issues

- ❖ Factual inquiries:to provide facts required for understanding and resolving value issues.

**13. What are normative inquiries? Give any two examples of normative questions.(A.U. April / May 2011)**

- ✓ Normative inquiries are meant for identifying and establishing the morally desirable norms or standards that are used as guide to assess something as good or bad. Generally, normative questions are about what ought to be? and what is good?
- ✓ Examples of normative questions: Some examples are
  - When and why the engineers have obligations to their employers, their clients, and the general public?
  - When should the engineers attempt for whistle blowing?

**14. What is meant by conceptual inquiry? Give any two examples of it. (A.U. Nov/Dec 2011) Nov 2023**

- ✓ The aim of conceptual inquiries is to clarify the meaning of key ideas and issues, possibly expressing by single word or by statements.

- ✓ Examples of conceptual inquiries: Some examples are
- What is safety?
- What is a bribe?
- When does a gift become a bribe?

**15.** What are factual inquiries? Give any two examples of factual questions.

- ✓ Factual inquiries are also known as ‘descriptive or exploratory’ inquiries.
- ✓ These inquiries are helpful to provide facts required for understanding and resolving value issues.
- ✓ Examples of conceptual inquiries: Some examples are
- What are the laws enforced in the intellectual property rights law recently?
- What are the procedures used in making risk assessments?

**16.** What are moral dilemmas? Define moral Dilemma. (A.U. May/June 2009/ Nov/Dec 2016, Nov/Dec 2022)

- ✓ Moral dilemmas are situations in which two or more moral obligations, duties, rights, goods, or ideals come into conflict with each other.
- ✓ The crucial feature of a moral dilemma is that all the moral principles cannot be fully respected in a given situation.
- ✓ Also solving one moral principle can create two or more conflicting applications for a particular situation.

**17.** What are the causes of moral dilemmas?(A.U. May/June 2012)(What are the types of moral dilemmas?)

- ✓ Dilemmas ‘are situations in which moral reasons come into conflict or in which the application of moral values are problems, and one is not clear of the immediate choice or solution of the problems.
- ✓ Moral dilemmas are situations, mostly, due to the following three problems.
- ✓ Problem of vagueness;
- ✓ Problem of conflicting reasons; and
- ✓ Problem of disagreement.

**18.** What do you mean by problem of conflicting reasons?

- ✓ This is a situation where two or more moral obligations, duties, rights or ideals come in to conflict with each other; independently each one is good and correct.
- ✓ But when they come together it is very difficult choice to choose the good one.
- ✓ In other words, this is a situation where two or more moral problems conflict each other, each of which seems to be correct. e.g., launching the challenger space shuttle despite there was an unknown probability that the shuttle would explode, which will kill all the persons on the board.

**19.** What are the steps required in confronting moral dilemmas? (A.U. May/June 06, May/June 2009)

In order to face/overcome the above said moral dilemmas, one can follow one or more of the following steps.

*Step 1:* Identifying the relevant moral factors and reasons.

*Step 2:* Collecting all the available moral considerations, which are relevant to the moral factors involved.

*Step 3:* Ranking the above collected moral considerations on the basis of importance as applicable to the particular situation.

*Step 4:* Making factual inquiries.

*Step 5:* Inviting discussions, suggestions from colleagues, friends and other involved persons to critically examine the moral dilemmas.

*Step 6:* Taking the final decision.

#### MORAL AUTONOMY

**20.** What is meant by moral autonomy?(A.U. April/May 2005, May/June 2006)

What are the merits of moral autonomy?( April/May 2018)

Define the term Moral autonomy. (Nov/Dec 2018)

- ✓ Autonomy means ‘self – determining or independent.’
- ✓ Moral autonomy means the skill and habit of thinking rationally on ethical issues based on moral concern.
- ✓ It is concerned with the independent attitude of an individual related to ethical issues.
- ✓ The autonomous people hold moral beliefs and attitudes based on critical reflection rather than on passive adoption of the conventions of the society or profession.

Merits:

- ✓ Wise and smart so as to suit the livelihoods of those around
- ✓ The sanctity of being of your own individual self by reaching a Nirvanic stage
- ✓ self-aware.

**21.** What are the factors that are influencing the moral concern?

Some of the factors influencing one’s moral concern are:

- ✓ Atmosphere in which the person is brought up in his childhood.
- ✓ One’s relationship with friends and relatives.
- ✓ One’s interaction with his neighbors.
- ✓ One’s family structure and the family’s economy.
- ✓ Influence of religious institutions such as temples, churches, mosques.
- ✓ Influence of educational institutions such as school, college etc.

**22.** What are the three levels of moral development of Lawrence Kohlberg’s theory?

(A.U. May/June 2006/Nov2016, April 2016, Nov/Dec 2022)

The three levels of moral development, suggested by Kohlberg, are:

1. Pre-conventional level;
2. Conventional level;
3. Post-conventional level.

His theory is based on the foundation that morality is a form of reasoning that develops instructional changes. He also pointed out that the people at post, conventional level have the most moral development and hence the moral autonomy.

**23.** What does Kohlberg’s pre-conventional level of moral development say?

- ✓ The pre-conventional level of Kohlberg’s theory says that individuals are motivated



- ✓ primarily by their interest to avoid punishment, or by their desire to satisfy their own
- ✓ needs, or by the external power exerted on them.
- ✓ It is based on the desire to derive benefits for oneself.
- ✓ This is a level of development of all young children and some adults, who are unable to reach beyond a certain limit.

**24.** What does Kohlberg's conventional level of moral development emphasize?

- ✓ According to Kohlberg's conventional level, the moral thinking and behavior of individuals are determined by the standards of their family, community, and society.
- ✓ That is, the norms or conventions of one's family/community/society are accepted and adopted as the ultimate standard of morality.
- ✓ At this level, individuals are motivated by the desire to please others and to meet the social unit's expectation, without bothering about self-interest.

**25.** What does Kohlberg's post-conventional level of moral development conclude?

- ✓ In the post-conventional level, the individuals are guided by strong principles and convictions, not by selfish needs or pressures from society.
- ✓ These individuals are called as 'autonomous.'
- ✓ Kohlberg felt that the majority of adults do not reach the post-conventional level.
- ✓ People at this level have more moral development.

**26.** When do Kohlberg call individuals as 'autonomous' persons?

- ✓ According to Kohlberg, the individuals are called as 'autonomous' persons only when they think for/by themselves and also they do not believe that customs are always right.
- ✓ Those individuals want to live by general principles that are universally applied to all people.
- ✓ They always desire to maintain their moral integrity, self-respect, and the respect of other autonomous individuals.

**27.** Bring out any two drawbacks in applying Kohlberg's theory to practical situations.

The drawbacks in applying the Kohlberg's theory to practical situations are:

- ✓ How to judge, whether an individual belongs to first, or second, or third level?
- ✓ What are the criteria?
- ✓ What is the exact stage to specify moral development or growth? How does one
- ✓ can say that the higher levels represent more advanced stage of moral maturity?
- ✓ According to this theory, only a few people reach the post-conventional level. Hence this theory does not record the path of moral development that the majority of people follow.

## GILLIGAN'S THEORY

**28.** What is the underlying basis/concept on which Gilligan's theory of moral development has been developed? State Gilligan's theory (May/June 2016)

- ✓ According to Gilligan, males have tendency to override the importance of moral rules and convictions while resolving moral dilemmas; whereas females have tendency to try hard to preserve

personal relationships with all people involved in a situation.

- ✓ Also Gilligan felt that men mostly focus their attention on content of the problem, whereas women focus their attention on the context i.e., situation of the problem.
- ✓ Gilligan refers her context oriented emphasis on maintaining personal relationships are the ethics of care and contrasts it with Kohlberg's ethics of rules and rights.

**29.** What does Gilligan's conventional level refer?

- ✓ According to Gilligan's conventional level, women will not hurt others and have a willingness to sacrifice their own interests in order to help others.
- ✓ Self – sacrifice is goodness.
- ✓ Individuals sacrifice their interests to others.
- ✓ This level differs from Kohlberg's second level.

**30.** What does Gilligan's post-conventional level emphasis?

- ✓ A reasoned balance is found between caring about others and pursuing the self interest.
- ✓ In this level, the individual is able to maintain balance between his own needs with the needs of others.
- ✓ The balancing can be achieved through context oriented reasoning i.e. examining all facts, people and circumstances involved, rather than by applying abstract rules ranked in a hierarchy or importance.

**31.** State the main difference between Kohlberg's and Gilligan's theories of moral development?

- ✓ Kohlberg gives greater emphasis to recognizing rights and abstract universal rules,
- ✓ Whereas Gilligan stresses the importance of maintaining personal relationships based on mutual caring.
- ✓ Kohlberg's theory is based on study of men.
- ✓ Men give importance to moral rule.
- ✓ Gilligan's theory is based on study of men and women.

#### CONSENSUS AND CONTROVERSY

**32.** Bring out the relationship between moral autonomy and respect for autonomy.

- ✓ Moral autonomy and respect for authority are compatible with each other. Moral autonomy highlights the capabilities and responsibilities of people. Authority provides the framework through which learning attitudes are encouraged.
- ✓ Sometimes, conflicts will arise between individual's need for autonomy and the need for consensus about authority. The ideas which we are getting is segregated into many views that views all come under autonomy and also respect must be given to it.

#### MODELS OF PROFESSIONAL ROLES

**33.** What is a profession? (A.U. May/June 2006, Nov./ Dec.2006)

- ✓ Professions are occupations requiring sophisticated knowledge, group commitment to some public good, and a significant degree of self-regulation.
- ✓ According to Oxford shorter dictionary, 'profession' means the act or fact of 'professing.'
- ✓ It means: "The occupation which one professes to be skilled and to follow.
- ✓ The characteristics of a profession are, advanced expertise, Self regulation and public good.

**34.** How do the terms 'job' and 'occupation' differ from profession?. (Is engineering job or occupation?)

- ✓ Any work for hire can be considered a job, irrespective of the skill level involved and the responsibility granted.
- ✓ The word occupation implies employment through which someone makes a living
- ✓ Engineering is certainly a job and also an occupation. Engineers are paid for the services; they make a living out of it. But the skills and responsibilities involved in Engineering are more than just a job.

**35.** What are the characteristics of a profession? (A.U. May/June 2012)

(When a job or an occupation can be said to be a profession?)

- ✓ The characteristics of a profession include:
  1. Knowledge: The work requires sophisticated skills (i.e., knowing how), theoretical knowledge (i.e., knowing – that), the use of judgment, and the exercise of discretion. Also, the work should not be a routine or susceptible to mechanization.
  2. Organization: There should be an organization or an association or a society to enlist the members practicing the profession.
  3. Public good: The professionals' knowledge and skills should be helpful to the well-being of the general public, society.
    - ✓ Thus any job or occupation or work can be said to be a profession only when the above said criteria are met.

**36.** What is meant by professionalism?

- ✓ The term 'professionalism' refers to the qualities, competencies, and skills of professionals.
- ✓ It has behavioral connotations and refers to the manifestations of a professional.
- ✓ When the criteria of a profession are applied to one's vocation or calling, it makes for professionalism.
- ✓ According to Macintyre, professionalism is defined as the services related to achieving the public good in addition to the practices of the knowledge of moral ideas.

**37.** What are the two different persuasive definitions of professionalism in engineering?

- ✓ Professionalism as Independence:  
This persuasive definition directly relates professionalism and freedom from coercion.
  - ✓ Professionalism and employee status are logically incompatible.
  - ✓ Professionalism as Serving Employers: This definition says loyalty and loyal service to employers/clients is the heart of professionalism in engineering.
  - ✓ The professional restraints should be only the laws and government regulations rather than one's personal conscience.

**38.** What are the professional roles to be played by an engineer? (A.U. May/June 2006, Nov./Dec. 2006) (Nov/Dec 2017)

Some of the professional roles or models are given below:

- ✓ Engineers as saviors;
- ✓ Engineers as guardians;
- ✓ Engineers as bureaucratic servants;
- ✓ Engineers as social servants;

- ✓ Engineers as social enablers and catalysts; and
- ✓ Engineers as game players.

**39.** What do you infer from the sentence ‘Engineers as saviors’?

- ✓ It is believed that engineers hold the key for any improvements in society through technological developments.
- ✓ Thus some people consider engineer as a savior because they redeem society from poverty, inefficiency, waste and the hardships drudgery of manual labor.

Example , R.L.Stevenson.

**40.** Compare and Contrast engineers’ role as bureaucratic servants and as social servants.

- ✓ The engineers act as a bureaucratic servants i.e., loyal organization person, while solving problems assigned by management within his limitations set by the management. He serves the organisation and the employers.
- ✓ Also, engineers have to play the role of social servants to receive society’s directives and to satisfy society’s desires. The engineer translates the interest and aspirations of the society into a reality remembering that his true master is the society at large. Eg., Sir.M. Viswesvarayya.

**41.** Classify ethical theories. Explain four common approaches used in Ethical Decision. Nov 2023

The four important ethical theories are:

Theory	Basic concept
Virtue ethics theory	- Virtues and vices
Right ethics theory	- Human rights
Duty ethics theory	- Duties to respect persons
Utilitarianism theory	- Most good for the most people

**42.** What is meant by virtues?

- ✓ Virtue can be defined as moral distinction and goodness. It refers to the moral excellence of one’s behavior.
- ✓ In other words, virtues mean our ideals of what is right and what is wrong.
- ✓ Virtues are desirable ways of relating to other individuals, groups and organizations.
- ✓ They are very much related to the motives, attitudes and emotions that are responsible for right and wrong conduct of an individual.

**43.** Do engineers need virtues?

- ✓ According to a professional code of ethics, the professionals, responsibilities include virtues that go beyond fulfilling the basic duties of their professions.
- ✓ Almost all the basic duties such as honesty, fair-mindedness, reliability, integrity, benevolence, public spiritedness, perseverance, compassion, kindness, and generosity are associated with the virtues of a person.
- ✓ Thus virtues are the foundations of engineering profession, as well as other professions.

**44.** What are the types of virtue ethics theories?

- ✓ In virtue ethics, one’s actions are considered right if he holds good character traits (i.e., virtues) and wrong if we hold bad character traits (i.e., vices). Basically virtue ethics is about to determine what kind of people we should be.

✓ The two basic theories about virtues are:

1. Aristotle's theory of the, 'Golden Mean'; and
2. MacIntyre's theory of virtue.

**45.** What does Aristotle's theory of the 'Golden Mean' refer?

- ✓ According to Aristotle's theory, the virtue of wisdom or good judgment is highly essential for accomplishing the rational activities successfully.
- ✓ As per this theory, virtues or tendencies to find the 'Golden Mean' between the extremes of excess (i.e., too much) and deficiency (i.e., too little).
- ✓ Eg., The excess of the virtue truthfulness is revealing all in violation of tact and confidentiality and its deficiency is being Secretive. The golden mean between these two extremes:- Necessary and sufficient, to proper person.

**46.** Give any two examples illustrating the Aristotle's the 'Golden Mean' concept?

- ✓ Virtue Truthfulness- the golden mean between the skills in avoiding offences and confidentiality (excess) and being secretive (deficiency) is should be necessary and sufficient to proper person..
- ✓ Virtue generosity the golden mean that lies between wasting one's resources (excess and being miserly (deficiency) is give in appropriate measure.
- ✓ Virtue friendliness- the golden mean that lies between without anger, effusive (excess) and bad tempered (deficiency) is being within decent limits.

**47.** What does MacIntyre's theory of virtue say?

- ✓ According to MacIntyre, any profession should develop for the sake of public goods.
- ✓ These public goods should not be related to external goods such as money and prestige.
- ✓ He related virtues with the social practices.
- ✓ He calls these public goods as internal goods.
- ✓ Primary internal good of engineering is the safety, health and welfare of the public.

**48.** What is meant by specific virtues? How can you classify them?

Specific virtues mean the virtues that are required for particular situations.

The various specific virtues can be grouped into four categories as below:

- ✓ Self-direction virtues,
- ✓ Public-spirited virtues,
- ✓ Team-work virtues, and
- ✓ Proficiency virtues

**49.** What are self-direction virtues? Give any two examples of them.

- ✓ Self-direction virtues are those that are fundamental in exercising moral autonomy and responsibility.
- ✓ Examples: some of the self-direction virtues:-
- ✓ On the basis of 'understanding and cognition' are self-understanding, humility, and moral judgement.
- ✓ On the basis of 'commitment and action' it covers courage, self discipline, perseverance, self-respect, and integrity.

**50.** What is meant by public-spirited virtues? Give any two examples of them.

- ✓ Publicspirited virtues are those focused on the benefit of clients and the society. These virtues are dictated by the needs of the community.
- ✓ Examples of publicspirited virtues are: justice (in the sense of respect for rights), a sense of community ; non-maleficence ( not harming others intentionally) promoting public safety ,health, welfare and generosity(helping the community by voluntarily giving their time, talent and money-voluntary service to the professional society and community).

**51. What are team-work virtues?**

- ✓ Teamwork virtues are those that are very essential in performing one's professional work successfully with others.
- ✓ Examples for team work virtues are: collegiality, cooperativeness, ability to communicate effectively, and respect for legitimate authority.
- ✓ Responsible exercise of authority and the ability to motivate others to achieve are also relevant to team-work virtues.

**52. What are proficiency/intellectual virtues? Give some examples of them.**

- ✓ Proficiency virtues, also known as intellectual virtues, are those that are due to one's mastery over the profession, thorough knowledge and technical skills.
- ✓ Examples for proficiency virtues are:
  - ✓ Competency
  - ✓ Diligence
  - ✓ Creativity
  - ✓ Excellence

**53. What is meant by cardinal virtues? Why are they called so?**

- ✓ The virtues of wisdom, courage, temperance, and justice are known as 'cardinal virtues' or 'chief virtues'.
- ✓ Because these cardinal virtues are general virtues that interconnect and cut across all other virtues.
- ✓ They are called cardinal because they are the hinges on which all virtues depend.
- ✓ These are also called moral because they govern our actions, regulate our passions and guide our conduct according to faith and reason.

**54. What is moral integrity? (A.U. Nov./Dec.2006, May/June 2009)**

- ✓ Moral integrity is the unity of character based on the moral concern and honesty.
- ✓ It is a virtue that lays the foundation for all other virtues and is therefore fundamental to all others.
- ✓ Integrity is a bridge that links the responsibilities between one's personal life and professional life.
- ✓ The virtues of *self-respect* and *pride* in one's work are possible only through the virtue of integrity

**55. Differentiate self-respect with self-esteem.**

- ✓ Though the terms self-respect and self-esteem are used interchangeably, there are some differences between them.
- ✓ Self-respect is a moral concept whereas self-esteem is a psychological concept.
- ✓ Self-respect refers to the virtue of properly valuing oneself, includes virtues of recognition and appraisal whereas self-esteem refers to

having a positive attitude towards oneself the attitude may be excessive or unwarranted.

**56. Compare and Contrast between recognition self-respect and appraisal self-respect.**

- ✓ Recognition self-respect means properly valuing oneself because of one's inherent Moral worth.
- ✓ It emphasizes that everyone has a duty to act in morally appropriate ways towards themselves
- ✓ Appraisal self-respect means properly valuing oneself on the basis of how well the person meets moral standards and his personal principles.
- ✓ Based upon their good (or bad) character, people receive higher (or lower) appraisal self-respect.

**57. What are the other virtues related to self-respect? (A.U. May/June 2009)**

In addition to the virtue of integrity, self-respect is also related to other virtues.

The other related virtues include:

- ✓ A sense of honor
- ✓ Self-control
- ✓ Courage and
- ✓ Good judgment

**58. What is 'A sense of Honor'?**

- ✓ A sense of honor, also known as *dignity*, is the virtue of stressing the emotions of self-respect and also its minimum requirements.
- ✓ This virtue involves pride in maintaining high professional standards, shame for failing to meet minimum standards of professionalism, and guilty for wrongdoing.
- ✓ It is the duties of an individual within a social group.
- ✓ An intensive but balanced feeling of self-respect is sense of honor.

**59. Briefly explain 'self-control.'**

- ✓ It is the virtue of maintaining personal discipline.
- ✓ It implies avoiding weakness of will due to lack of effort, half-hearted commitments, temptation, procrastinating, self-deception or excessive and distorting emotions of fear or hatred.
- ✓ The self-control virtue provides a strong motive for overcoming the above weakness.
- ✓ It is self-regulation.

**60. Write short notes on 'courage'.**

- ✓ It is the virtue of confronting dangers and difficult tasks in rational ways and with self-control.
- ✓ Courage supports self-respect and in turn self-respect supports courage.
- ✓ Many forms of courage, based on the types of dangers confronted are:

i. Physical courage – response to threats to life

ii. Social courage – response to social dangers

iii. Intellectual courage – response to threats to one's commitments.

**61. What is meant by the virtue of Good judgment?**

- ✓ Good judgment is the practical wisdom in moral matters of all virtues including self-respect.
- ✓ It is the **evaluation** of evidence to **make a decision**
- ✓ Good judgment is very essential to strike a balance between any two extremes.
- ✓ One's concern for self-oriented goods (like income and prestige) and for society-oriented goods (like producing worthy products).

**62. What are the various senses of ‘responsibilities’?**

The term responsibility or moral responsibility has several distinct meanings and is used in different senses under different situations. The five important senses of ‘responsibilities’ are given below:

- (i) First sense: responsibility is a moral virtue.
- (ii) Second sense: responsibility is a moral obligation.
- (iii) Third sense: responsibility is about general moral capacities of people.
- (iv) Fourth sense: responsibility means accountability and liability for actions.
- (v) Fifth sense: responsibility means blameworthiness or praiseworthiness.

For example, when we ask the question.

**63. Differentiate between causal responsibility and legal responsibility.**

- ✓ Casual responsibility: It is the cause of some event. Sometimes people can be casually responsible for an event without necessarily being morally responsible for it. For example, a child may cause fire while playing with matches, here the parents are morally responsible for this fire.
- ✓ Legal responsibility: it is related with legal aspects. For example, an engineer can be held legally responsible for the harmful effects of his product.

**64. What is meant by utilitarianism?**

- ✓ Utilitarianism seeks to produce the most utility.
- ✓ In other words, utilitarianism holds that those actions are right that produce the most good for the most people.
- ✓ Utilitarian standard is: Those individual actions or rules that produce the greatest total amount of utility to those affected are right.
- ✓ It attempts to balance the needs of society with the needs of the individual, with an emphasis on providing the most benefit to the most people.

**65. What are the two versions of utilitarianism? (Nov/Dec 2017)**

- ✓ Utilitarianism attempts to balance the needs of society with the needs of the individual, with an emphasis on providing the most benefit to the most people.
- ✓ The two important versions of utilitarianism are:

1. John Stuart Mill's act utilitarianism, and
2. Richard Brandt's rule utilitarianism.

**66. Differentiate between act- utilitarianism and rule – utilitarianism.**

- ✓ The act utilitarianism focuses on individual actions rather than on general rules.
- ✓ The act utilitarianism concept was developed by John Stuart Mill.
- ✓ Rule utilitarianism differs from act utilitarianism in holding that moral rules are more important than an individual's action.
- ✓ Richard Brandt proposed this version of utilitarianism.

**67. What are the ‘internal good’ and ‘instrumental goods’, proposed by Stuart Mill?**

Mill's view about ‘goodness’:

We know the standard of right action is maximizing goodness. According to Mill ‘goodness’ represents two things:



- ✓ Intrinsic good: Intrinsic good is something good in and of itself, or desirable for its own sake.
- ✓ It was felt that happiness is the only intrinsic good.
- ✓ Instrumental goods: Instrumental goods are other good things that provide means for happiness.

**68.** Bring out any two difficulties in confronting the utilitarianism perception.

- ✓ Sometimes it is difficult to judge the things, which are good for everyone in the society. Because what is good for everyone may be bad for a particular individual or group of individuals.
- ✓ The second problem with the utilitarian standard is that its implementation depends mainly on knowing what will lead to the most good. Because it is almost impossible to calculate which actions actually produce the most good for great number of people.

**69.** What are the two versions of duty ethics?

Two versions of duty ethics are:

1. Kant's theory of duty ethics:

Moral duties are fundamental rather than good consequences. They express respect for persons and an unquantified command for autonomous moral agents .

2. John Rawls's modern theory of duty ethics:

Principles of duty that would be voluntarily agreed upon by rational persons. It also enables him to check his intuitions and to set aside his biases.

**70.** What is the basic concept of right ethics? (A.U. Nov./Dec. 2004)

- ✓ The rights ethicists emphasize that any action that violates any moral right is considered as ethically unacceptable.
- ✓ This theory holds that those actions are good that respect the rights of the individual.
- ✓ It is also called as Theory of Human Rights Ethics.
- ✓ It holds that people have fundamental rights that other people have a duty to respect.

**71.** What are the two versions of rights ethics? (OR) List the theories about right action. (Nov/Dec 2018)

Two versions of rights ethics are:

- ✓ Locke's version of rights ethics -  
Humans have human rights to life, liberty and property generated by one's labour.
- ✓ Melden's version of right ethics – human rights are intimately related to communities of people.

**72.** Write a note on Locke's version of Rights Ethics.

- ✓ According to John Locke, humans have human rights to life, liberty, and the property generated by one's labour.
- ✓ His views of human rights ethics were considered as highly individualistic.
- ✓ In his view, rights are claims that prevent other people from interfering in one's life.
- ✓ These rights are referred as '*liberty rights*' or '*negative rights*' that place duties on other people not to interfere with one's life.

**73.** Briefly explain about Melden's version of Rights Ethics.

- ✓ Melden considered human rights as intimately related to communities of people.
- ✓ According to him, moral rights require the capacity to show concern for others and to be accountable within a moral community.
- ✓ He defined welfare rights as rights to community benefits needed for living minimum decent human life.

e.

- ✓ He highlighted that the rights should be based on the social welfare system.

**74.** Bring out the similarities between Duty Ethics and Rights Ethics.

- ✓ Duty ethics and right ethics are like two different sides of the same coin.
- ✓ Both the theories focus and achieve the same end result.
- ✓ The end result is that individual persons must be respected.
- ✓ As per duty ethics, people have duties, a primary one of which is to protect the rights of others.
- ✓ But according to right ethics, people have fundamental rights that others have duties to protect.

Self-interest – Customs and Religion

**75.** What is meant by self-interest, customs and religious values? (A/M 2023)

- ✓ Self-interest means one's personal good.
- ✓ Customs are considered to have a great significance in deciding one's moral values.
- ✓ Religions motivate right action, which involves the notion of ethics per se;
- ✓ The main function of religion is to sustain people's convictions and to promote tolerance and moral concern for others.

#### USES OF ETHICAL THEORIES

**76.** How to decide which theory is applicable to a given situation?

- ✓ It should be noted that while solving ethical problems, it is always not necessary to choose any one theory among the four theories.
- ✓ In fact, one can use all the theories to study and analyze the given problem from different angles.
- ✓ Most often the result will be the same even though the theories are very different.
- ✓ When the different theories give different answers for a particular problem, then a balanced judgment should be taken examining, comparing, and weighing the answers of all theories.

**77.** List out the various uses of ethical theories. (April/May 2016, 2018) State the importance of ethical theories (Nov/Dec 2021).

The three most important uses are as follows:

- ✓ Ethical theories are helpful in understanding and resolving moral dilemmas; They provide clarity, consistency, systematic and comprehensive understanding.

- ✓ Ethical theories are useful in justifying professional obligations and ideals; and

Also ethical theories are useful in expressing everyday moral experience and justifying the professional morality.

- ✓ It is useful in relating ordinary and professional morality. It provides helpful practical guidance in moral issues towards the solution.

**78.** What is meant by consensus and controversy? (May/ June 2016) Nov 2023

Consensus means general agreement. Ex: The consensus of the universities is that they should conduct university exam twice in a year.

Controversy means disagreement /Argument All individuals will not arrive at same verdict during exercising their moral autonomy.

**79. State Kohlberg's Theory. (Nov / Dec 2016)**

Lawrence Kohlberg's stages of moral development constitute an adaptation of a psychological theory originally conceived by the Swiss psychologist Jean Piaget. ... The six stages of moral development are grouped into three levels of morality: pre-conventional, conventional, and post-conventional morality.

**80. Define moral dilemma. (Nov / Dec 2016)**

Moral dilemma is a conflict in which you have to choose between two or more actions and have moral reasons for choosing each action.

**81. What is meant by engineering as experimentation? (Nov/Dec 2021)[Nov/Dec 2022]**

During the course of an engineer's career, he is frequently involved in research, experimentation, or the testing of new products. Especially, during the design phase, one needs to apply various experimental procedures, which is called experimentation.

In engineering, each and every stage of product or process development, experiments are conducted. There may be many uncertainties at each stage. But engineers cannot afford to delay projects until all the information is received. Thus the final outcome of an experiment could be uncertain.

**82. Define Liability. Nov 2023**

Liability is fundamentally assigning responsibility.

## **PART-B**

1. Explain the scope of Engineering Ethics. Highlight the importance of Ethics.
  2. Explain in details about the senses of Engineering Ethics.(May/June 2016)  
Senses of Engineering Ethics (Nov/Dec 2017 - 2mark)
  3. (i) Discuss in detail about the various types of Moral issues (ii) Specify the various types of Ethical inquiries available.[April 2014] [April/May 2016][Nov/Dec 2022]
  4. Discuss in detail about the concept of (Nov/Dec 2016, 2021)[Nov/Dec 2022]  
(a)Moral Dilemmas. (b)Moral Autonomy (Apr/May 2016) (Define Moral Autonomy Nov/Dec 2017) What is meant by moral autonomy? (April/May 2018) Discuss the factors influencing a person's concern and skills required to improve moral autonomy (Nov/Dec 2017) Define 'Moral Dilemma'. Explain in brief any three causes ofMoral Dilemma. Nov 2023 Define 'Moral Autonomy'. List any four skills required to improve moral autonomy. Nov 2023
- 5. Discuss in details about**
- a) Gilligan's Theory (b) Kohlberg's Theory [Nov 2015] State Kohlberg's Theory. Compare and contrast the theories of moral autonomy by Gilligan's Theory and Kohlberg's Theory (April/May 2018). Discuss the theories of moral autonomy by Kohlberg and Gilligan (Nov/Dec 2018) Discuss any two theories of Moral Autonomy. (A/M 2022) [Nov/Dec 2022](A/M 2023) Define the following a) Gilligan's Theory (b) Kohlberg's Theory Nov 2023**
6. Discuss in details the various theories about right action. (Nov/ Dec 2021) Discuss in detail about

various ethical theories and their uses (May/ June, Nov/Dec2016)

7. Explain in detail the traits of Self Interest, Customs and Religions[Nov/Dec 2022]

8 Explain in detail about professional and professionalism. [April 2014](April/ May 2016, 2018) (OR) Discuss the motives for professionalism and the models for professional Engineers (Nov/Dec 2018) Give a detail note on models of Professional engineers. (A/M 2022)

What is profession? List and explain three characteristics of profession. Nov 2023  
What is professionalism?  
Explain any four professional roles. Nov 2023

### **UNIT-3**

#### **PART – A**

##### **ENGINEERING AS EXPERIMENTATION:**

**1. What are the aspects of engineering that make it appropriate to view engineering as experiments?**  
(Nov/Dec 2005, May/June 2009, April 2016).

**What is the need to view Engineering project as experiments? (Nov/ Dec 2016)**

The three important similarities are as follows:

- ✓ Engineering projects like the standard experiments, are carried out in partial uncertainties.
- ✓ The final outcomes of engineering projects are also generally uncertain like those of other experiments.
- ✓ Similar to standard experiments, engineering experiments also require thorough knowledge about the products at the pre-production and post-production stages.

**2. In what ways, engineering experiments differ from standard experiments.**

**Differentiate scientific experiment and Engineering project ( May/June 2016)**

- ✓ The engineering experiments involve human beings as experimental subjects. In fact clients and

customers have more control, as they own the authority of that project. So here the experimental subjects say clients or end user are out of the engineering experimenter's control, unlike standard experiments.

- ✓ Scientific experiments are conducted to gain knowledge, while “ engineering projects” are experiments that are not necessarily designed to produce very much knowledge.

**3. What is meant by Engineering as experimentation?(May/June 2014)[Nov/Dec 2022]**

- ✓ An engineer is frequently involved in research, experimentation or the testing of new products, especially during the design phase when one needs to apply various experimental procedures which is called experimentation.
- ✓ In engineering, each and every stage of product or process development, experiments are conducted.
- ✓ There may be many uncertainties at each stage. But engineers cannot afford to delay projects until all the informations are received.
- ✓ Thus the final outcome of an experiment could be uncertain. Therefore one can view each engineering work /project/ activity as an experiment.

**4. What do you understand by experimental control? What does control group mean?**

- ✓ In standard experiments, experimental control involves selecting members for two different groups randomly.
- ✓ The first group members are given the special, experimental treatment, whereas the members of the other group are not given that special treatment. Even both the groups are subjected to the same environment.
- ✓ The group that was not given the special treatment is called as the ‘control group’.
- ✓ In Engineering experiments usually there is no control group. Sometimes the control group is used only when the project is limited to laboratory experimentation.

**5. Give a brief account of learning from the past, mentioning an example. (Apr/May 2005)**

- ✓ Engineers should learn not only from their own earlier design and operating results, but also from those of other engineers.
- ✓ Engineers cannot rely only on engineering handbooks.
- ✓ They demand updated details information at every stage of a project's history.
- ✓ The absence of interest and channels of communication, ego in not seeking information, guilty upon

the failure, fear of legal actions and mere negligence have caused many a failure.

- ✓ Example: The Titanic lacked a sufficient number of lifeboats.
- ✓ After many years, because of the same problem the steam ship Arctic had suffered.

**6. What reasons lead to many repetitions of past mistakes? (Nov/Dec2005,May/June2006,Nov/Dec2006)**

Reasons that lead to many repetitions of past mistakes:

- ✓ Lack of established channels of communication.
- ✓ Misplaced pride or ego in not asking for information.
- ✓ Embarrassment at failure or fear of litigation.
- ✓ Plain neglect often impedes the flow of such information and lead to many repetitions of past mistakes.
- ✓ Lack of interest in gaining information.
- ✓ Guilt upon the failure.
- ✓ Fear of legal actions.

**7. What is the role played by experimentation in the design process? (Nov/Dec 2004,Nov/Dec2005)**

Role played by experimentation in the design process:

- ✓ During the design process, engineers need to apply various experimentations.
- ✓ Preliminary tests or simulations are conducted to convert a new engineering concept into its first rough design.
- ✓ Then many formal experimental techniques are employed to try out different materials and processes.
- ✓ Since design process is iterative in nature, therefore many trial design experiments are carried out before the final tests.

**8. What are the uncertainties that occur in the model designs?**

Uncertainties that occur in the model designs:

- ✓ Abstract Model used for the design calculations.
- ✓ Exact characteristics of the materials purchased.
- ✓ Constancies of the materials purchased.
- ✓ Constancies of the materials processing and fabrication.
- ✓ Nature of the stresses/pressure, the finished product will encounter.

## 9. What is the role of experimentation in production?

### Role of experimentation in production:

- ✓ Preliminary tests or simulations are conducted from the time it is decided to convert a new engineering concept into its first rough design.
- ✓ Materials and processes are tried out employing formal experimental techniques.
- ✓ These tests serve as the basis for more detailed designs, which in turn is tested.
- ✓ Feedback from tests serve for further tests on trial designs.
- ✓ Design process is iterative, carried out on trial designs with modifications made from feedbacks.
- ✓ Tests are run till finished products evolves.

## 10. What is monitoring?

### Monitoring:

- ✓ Monitoring is a continuous process that helps in progress and gaining new knowledge that are needed before, during and after execution of project.
- ✓ Monitoring is the activity of making periodic observations, tests by checking all possible outcomes as well as side – effects.
- ✓ But since the ultimate test of a product's efficiency, safety, cost-effectiveness, environmental impact and aesthetic value lies in how well that product functions within society, monitoring cannot be restricted to the in-house development or testing phases of an engineering venture. It also extends to the stage of client use.

## 11. Define informed consent. (Apr/May 2015)

- ✓ Informed consent is a process for getting permission before conducting a healthcare intervention on a person.
- ✓ A health care provider may ask a patient to consent to receive therapy before providing it, or a clinical researcher may ask a research participant before enrolling that person into a clinical trial.
- ✓ Some acts can take place because of a lack of informed consent.
- ✓ In cases where an individual is considered unable to give informed consent, another person is generally authorized to give consent on his behalf, e.g., parents or legal guardians of a child (though in this circumstance the child may be required to provide informed assent) and conservators for the mentally ill.

## 12. What is meant by informed consent? (Apr/May 2011, May/June 2011, May/June 2012)

### Informed consent:

- ✓ The experimenters whose experiments involve human subjects have moral and legal obligations to inform about all the relevant facts about the experiments to the person who participates in experiments. They have to get 'informed consent' from the people involved in the experiments .
- ✓ Informed consent when bringing an engineering product to market, implies letting the customer know the following:
- ✓ The knowledge about the product
- ✓ Risks and benefits of using the product
- ✓ All relevant information on the product such as how to use and how not to use (do's and don't's)

### **13. What are the elements of informed consent? (Nov/Dec 2011)**

Informed consent consists of two main elements: knowledge, and voluntariness.

- ✓ Knowledge: the human subjects (i.e., the persons who participate in experiments) should be given all the information to make a reasonable decision.
- ✓ Voluntariness: the human subjects should show their willingness to be a human model voluntarily.
- ✓ The person should not be forced, deceived, frauded, etc., The experimenters have to respect for the fundamental rights to minorities and the compensation for any harmful effects of that experiment.

### **14. What are the conditions that are essential for a valid informed consent?**

The 'informed consent' can be called as 'valid consent' when the following three conditions are met:

- ✓ The consent should be given voluntarily and not by any force.
- ✓ The consent should be based on all the information needed for a rational person to make a reasonable decision.
- ✓ Moreover, the information should be presented in a clear and easily understandable manner.
- ✓ The consentor should be competent enough to process the information and to make rational decisions.

### **ENGINEERS AS RESPONSIBLE EXPERIMENTERS (Nov/Dec 2016), (May/ June 2016)**

### **15. What are the general responsibilities of engineers to society?**

- ✓ Engineers are primarily considered as technical enablers or facilitators, rather than being the sole experimenters.
- ✓ Engineers' responsibility is shared with management, the public and others.
- ✓ The other unique responsibilities of engineers include



- a. Monitoring projects,
- b. Identifying risk,
- c. Providing customers and clients the required information to make reasonable decisions
- d. Engineers should display the virtue of being morally responsible persons.

**16. What are the general features of morally responsible engineers?**

There are four characteristic features of morally responsible engineers, from the perspective of engineering as social experimentation. They are as follows;

- ✓ **A conscientious commitment to live by moral values:** the primary duty of morally responsible engineers is to protect the safety of human subjects and respect their right of consent.
- ✓ **A comprehensive perspective:** the morally responsible engineers should have a constant awareness of the experimental nature of the project, forecasting of its possible side effects, and a decent effort to monitor them.
- ✓ **Autonomy:** the morally responsible engineers are the one who are personally motivated to have a dedicated involvement in all aspects of a project.
- ✓ **Accountability:** the morally responsible engineers should be accountable for the results of their projects.

**17. What is meant by conscientious in terms of engineers as responsible experimenters?(Nov/Dec 2006 )What is meant by conscientious? (Nov/Dec 2017) (or) Give note on the senses of responsibility for engineers. (A/M 2022) List any two responsibilities of Engineers to the society. Nov 2023**

**Conscientiousness:**

- ✓ Conscientiousness means commitments to live according to certain values. It implies consciousness. Conscious means knowing what is going on around one because one is able to use one's senses and mental powers.
- ✓ Engineers have to be sensitive to a range of moral values and responsibilities which are relevant in a given situation.
- ✓ Engineers should have the willingness to develop the skill and apply the effort needed to reach the best balance possible among various considerations.
- ✓ Open eyes, open ears, and an open mind are required to evaluate a given situation, its implications and to determine who are involved or affected.

**18. Define ethical accountability. (Apr/May 2011, May/June 2011)**

Accountability:

- ✓ Accountability refers to the general tendency of being willing to submit one's actions to any type of moral scrutiny and be responsive to others' assessments.
- ✓ Accountability means being responsible, liable, answerable or obligated.
- ✓ It involves willingness to present morally convincing reasons for one's actions and conduct.
- ✓ Morally responsible people are expected to accept moral responsibility for their actions.
- ✓ According to Stanley Milgram, people are not willing to accept personal accountability when placed under authority.

**19. What are the requirements for the engineers to act as “responsible agents”?**

The responsible agents require:

- ✓ Imaginative forecasting of possible bad side effects;
- ✓ The development of an attitude of ‘defensive engineering’ and ‘preventive technology’
- ✓ Careful monitoring of projects; and
- ✓ Respect for people's right to give informed consent.
- ✓ They should be the Guardians of the public interest whose professional duty it is to hold paramount the safety, health and welfare of those affected by engineering projects.

**20. What is voluntary and involuntary risk?**

Involuntary risks :

- ✓ People object to involuntary risks.
  - ✓ The affected individual is neither a direct participant nor a decision maker.
- Ex: Side effect due to medicine.

Voluntary risks :

- ✓ Voluntary risks are accepted by the people directly.
  - ✓ They know the factor that causes risks and are ready to accept risk.
- Ex: Residing near a nuclear plant, stunts and amazing races.

CODES OF ETHICS:

**21. What is meant by codes of ethics? (Nov/Dec 2017) Nov 2023 What is code of Ethics? (A/M 2022)**

- ✓ The primary aspect of codes of ethics is to provide the basic framework for ethical judgment for a professional.

- ✓ The codes of ethics, also referred as codes of conduct, express the commitment to ethical
- ✓ conduct shared by members of a profession.
- ✓ In other words, these codes furnish common, agreed-upon standards for professional conduct.
- ✓ The codes of ethics express the ethical principles and standards in a coherent, comprehensive, and accessible manner.
- ✓ The codes of ethics also define the roles and responsibilities of professions.
- ✓ The codes of ethics help the professionals to apply moral and ethical principles to the specific situations encountered in professional practice.

**22. What are the different roles and functions of codes of ethics? (Nov/Dec 2004) (Nov/Dec 2016)**

The codes of ethics propagated by professional societies play a variety of roles. They are as follows:

- ✓ Inspiration and Guidance;
- ✓ Support for responsible conduct;
- ✓ Deterring and disciplining unethical professional conduct;
- ✓ Education and promotion of mutual understanding;
- ✓ Contributing to a positive public image of the profession;
- ✓ Protecting the status quo and suppressing dissent within the profession; and
- ✓ Promoting business interests through restraint of trade.

**23. List out the advantages of industrial standards. (Apr/May 2015) (Nov/Dec 2017)**

- ✓ Improving performance
- ✓ Reducing business risk
- ✓ Using standards can offer a set of powerful business and marketing tools for organizations of all sizes.
- ✓ Increase in safety
- ✓ You can use them to fine-tune your performance and manage the risks while operating in more efficient and sustainable ways. You can use them to fine-tune your performance and manage the risks you face while operating in more efficient and sustainable ways; they'll allow you to demonstrate the quality of what you do to your customers.

**24. How does code of ethics support engineers and help in deterrent and discipline?**

Support:

- ✓ Codes give positive support to those seeking to act ethically,
- ✓ Gives engineers some group backing in taking stands on moral issues,
- ✓ Serve as legal support for engineers criticized for living up to work related professional obligations.

Deterrent and discipline:

- ✓ Serve as formal basis for investigating unethical conduct,
- ✓ If investigation is possible motive for not acting immorally is exempted,
- ✓ Investigations require paralegal proceedings to get the truth without violating personal rights of those being investigated.

**25. How code of ethics will create profession's public image and help in protecting status quo?**

Code of ethics create profession's public image:

- ✓ Codes can present a positive image to public of an ethically committed profession,
- ✓ When image is warranted it can help engineers serve the public more effectively
- ✓ If unwarranted it is only window dressing increasing public selfish about the profession

Code of ethics help in protecting status quo

- ✓ Promote minimum level of ethical conduct
- ✓ But can reduce dispute within profession
- ✓ Occasionally code has discouraged moral conduct and caused harm to those who served the public.

**26. Write a note on the following role played by the codes of ethics.**

**a) Inspiration**

**b) Guidance**

a) Inspiration:

- ✓ Ethical codes provide a positive inspiration for the professionals to exercise their obligations effectively.
- ✓ These codes inspire the engineers to apply moral principles under the various conflicting situations.

b) Guidance:

- ✓ The ethical codes provide guidelines for achieving the obligations of professionals.
- ✓ These codes also provide specific guidelines, which tell how to apply the code to the unique situations.

**27. What are the fundamental Canons of code of ethics? What does code of ethics exhibit (Nov/Dec 2017) What are the advantages of codes of ethics? (Nov/Dec 2018, 2021)**

Engineers, in the fulfillment of their professional duties, shall:

- ✓ Hold paramount safety, health and welfare of the public in their performance of their professional duties.
- ✓ Perform services only in areas of their competence.
- ✓ Issue public statements only in an objective and truthful manner.
- ✓ Act in professional matters for each employer or client as faithful agents or trustees.
- ✓ Avoid deceptive acts in the solicitation of professional employment.

**28. Name some of the engineering societies that have published codes of ethics.**

Some of the reputed engineering societies that have published codes of ethics are:

1. American Society of Mechanical Engineers (ASME);
2. American Society of Civil Engineers (ASCE);
3. Institute of Electrical and Electronics Engineers (IEEE); and
4. The Institution of Engineers (India);
5. National Society of Professional Engineers (NSPE) and
6. American Institute Of Chemical Engineers (AIChE).

**29. Which functions of the codes of ethics are the most valuable, in the perspective of engineering as social experimentation?**

- ✓ The perspective of engineering as social experimentation provides some useful clues in prioritizing and ranking the various functions of the ethical codes.
- ✓ The supportive function of engineering codes is viewed as the primary important function. Because the supportive function of engineering codes enable the engineers to express their views freely, especially about safety to those affected by engineering projects.
- ✓ The disciplinary function of engineering codes is recognized as the secondary important function. Because, this function is essential in engineering as it ensures all clear and enforceable rules.
- ✓ The guidance, inspirational and educational functions of engineering codes promote mutual understanding among those affected by them.
- ✓ The functions of protecting the status quo and promoting only business interests in violation of free competition should be avoided altogether.

**30. What are the limitations of codes of ethics? (Apr/May 2005, May/June 2006, Nov/Dec 2006, Nov/De**

**c 2008, May/June 2009, Apr/May 2011, May/June 2011, Nov/Dec 2011, May/June 2016)  
(April/May 2018)[Nov/Dec 2022]**

The four major limitations of codes of ethics are as follows;

- ✓ Codes of ethics are broad guidelines, restricted to general and vague wording/phrases.
- ✓ The codes cannot be applied directly to all situations.
- ✓ Engineering codes often have internal conflicts, which may result in moral dilemmas.
- ✓ The codes cannot serve as the final moral authority for professional conduct.
- ✓ The proliferation of codes of ethics for different branches of engineering
- ✓ Gives a feeling that ethical codes are relative.

**31. In what ways, the engineering societies can promote ethics?**

The specific ways in which engineering societies can promote ethics are as follows:

- ✓ Engineering societies should act as the forum for debating what should be in a professional code of ethics.
- ✓ Engineering societies could promote ethics by establishing awards for engineers and employers who exhibit commendable ethical conduct.
- ✓ Engineering societies could assist and protect engineers who have been discharged because they stick on to high ethical standards.
- ✓ Engineering societies could establish 'ethics helplines' or other services whereby engineers could seek advice on difficult ethical issues.

**32. "Engineers shall perform services only in area of their competence". Explain this phrase on code of ethics. (Nov/Dec 2005, Nov/Dec 2006)**

- ✓ Engineers should offer their services only in areas of their competence.
- ✓ Engineers shall undertake assignments only when qualified by education or experience in the specific technical fields involved.
- ✓ Engineers shall not affix their signature to any plans or documents dealing with subject matter in which they lack competence, nor to any plan or document not prepared under their direction or control.
- ✓ Engineers may accept assignments and assume responsibility for coordination of an entire project and sign and seal the engineering documents for the entire project, provided that each technical segment is signed and sealed only by the qualified engineers who prepared that segment.

## **INDUSTRIAL STANDARDS**

### **33. What is meant by standardization?**

#### Standardization:

- ✓ Standardization primarily means setting up standards or measuring sticks by which extent, quality, quantity, value performance or service may be gauged or determined.
- ✓ In simple terms, it is the process of defining and applying conditions required to ensure that a given range of requirements can be easily met with minimum changes in an economical and reproducible manner by the latest technique.

### **34. What are industrial standards?**

- ✓ Standards are framed by companies for their in-house use i.e., internal use, and by professional associations and trade associations for industry-wide use.
- ✓ Sometimes standards are also prescribed as parts of laws and official regulations.

#### Standard facilitate:

- ✓ Interchangeability;
- ✓ Accuracy in measurement;
- ✓ Ease of handling;
- ✓ Prevention of harms;
- ✓ Decreased production cost;
- ✓ Quality products, etc.

### **35. Name the area in which industry usually welcomes greater specificity. Explain how they are established.**

- ✓ Industries usually welcomes greater specificity in regard to 'standards'.
- ✓ Standards facilitate the interchange of components they serve as ready-made substitutes for lengthy design specifications and they decrease production costs.
- ✓ Industrial standards consists of explicit specifications that when followed with care ensure interchangeability and Quality will be attained. Examples range from automobile tire sizes and load ratings to computer languages.

Standards are established by

- ✓ Companies for in-house use.

- ✓ Professional associations for industry wide use.
- ✓ Prescribed as laws and
- ✓ Regulations which may frequently arise from lack of adherence to voluntary standards.

**36. What are the benefits of standards? (May/June 2012)**

Benefits of standards are;

- ✓ Help manufacturers, client , public,
- ✓ Reduces over emphasis on brand names,
- ✓ Preserve competitiveness,
- ✓ Small manufacturers can compete,
- ✓ Ensure quality
- ✓ International standards are becoming a necessity.

**37. Enumerate the criteria in the types of standards.**

Criterion in Types of standards:

1. Uniformity of physical properties and functions
2. Safety and reliability
3. Quality of product
4. Quality of personnel and service
5. Use of accepted procedures
6. Separability.

**38. What is the first and second criterion of standards? Give their purposes with examples.**

First criterion of standards :

First criterion is –Uniformity of physical properties and functions,

- The Purpose is :- Accuracy in measurement, interchangeability, and ease of handling,
- Examples- Standards of weights, screw thread dimensions, standard time, film size.

The second criterion of standards:

Second criterion is– Safety and reliability,

- Purpose :- prevention of injury, death and loss of income or property,
- Examples- National electric code, boiler code, methods of handling toxic wastes.

**39. ‘Standards are thought to apply when in actuality there is no standard at all’. Justify.**

- ✓ Sometimes Standards are thought to apply when in actuality there is no standard at all. Product



appearances can be misleading in this respect.

- ✓ Years ago, when competing foreign firms were trying to corner the South American market for electrical fixtures and appliances, one manufacturing company had a shrewd idea. It equipped its lightbulbs with extra – long bases and threads.
- ✓ These would fit into the competitors shorter lamp sockets and its own deep sockets.
- ✓ But the competitors bulbs would not fit into the deeper sockets of its own fixtures. Yet so far as the unsuspecting consumer was concerned, all the lightbulbs and sockets continued to look alike.

### **BALANCED OUTLOOK ON LAW (Nov/Dec 2016):**

#### **40. What is meant by law?**

##### Law:

- ✓ Law is a body of rules of action prescribed by a controlling legal authority and having binding legal force.
- ✓ In general, law means all the rules established by authority or custom for regulating the behavior of members of a community or country.
- ✓ It is a solemn expression of the will of a supreme power the authority.

#### **41. What is the need for laws?**

- ✓ Laws and regulations are necessary in directing and controlling the engineering practice.
- ✓ Laws are necessary because, people are not fully responsible by themselves and because of the competitive nature of the free enterprise, which does not encourage moral initiatives.
- ✓ Laws are needed to provide a minimal level of compliance.
- ✓ Laws are needed to authoritatively establish reasonable minimal standards of professional conduct.
- ✓ Laws are needed to provide a self – interested motive for the people and the corporations.

#### **42. Bring out the relationship between law and ethics.**

##### Relationship between law and ethics:

- ✓ Ethics can be defined as ‘knowing the difference between what one has a right to do and what is the right thing to do’.
- ✓ Law dictates the minimum standard of behaviour required of an individual by a given society, whereas ethics go beyond what is required.

- ✓ It should be noted that many things that are legal need not to be ethical, in other words, legality does not imply morality. Conversely, illegality does not imply immorality. That is something is illegal does not mean that it is unethical.

#### **43. Enumerate the consequences of Santa Barbara offshore spill.**

The 1969 Santa Barbara offshore spill of 235,000 gallons of crude oil

1. Blackened 30 miles of spectacular beaches
2. Fouled the coastline from Goleta to Ventura as well as the northern shores of the four northern Channel Islands.
3. Damaged wildlife-3,500 sea birds, as well as marine animals such as dolphins, elephant seals, and sea lions.
4. Commercial fishing was suspended in the affected area, and tourism suffered a precipitous drop.
5. Most ocean-related industries were affected in some way.
6. Property damage along the shoreline was also considerable.
7. Hurt local tourist trade
8. Disaster prompted demands for new laws and tighter controls to prevent recurrence.

#### **44. Who are the people involved in drafting safety regulations for offshore drilling? What is Hickel's Law?**

People involved in drafting safety regulations for offshore drilling are;

- ✓ Experienced petroleum engineers
- ✓ Geologists
- ✓ Well drillers
- ✓ Members of the same group that prepared state regulations,
- ✓ Oil company employees conducting drilling in offshore.

Hickel's law:

- ✓ Hickel the then-Secretary ordered inspection of thousands of oil wells, hundreds lacked mandatory safety chokes. He ordered prosecutions and later justified his tough approach to pollution with what has been called "Hickel's Law": "You've got to hit them (polluters) with a two-by-four to make them believe you."

#### **45. What is the Hammurabi's Babylon building code?**

Hammurabi's Babylon building code:

- ✓ If builder's house for a man has fallen down causing death of house holder builder can be put to death,
- ✓ If it causes householder's son's death builder's son shall be put to death,
- ✓ If the house builder has built has fallen down he shall rebuild it at his cost.
- ✓ If the builder's work is not perfect and the wall bulges the builder shall build that wall at his own cost.

**46. What is the Napoleonic code in France?**

Napoleonic code in France:

- ✓ In France boiler safety standards were earlier and more rapidly promulgated under state authority of Napoleonic code, By 1823 and 1830 a Committee of engineers were assisted by prominent scientists of the time.
- ✓ They developed accurate steam tables. Stress values for metals were assigned.
- ✓ Design standards that called for hemispherical end plates were formulated.
- ✓ Initial testing of boilers at three times their expected operating pressure was made mandatory. France had very few boiler explosions later.

**47. List some of the problems with the law in Engineering.**

There are more complaints about the laws that can cause problems in engineering with regard to ethical conduct. Some of the problems with the law in engineering are given below.

- ✓ The existence of minutely detailed rules/laws may result in minimal compliance i.e., small level of obedience. The minimal compliance has become one of the greatest moral problems in engineering nowadays. Because the minimal compliance encourages the companies and individuals to search for loopholes in the law so that they can violate the spirit of laws for achieving their goals. For example, the Titanic tragedy was caused by this minimal compliance.
- ✓ It is inevitable that the law lags behind the technological development. Even updating the laws and regulations continually with further specifications may also be not effective and not productive. Also there is a danger of over burdening the rules and the regulators.

**48. Enumerate some of the roles played by the laws.**

The laws can play the following roles:

- ✓ The laws can authoritatively establish reasonable minimal standards of professional conduct.

- ✓ The laws can provide a self-interested motive for most of the people and corporations to comply.
- ✓ The laws act as a protector of ethical engineers. That is, they serve as a powerful support and defense to those who wish to involve in ethical activities.
- ✓ Also the laws can be little considerate with some exceptional engineering situations.

For example, in cases where string experimentation is involved. In these situations, the rules should not try to cover all possible outcomes of the experiment. Also the rules should not force the engineers to adopt a rigidly specified course of action.

**49. Why regulations are needed? Why should regulations be so specific?**

Need for regulations:

- ✓ Industry complains about excessive regulations,
- ✓ Manufacturers neglected danger of babies strangling in cribs and neglected to measure size of heads
- ✓ Specifications were fixed by US consumer product safety rule for baby cribs.

Regulations must be specific for the following reasons:

- ✓ Strict numerical standards are difficult to promulgate as per EPA norms for asbestos emissions,
- ✓ Asbestos dispersal and intake are difficult to measure,
- ✓ EPA set work practices to minimize emissions,
- ✓ But difficult to enforce.

**50. What is meant by minimal compliance? Give examples.**

Minimal compliance:

- ✓ Caused by existence of minutely detailed rules,
- ✓ When companies search for loop holes when violating law,
- ✓ Refer to standards with readymade specifications adopting handbook mentality
- ✓ Repetition of mistakes

Examples for minimal compliance:

- ✓ Titanic- why enough life boats to accommodate all when British norms required only a minimum,
- ✓ Tampa bay bridge-why not designed with possible collisions in mind.
- ✓ But code required only wind loads (not impact loads) to calculate horizontal forces

**51. What does viewing engineering as experimentation provide?**

Viewing engineering as experimentation provides;

- ✓ Engineers with proper perspective on laws

- ✓ Rule of engineering practice should not be rules of game, but as rules of responsible experimentation
- ✓ Engineers are responsible for safe conduct of experiments
- ✓ Well established procedures have safety of the public as their purpose,
- ✓ If violated then precise rules are appropriate in cases of ethical misconduct,
- ✓ Engineer is responsible for safe conduct of his experiments.

**THE CHALLENGER CASE STUDY:**

**52. What are the major components of a space shuttle? List the major causes for the failure of Challenger Space Shuttle.**

There are three main components of a space shuttle:

- (i) The orbiter
- (ii) The external fuel tank
- (iii) The solid – fuel rocket boosters

**The major causes for the failure of Challenger Space Shuttle:**

- ✓ The failure of the sealing system on the field joint that led to the explosion of the challenger
- ✓ The unfavorable cold weather during the launch.
- ✓ The improper functioning of the O – ring component which holds the shield joints. Mainly, the political urge to launch the shuttle.

**53. What were the safety measures rejected during launch of Challenger?**

Safety measures rejected :

- ✓ Space shuttle could have ignition of all fuel carried,
- ✓ Explosion close to the ground can have catastrophic effects,
- ✓ Crew had no escape mechanism,
- ✓ Douglas designed an abort module with own thruster, it would have allowed separation of orbiter triggered by field joint leak,
- ✓ Expensive safety measure rejected because of an accompanying reduction in payload.
- ✓ Safe operation not stressed .
- ✓ Shuttle program was experimental and research undertaking,
- ✓ Crew knew that it was a dangerous mission,
- ✓ But challenger astronauts were not informed of joint leaks,
- ✓ Consent not got to work under unsafe conditions.

**54. Write a note on moral/normative issues in the challenger case.**

Moral /normative issues:

- ✓ The crew had no escape mechanism. Douglas the engineer designed an abort module to allow the separation of the orbiter triggered by a field joint leak. But such a 'safe exit' was rejected as too expensive, and because of an accompanying reduction in payload.
- ✓ The crew were not informed existing in the field joints. The principle of informed consent was not followed.
- ✓ Engineers gave warning signals on safety. But the management group prevailed over and ignored the warning.

**55. How is arrogance referred to Challenger case?**

- ✓ Instead of labeling as 'money' or 'schedule' Conrad could have used 'arrogance', that prompts higher level decision makers to pretend that factors other than engineer judgment should influence flight safety decisions,
- ✓ NASA's motto changed from 'Don't fly if it cannot be shown to be safe' to 'Fly unless it can be shown not to be safe'.
- ✓ According to Paul Conrad, where was the flaw? It was not in decision making process but in decision making mentality, Engineering decision should not be moved to higher levels that is the way it has done.

**56. Write about the guidance and support in code of ethics?**

- ✓ Being mindful of the need for protection of the public;
- ✓ Expressing clear ethical principles, values and standards;
- ✓ Promoting such standards by education and consultation;
- ✓ Developing and implementing methods to help psychologists monitor their professional behaviour and attitudes;
- ✓ Assisting psychologists with ethical decision making; and
- ✓ providing opportunities for discourse on these issues.

**57. What are the differences between autonomy and accountability?**

<b>AUTONOMY:</b>	<b>ACCOUNTABILITY:</b>
<p><i>1. It is the ability to think critically and independently about moral issues and apply this moral thinking to situations that arise during the professional engineering practice.</i></p> <p><i>2. As an experimenter, an engineer has to undergo an extensive and updated training to form his identity as a professional.</i></p>	<p><i>It means being responsible, liable, answerable or obligated.</i></p> <p><i>Morally responsible people are expected to accept moral responsibility for their actions.</i></p>

**58. What are the conditions that are essential for a valid informed consent?(Nov/Dec2015)**

- ✓ For an individual to give valid informed consent, three components must be present: disclosure, capacity and voluntariness.
- ✓ While Disclosure requires the researcher to supply the subject with the information necessary to make an autonomous decision, the investigators must ensure that subjects have adequate comprehension of the information provided.
- ✓ This latter requirement implies that the consent form be written in lay language suited for the comprehension skills of subject population, as well as assessing the level of understanding during the meeting.
- ✓ Capacity pertains to the ability of the subject to both understand the information provided and

form a reasonable judgment based on the potential consequences of his/her decision.

- ✓ Voluntariness refers to the subject's right to freely exercise his/her decision making without being subjected to external pressure such as coercion, manipulation, or undue influence.

**59. How codes of ethics promote the business interest?**

- ✓ A code of ethics document may outline the mission and values of the business or organization, how professionals are supposed to approach problems, the ethical principles based on the organization's core values and the standards to which the professional is held.
- ✓ A code of ethics, also called a code of conduct or ethical code, sets out the company's values, ethics, objective and responsibilities.
- ✓ Every code of ethics is different and should reflect the company's ethos, values and business style. Some codes are short, setting out only general guidelines, and others are large manuals, encompassing a huge variety of situation.

**60. What was the role of code of ethics in protecting status quo?**

The Code of Professional Ethics and Social Responsibility of the Greek journalists has the following objectives:

- ✓ To reaffirm and ensure the social role of the journalist in the new conditions which are formed by gigantism, oligarchy in the ownership status quo, the increased range and influence of the mass media and the globalization of communication.
- ✓ To discourage and to resist any attempt of state or other party to influence self-determination in Standards of responsible professional functioning.
- ✓ To ensure freedom of information and expression, the autonomy and dignity of the journalist, and to defend freedom as part of democracy and society.

**61. Differentiate deterrence and discipline.**

<b>Deterrence:</b>	<b>Discipline:</b>
<p>i. Deterrence is the use of punishment as a threat to deter people from offending.</p> <p>ii. Deterrence is often contrasted with retributivism, which holds that punishment is a necessary consequence of a crime and should</p>	<p>i. The practice of training people to obey rules or a code of behaviour, using punishment to correct disobedience.</p> <p>ii. A branch of knowledge, typically one studied in higher education.</p>



be calculated based on the gravity of the wrong done.	
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**62. Why do the industries welcome the concept of standards?**

*Industries welcome the concept of standards due to the following reasons:*

- ✓ Discipline and dignity will be maintained
- ✓ A health and safety standard to help reduce accidents in the workplace
- ✓ Honesty
- ✓ Co-operation in work
- ✓ Co-ordination among employees
- ✓ A quality management standard to help them work more efficiently and reduce product failures
- ✓ An environmental management standard to help reduce environmental impacts, reduce waste and be more sustainable.

**63. What is the interaction of rules with the engineering codes?**

- ✓ Work requires sophisticated skills, judgment, and exercise of discretion (work is not routine) .
- ✓ Membership in the profession requires formal education
- ✓ Special societies (controlled by members of the profession) establish standards for admission into the profession and conduct of its members .
- ✓ Significant positive public service results from the practice of the profession.

**64. Write about the negative aspects of standards.**

*Standards possess the following positive aspects:*

- ✓ Discipline and dignity will be maintained
- ✓ A health and safety standard to help reduce accidents in the workplace
- ✓ Honesty
- ✓ Co-operation in work
- ✓ Co-ordination among employees

*The negative aspects of standards are as follows;*

- ✓ Vagueness: A state of confusion
- ✓ Conflict in works: Competition in business or works
- ✓ Confusion: Conflict between works
- ✓ Non-co-operation: Refusing to co-operate.

**65. “The moral responsibility of engineers should go beyond merely following the laws”- Discuss.**

The moral responsibilities of engineers go beyond the laws in the following aspects;

- ✓ Empathy: Understanding the feeling or internal thoughts of someone
- ✓ Concern over atmosphere
- ✓ Tolerating in not doing any hazard to people and environment
- ✓ Saving people lives and ecosystem.

**66. Do you agree with the view of “engineering as experimentation”? Justify your answer.**

Yes we agree with the view of engineering as experimentation, because;

- ✓ Engineers are primary considered as technical enablers or facilitators, rather than being the sole of experimenters.
- ✓ Engineers responsibility is shared with management
- ✓ They are shared even with the public and others.
- ✓ Engineers should display virtue of being morally responsible persons.

**67. Enumerate the proper role of law in engineering.**

*The roles of law in engineering are as follows;*

- ✓ The laws can authoritatively establish reasonable minimal standards of professional conduct.
- ✓ The laws can provide a self-interested motive for most of the people and corporations to comply
- ✓ The laws act as a protector of ethical engineers.
- ✓ That is, they serve as a powerful support and defense to those who wish to involve in ethical activities.

**68. “Moral agents should develop an attitude of defensive engineering”- Explain.**

Moral agents should develop their defensive thoughts, because

- ✓ They are the technical supporters of society
- ✓ They can possess various faces like guardians, saviours and enablers.
- ✓ They can afford good environment
- ✓ They can afford hazardless life to society.

**69. “Conscientiousness is blind without relevant factual information”- Justify.**

*Conscientiousness is important due to the following reasons;*

- ✓ Factual information is necessary in any aspects of inquiry
- ✓ They can be admitted wrong without any factual information
- ✓ We cannot conclude any aspects by conscientiousness
- ✓ It leads to misunderstanding and false statements

**70. “Engineering as experimentation plays a vital role in the design process”- Discuss.**

- ✓ The engineering design process is a series of steps that engineers follow when they are trying to solve

a problem and design a solution for something;

- ✓ ASK: What is the problem? How others have approached it? What are your constraints?
- ✓ IMAGINE: What are some solutions? Brainstorm ideas. Choose the best one.
- ✓ PLAN: Draw a diagram. Make lists of materials that you will need.
- ✓ CREATE: Follow your plan and create something. Test it out!
- ✓ IMPROVE: What works? What doesn't? What could work better? Modify your design to make it better. Test it out!

**71. Define research ethics. (April 2016)**

- ✓ *Research* that involves human subjects or participants raises unique and complex *ethical*, legal, social and political issues. *Research ethics* is specifically interested in the analysis of *ethical issues* that are raised when people are involved as participants in *research*.

**72. What are the merits of standardized experimentation? (April/May 2018)**

- ✓ *It has a positive impact on achievement.*
- ✓ *It provides a practical solution to any problem*
- ✓ *It is a reliable and objective measurement of achievement.*
- ✓ *Standardized experimentation allow for equal and equivalent content for all.*

**73. What are the limitations of standardized experimentation? (Nov/Dec 2018, 2021)?**

- ✓ *The results can be inaccurate*
- ✓ *Standardized test only took at raw comprehension data.*
- ✓ *It promises big results that do not usually happen.*
- ✓ *It is a system that can be gamed.*
- ✓ *It encourages cheating*

**PART-B**

1. (i) Explain how codes of ethics guides an engineer in the professional behavior.(May/ June 2016)  
(ii) Discuss briefly the role of industrial standards. (Apr/May 2015)[Nov/Dec 2022]
2. Compare and contrast engineering experiments with standard experiments with suitable examples.(Apr/May2005, May/June 2006, April/May 2011)(Nov/Dec 2017) (April/May 2018) (Nov/Dec 2018)(A/M 2022)[Nov/Dec 2022]
3. Discuss the ethical issues involved in challenger case study. (Apr/May 2015, Apr/May 2008)
4. (i) Explain in detail the powerful support and proper role of law in engineering. (Nov/Dec 2017)  
(ii) Explain the concept, 'engineering as social experimentation' with examples.(Nov/Dec 2015)(A/M2023)  
Discuss the different roles played by codes of ethics set by professional societies.(May/June2016)

(Nov/Dec 2005, May/June 2006, Nov/Dec 2006, Apr/May 2008, Apr/May 2011 May/June 2012)  
[Nov/Dec 2022](A/M 2023) Explain the limitation of code of ethics. Nov 2023 Explain four essential roles 'code of ethics'. Nov 2023 Discuss the role played by the codes of ethics set by the professional societies. Nov 2023

5. Give the code of ethics promulgated by Institute of Electrical and Electronics Engineers. (Nov/Dec 2005)

6.(i) What is meant by informed consent when bringing an experimental product to the market?

(ii) How ethical codes provide discipline among the engineers? (May/June 2014)

7. What are the different roles and functions of code of ethics? (Nov/Dec 2015) What are industrial standards?

List the purpose of industrial standards. Nov 2023

8. What is Milgram's experiment with "accountability"? What conclusions were drawn? Discuss. (May/June 2012)

9. Write about the role of law in engineering and what are the problems with law in engineering.

(Nov/Dec 2017)(A/M 2023) Discuss the problem associated with laws in engineering and Enumerate the proper role of law engineering. Nov 2023

10. What is research ethics. Discuss the models of research ethics with suitable examples.

(April / May 2018) (Nov/Dec 2018)

11. What are codes of ethics? State and explain the functions of codes of ethics and objections to codes of ethics. (Nov/Dec 2017)

12. What is the importance of codes of ethics? Explain in detail. (Nov / Dec 2021) (or) Discuss the importance of duty ethics and virtue in engineering profession. (A/M 2022)

13. How can an engineer become a responsible experimenter? Explain in detail. (Nov / Dec 2021)

Explain 'Engineers as Responsible Experimenters'. Nov 2023

## UNIT-4 Safety and Risk

### Safety and Risk

**1. State the industrial definition on safety. (AU May 2014)(OR) State the Lawrence's definition of safety. (AUMay/June2006,Nov./Dec.2006, April /May 2014).**

Industrial definition on safety: / A modified Lawrence Definition of safety:

"A thing is safe (to a certain degree) with respect to a given person or a group at a given time, if its risks were fully known, if those risks would be judged acceptable (to a certain degree), in light of settled value principles"

In the modified Lawrence definition the term 'things' represent not only products, but also services, processes, etc. Therefore the definition can be extended to medicine, finance, international affairs, etc.

2. **What is the meaning for the term “Safety”?** (AU Dec 2006) **Define safety** (Nov/Dec 2017) (April/May 2018) **Define the term safety. How is it related to risk?** (Nov/Dec 2018) **Define safety.** Nov 2023

Safety means the state of “**being safe**”.

Safety is defined as the risk that is known and judged as acceptable. For example, a shaving razor in the hands of a child is never safe as it can be in the hands of an adult. The American Heritage Dictionary defines safety as freedom from damage, injury, or risk. Absolute safety that satisfies all individuals or group under all conditions is neither attainable nor affordable.

Probability of safety = 1 - Probability of risk

Risk = Probability of occurrence X Consequence in magnitude.

3. **Define the term Risk.** (AU Dec 2014 , Nov 2008, Nov 2006)( Nov/ Dec 2016)(A/M 2023) Nov 2023

William W. Lowrence has defined risk as “a compound measure of the probability and magnitude of adverse effect”. Mathematically,

**Risk = (Probability of the harm) x (Magnitude or consequence of the harm)**

The risk is the product of the likelihood and the magnitude of the harm. A relatively slight harm having more probability of occurring might constitute a greater risk than a relatively large harm having lesser probability of occurring.

4. **What is meant by risk? What are the risks that are caused in technology?**(AU May2009,2011)

**Risk:**

A risk is the potential that something unwanted and harmful may occur. The American Heritage Dictionary defines risk as the possibility of suffering harm or loss. Generally the term “risk” is synonymously used with adverse effect or harm. The term “harm” may be defined as “an invasion or limitation of a person’s freedom or well-being”. It is the result of an unsafe situation, something unanticipated, during its use.

Probability of safety = 1 - Probability of risk

Risk = Probability of occurrence X Consequence in magnitude.

**Risks that are caused in technology:**

- Dangers of bodily harm.
- Environmental degradation,

- Delayed job completion,
- Faulty products or systems,
- Economically / environmentally injurious solutions to technological problems.

**Assessment of safety and risk:**

**5. What is the use of risk – analysis? (AU Dec 2013)**

- ✓ In IT, a risk analysis report can be used to align technology-related objectives with a company's business objectives. A risk analysis report can be either quantitative or qualitative.
- ✓ In quantitative risk analysis, an attempt is made to numerically determine the probabilities of various adverse events and the likely extent of the losses if a particular event takes place.
- ✓ Qualitative risk analysis, which is used more often, does not involve numerical probabilities or predictions of loss.
- ✓ Instead, the qualitative method involves defining the various threats, determining the extent of vulnerabilities and devising countermeasures should an attack occur.

**6. What is meant by Disaster? How do disasters occur? (AU Nov/Dec.2013, April / May 2014). Nov 2023**

A disaster is a serious disruptive event coincides with a state of insufficient preparation. In recent years, engineering and technology has greatly reduced some of the effects of natural hazards and disasters.

**Occurrence of disasters:**

- When disruptive events coincides with insufficient preparation,
- Emergency preparedness inadequate (titanic hit iceberg), few lifeboats, no life boat drills, iceberg warning ignored.
- If a disaster emerges from a combination of factors, risk also emerges from a combination of probability of occurrence and consequence.

**7. What is meant by acceptable/voluntary risk? (A.U. Nov. / Dec.2004, May/ June 2006) (or) Give brief note on types of risk. (A/M 2022)**

**Acceptable risk:**

- ✓ According to D. Rows, “A risk is acceptable when those affected are generally no longer (or not) apprehensive about it.”
- ✓ Apprehensiveness (or doubtfulness) mainly depends on how the risk is perceived by the people.

- ✓ This is influenced by the factors influencing perception of risk

### **Voluntary risks:**

- ✓ If people take risk knowingly, then their involvement of risk is known as voluntary risk.
- ✓ Many people consider safer if they knowingly take on the risk.
- ✓ Also the people believe that they have “full control” over their actions.
- ✓ Example: Buying a flat/ house near a chemical plant that emits low levels of toxic waste into the air, because the property values are very low.

## **8. What is meant by controlled risks and experimental risks?**

### **Controlled risk:**

If the risk taken is within the control limit, which can be controlled by any means, then the risk is known as controlled risk.

Example: In practice, all the dangerous sports such as motorcycle racing, skiing, boxing, Etc. is carried out under assumed control of the participants.

They use all safety guard to keep the risk under control.

### **Experimental risks:**

Experimental risks occur due to

- Introduction of new technology,
- Risks related to new and expanded applications of familiar technology,
- Risk arising from misapplied attempts at disaster control.

## **9. What are the factors influencing the perception of risk?**

The risk perception is influenced by the factors such as:

- Whether the risk is assumed voluntarily;
- The effect of knowledge on how the probabilities of harm are perceived;
- Job-related or other pressures that cause people to be aware of risks;
- Whether the effects of a risky activity or situation are immediately noticeable; and
- Whether the potential victims are identifiable beforehand.

## **10. What are job-related risks and also compare safe risk and unsafe risk. (A.U. Nov. / Dec. 2005)(A.U. April / May 2005)**

**Define the term safety and relate it to risk (April/May 2018)**

### **Job-related risks**

- The exposure of risk depends on the person’s job and his work place.

- The nature of the job and the working environment will determine the risk level of a person.
- For example, people working in the coal mines, oil mines, shipyards, chemical plants, nuclear power plants, etc have more probability of being exposed to the high risk.

**Safe risk and unsafe risk:**

- If a person knowingly takes any risk, then he feels it safe.
- In contrast, if the same risk is forced to him, then he feels it unsafe.
- In simple terms, the voluntary risks are considered as safe (even if the risks are really unsafe)
- The involuntary risks are considered as unsafe (even if the risks are really safe).

**11. What are three types of accidents? Explain**

Engineers should have the knowledge about different nature of accidents.

The three important types of accidents are

- i. Procedural
  - ii. Engineered and
  - iii. Systemic accidents.
- ***Procedural accidents:***  
Procedural accidents are the result of someone making a bad choice or not following established standard procedures. Example: Road accidents because of not following the traffic rules.
  - ***Engineered accidents:***  
Engineered accidents are caused by errors in the design. Because of minor design error, the device may not perform as expected or the device may not perform well under all circumstances. Example: Minor casting defects in aircraft turbine blades may cause failure of the system.
  - ***Systemic accidents:***  
Systemic accidents are difficult to understand and difficult to control. They are characterized of very complex technologies and the complex organization that are required to operate them. Example: Failure of US space shuttle, in which seven astronauts including Indian born astronaut Kalpana Chawla were killed.

**12. What does risk-benefit value function graph depict?**

- ✓ The risk-benefit value function graph depicts that the risk and benefits are based on the Perception of probable gain and probable loss



- ✓ The risk – benefit function drops sharply on the loss portion and rises on the gain portion.
- ✓ A threshold is added on both gain and loss sides of the function.
- ✓ Threshold on loss side indicates how the habit of ignoring smaller hazards to avoid Overload of anxiety, no value for first small loss, and no effort taken to overcome it.
- ✓ Threshold on gain side indicates, normal human inertia, inherent generosity that prevents people to seek their own gain.

**13. Explain risk in terms of magnitude and proximity.**

- ✓ Reaction to risk is affected by fear of possible mishap in terms of magnitude and personal relationship with the victims. 1 in 20 close friends is subjected to great harm, 50 strangers in 1000 are in trouble, and former has more impact than latter.
- ✓ Single major airplane crash, known or familiar child trapped affects us acutely than aremote highway accident.Future risk is not considered out of sight out of mind.
- ✓ It is assumed that predictions for future have lower probabilities and is believed that a countermeasure will be found in time.

**14. What are the problems faced by engineers with public conception of safety? What is engineers' reaction to the perceptions of risk?**

*Problems faced by engineers:*

- ✓ Overly optimistic attitude that things are familiar, that have not hurt us before, overwhich we have some control, present no risks.
- ✓ People fear when accident kills large numbers or harms whom we know, though it is arare occurrence.

*Engineer'sreaction to the perceptions of risk:*

- ✓ Industry leaders say that those who fear the effects of pollution, toxic wastes, nuclearpower are emotional, irrational or politically motivated,

- ✓ Engineers should consider such perceptions of risk and incorporate in their design; it isnot wise to assume that education will quickly change public's overestimation orunderestimation.

**15. How does improvement in safety influence cost? What are the costs incurred if products are not safe?**

Any improvement in safety results in increase in cost of the product. Products that are not safe lead to secondary cost along with primary cost. Manufacturer and user should have common understanding of risks and know how reducing risk will cost.

**Costs incurred if products are not safe:**

- ✓ Products that are not safe lead to secondary cost along with primary cost (production)
- ✓ Costs are related to warranty
- ✓ Loss of customer goodwill
- ✓ Loss of customers because of injuries sustained from the use of the product.

**16. What is minimum optimum point? In spite of good information being collected, gaps remain. Why?**

✓ **Minimum optimum point:**

It is a point where slopes of primary and secondary cost curves are equal in magnitude but opposite in direction, If all costs are quantifiable optimum point will be the goal, for this we must know how to determine risk and how to compare losses with benefits.

✓ **In spite of good information being collected, gaps remain, because**

Experience and historical data provide good information about safety of standard products. Industries do not share information. New applications of old technology that make available information less useful.

**17. How does risk arise? What are the possible uncertainties encountered in a design process?**

Risk is not intentionally included into a product. Risk arises because of many uncertainties faced by

- ✓ Design engineer,
- ✓ Manufacturing engineer,
- ✓ Sales and
- ✓ Service engineer.

The uncertainties encountered in a design process are in the form of

- ✓ Application of the product,
- ✓ Materials used for producing the product,
- ✓ Changing economic conditions,
- ✓ Unfavorable environment conditions,
- ✓ Temperature, etc.,

**18. Give an example for failure of design regarding application and due to wind.**

- ✓ Bridge example for failure of design regarding application:
  - Designs that do quite well under static loads may fail under dynamic loads

- When Napoleon army marched wooden bridge collapsed (also steel bridge)
- Soldiers ordered to fall out of step while crossing a bridge.
- ✓ Failure design due to wind
  - Wind can also cause vibration
  - Collapse of Tacoma Narrows Bridge
  - Breaking of HT line due to swinging of cables.

**19. What is meant by a factor of safety? What engineer can do to ensure safety?**

The factor of safety for load is called as Partial Safety factor. Factor of safety (FoS), also known as (and used interchangeably with) safety factor (SF), is a term describing the structural capacity of a system beyond the expected loads or actual loads. Essentially, how much stronger the system is than it usually needs to be for an intended load. Safety factors are often calculated using detailed analysis because comprehensive testing is impractical on many projects, such as bridges and buildings, but the structure's ability to carry load must be determined to a reasonable accuracy.

Many systems are purposefully built much stronger than needed for normal usage to allow for emergency situations, unexpected loads, misuse, or degradation (reliability).

To ensure safety an engineer can,

- Rely on experience
- But experience gained by one is not passed on
- Bad news travels fast without hard facts
- Gain experience through tests.

**20. Mention any four popularly practiced techniques for safety of employees in an inflammable chemical plant. (A.U. May / June 2006).**

The various testing approaches other than destructive testing for safety are:

- i. **Scenario analysis:** This test starts from a given event, and then studies the different consequences that might develop from it.
- ii. **Failure modes and effects analysis:** This approach systematically examines the failure modes of each component without focusing on causes or relationships among the elements of a complex system.
- iii. **Fault-tree analysis:** This approach proposes a system failure and then traces the events back to possible causes at component level.

- iv. **Event-tree analysis:** This is the reverse of the fault – free analysis. This analysis is very useful in identifying a potentially hazardous situation in the plant.

## 21. What is safe exit?

In the study of safety, the ‘safe exit’ principles are recommended. The conditions referred to as ‘safe exit’ are:

- The product, when it fails, should fail safely.
- The product, when it fails, can be abandoned safely (it does not harm others by explosion or radiation)
- The user can safely escape the product(e.g., ships need sufficient number of life boats for all passengers and crew; multi-strayed buildings need usable fire escapes)
- Providing safe exit is an integral part of experimental procedure, experiment is to be carried out without causing bodily or financial harm, if so to be terminated safely.

## 22. What is the responsibility of an engineer when there is no safe exit? Give examples of safe exit.

- ✓ Responsibility of safe exit cannot fall on the shoulders of a lone engineer,
- ✓ But engineer can issue warnings when safe exit does not exist or the experiment has to be terminated,
- ✓ Only way project can continue without safe exit is when all participants (including subjects) give valid consent for its continuation.

### *Examples of safe exit:*

- Ships need lifeboats with sufficient space for crew and passengers.
- Fire escapes in building.
- Operation of nuclear plants should include evacuating nearby communities.

## **Risk Benefit Analysis**

### 23. What are the Conceptual difficulties in Risk-Benefit Analysis?

Conceptual difficulties in Risk-Benefit Analysis

- ✓ Both risks and benefits lie in future
- ✓ Heavy discounting of future because the very low present values of cost/benefits do not give a true picture of future sufferings.
- ✓ Both have related uncertainties but difficult to arrive at expected values.

- ✓ If the benefits accrue to one party and risks to another
- ✓ The risks and benefits are expressed in a common set of units.
- ✓ Risks can be expressed in one set of units (deaths on the highway) and benefits in another (speed of travel)
- ✓ Many projects, which are highly beneficial to the public, have to be safe also. Hence these projects can be justified using RISK-BENEFIT analysis.

**24. List out some of the Ethical Implications of Risk Benefit Analysis.**

***Ethical Implications***

- ✓ When someone entitled to impose a risk on another in view of a supposed benefit to others
- ✓ Consider the worst case scenarios of persons exposed to maximum risks while they are reaping (harvest) only minimum benefits.
- ✓ When the rights get violated
- ✓ Providing safe alternatives
- ✓ Engineers should keep in mind that risks to known persons are perceived differently from statistical risks
- ✓ Engineers may have no control over grievance redressal.

**25. When will the engineers willing to take risk?**

Engineers are willing to take risk due to the following factors;

- ✓ As long as project promises sufficient benefit,
- ✓ If risk and benefit can be expressed in common set of units (lives or dollars) it is easy to conduct risk benefit analysis
- ✓ It can be determined whether more benefit can be got.
- ✓ Example (inoculation program- some deaths-risk is worth if many lives are saved by suppressing an imminent epidemic)

**26. Why are personal risks very difficult to assess than the public risks? What are the ethical questions one should consider while assessing personal risk?**

Personal risks are very difficult to assess than the public risks because:

- ✓ The quantification in assessing personal safety and risk is very difficult to estimate; and
- ✓ In public risk, individual differences tend to even out as large numbers of people are considered.

While assessing the personal risk, one should consider the following ethical questions:

- ✓ How to access the money value of an individual's life?
- ✓ On what basis, the compensation for a risk by an amount based on the exposure tolerance of the average person justifiable?
- ✓ What will be the compensation if the tolerance level of the person is below or above the average tolerance level?

**27. What are the problems that affect the public accountability for benefits and risks?**

Public accountability for risk has been affected by the following problems:

- ✓ An expert or even group of experts cannot be expected to know everything.
- ✓ Hence the public processes suffer from incomplete engineering knowledge.
- ✓ The uncertainty produced by scientists and regulators also infects the risk regulation.

- ✓ Since the conceptions of risk vary depending on how the facts are presented, special caution should be given when stating probabilities of rare events.

**28. What are the roles of an engineer related to safety? How can engineers exhibit their humanity?**

*Engineer role related to safety:*

- Engineer face formidable tasks of designing and manufacturing safe products,
- Accounting for benefits and risks for those products,
- Meeting production schedules to get good profit for the company,
- Safety should get top priority.

*Engineers can exhibit their humanity,*

- When harm is done paying compensation may be an efficient and pleasing method.
- But efficiency does not promote ethics as both may be equated,
- Example urban renewal, though residents may be displaced and promised new housing units but neighborhood would have been destroyed, residents revolted, expensive and humane solution taken to rebuild on block by block basis.
- Engineers need to be sensitive to such considerations.

**Reducing risk:**

**29. Define risk management. How can you identify risks?**

*Risk management:*

Risk management may be defined as the eradication or minimization of the adverse effects of the pure risks to which an organization is exposed. Elements of risk management programme are:

- ✓ Risk identification
- ✓ Risk evaluation (or risk measurement) and
- ✓ Risk control.

***Identifying risks:***

Risk can be identified by various techniques such as

- ✓ Physical inspection,
- ✓ Safety audit,
- ✓ Job-safety analysis,
- ✓ Historical data analysis,
- ✓ Managements and
- ✓ Worker discussions.

**30. How do you evaluate risk?**

**Evaluation of risks:**

- ✓ Risk can be measured on the basis of economic, social or legal considerations.
- ✓ Economic and social considerations include financial aspects, uninsured cost of accidents, insurance premium, overall effect on the profitability, and possible loss of production.
- ✓ Legal considerations include possible constraint from compliance with health and safety legislation, code of practice, guidance notes and accepted standards, fire prevention.
- ✓ Pollution and product liability.

**31. What are the methods by which one can reduce risk? (A.U. April / May 2005) What are the incentives for engineers for reducing 'risk' in their products or services? (A.U. Nov. / Dec. 2008)**

***The methods to reduce risks are:***

- ✓ Risk identification
- ✓ Risk evaluation (or risk measurement) and
- ✓ Risk control.

***Incentives received by engineers for reducing risk are:***

- ✓ Understanding the experimental nature of engineering work
- ✓ Defense against legal liability
- ✓ Possibility to avoid risk by working with caution.

### **32. Write about**

- i. Risk avoidance,
- ii. Risk retention,
- iii. Risk transfer and
- iv. Risk reduction

#### ***i. Risk avoidance:***

Risk avoidance refers to the conscious decision by the management to avoid completely risk by discontinuing the operation producing the risk.

#### ***ii. Risk retention:***

Risk retention refers to retaining a particular risk for which any consequent loss is financed by the organization.

#### ***iii. Risk transfer:***

Risk transfer refers to the legal assignment of the cost of certain potential losses from one party to another (example, by insurance).

#### ***iv. Risk reduction:***

It refers to the reduction or elimination of all aspect of accidental loss that lead to a wastage of an organization's assets.

### **33. Mention some of the faulty assumptions about safety (A.U. May / June 2008)**

There are many misconceptions about safety. Some of the popular fault assumptions about safety are given below:

- ✓ The principle causes of all accidents are operator error and negligence.
- ✓ Producing a safe product always increases the costs.
- ✓ One can learn about safety after a product has been completed and tested.
- ✓ Warnings about harms are sufficient. Insurance coverage is cheaper than planning for safety.

### **34. What are the assumptions of safety?**

#### ***First assumption:***

- The first assumption is operator error and negligence are the principal causes of all accidents.
- Reality- accidents are caused by dangerous conditions that can be corrected.



- Example- automatic couplers reduce number of deaths / injuries suffered by train workers
- Safety devices prevent accidents if they are not disabled for convenience or to speed up the work.

**Second assumption :**

- The second assumption of safety is making a product safe invariably increases costs.
- Reality- initial costs need not be high if safety is built in the beginning itself.
- If included at later stage it is costly.

**Third assumption:**

- ✓ The third assumption of safety is - we learn about safety after a product has been completed and tested
- ✓ Reality- if safety is not built in the original design people can be hurt during testing stage.
- ✓ If we are not interested to change the design it means safety features will not be incorporated.

**Fourth assumption:**

- ✓ The fourth assumption of safety is - warnings about hazards are adequate, insurance coverage is cheaper than planning for safety
- ✓ Reality- warning only means that hazard exists, provides only minimal protection against harm.
- ✓ Insurance rates are very high.

**35. What is engineers' outlook on safety? Give examples of improved safety.**

**Engineers' outlook on safety:**

- Engineers should recognize that reducing risk is not an impossible task,
- Even under financial and time constraints, we should have a different perspective on the design problem
- Working on the experiment with safety as important factor.

**Examples of improved safety:**

- ✓ Safety is not a thesis on design, introduction of magnetic door in fridges, prevents death by suffocation of children accidentally trapped inside, it can be opened from inside and cheaper

- ✓ Dead man handle used by train driver to control speed, train is powered only as long as some pressure is exerted on the handle, if let off train stops.
- ✓ Semaphores actuated by cable indicated STOP when arm is lowered, even if cable failed arm will be in STOP position, when door is opened in Volkswagen car seat belt is worn automatically.
- ✓ Arms 1 and 2 of the switch are raised by solenoid, if one contact sticks and other moves battery is shorted and discharged; exchanging battery and motor will not harm the battery.

**36. What is meant by “caveat emptor “and “Privacy of contract”?**

***‘Caveat emptor:***

- ✓ ‘Caveat emptor’ means ‘buyers beware’.
- ✓ Producers of goods and services were respected very much.
- ✓ Their success were the country’s success,
- ✓ One should examine what he buys
- ✓ If he is not careful he has to suffer a bad bargain
- ✓ Law will not support who are negligent.

***‘Privacy of contract’:***

- ✓ One who is not a party of contract has no rights arising from it,
- ✓ If not bought product directly from the manufacturer and if injured by it, manufacturer cannot be sued.
- ✓ If the injured person can prove that he has bought from the middleman then he can sue the middleman and not the manufacturer.

**37. What is the turning point in the reversal of attitude about liability? What is strict liability? Define strict liability. Nov 2023**

In 1916, when Judge Cordoza found Buick Motor Company responsible for the injuriessuffered by one McPherson when a wheel on a new Buick collapsed. Gradually thereafter, over a period of half a century, the

notion took that, If negligence is proved then manufacturer can be held be liable for negligence in design. Still, such negligence has to be proven.

***‘Strict liability’:***

- For the manufacturer to be held liable it is enough if the sold product is defective and creates harm to users.
- Negligence is not at issue.
- It is fact that the product had a defect not obvious to the users.

### **38. What is minimal compliance?**

- ✓ Proof of negligence is not required to make a manufacturer liable is a frightening prospect for them.
- ✓ Although it is impossible to test every product the engineer must compare the chances of a defect causing a serious injury and cost of minimizing defects.
- ✓ Adhering to accepted practices and observing standards alone is not sufficient.
- ✓ It neither guarantees a safe product nor does it provide a valid excuse in the court.
- ✓ Standards are good starting points and good check lists, but they must be used creatively and judgmentally.
- ✓ In the design process they must be the beginning and not the end.

### **39. What are the causes for the accident at Three Mile Island and Chernobyl?**

The causes of accident at Three Mile Island and Chernobyl are:

- ✓ Operator errors,
- ✓ Complacency shown by managers and operators
- ✓ Operators not fully conversant with the operating principles of the plant equipment
- ✓ Inadequate provisions for evacuation of nearby population
- ✓ Lack of safe exit in all complex problems.

### **40. What are the indefensible incidents at Chernobyl?**

- ✓ Firefighters lost their lives.
- ✓ It took hours to warn the surrounding communities.
- ✓ Alert nuclear operators in Sweden detected radio activity first then only Moscow knew it they were not prepared for this radio activity fallout.
- ✓ Countries did not have monitoring devices.
- ✓ Instructions regarding handling milk, vegetables, children playing depended on politicians.

### **41. What are the after impact and the steps taken after the accident in Chernobyl?**

- ✓ *After impact:*

- 200 Chernobyl workers were severely affected.
- 31 died immediately.
- 12 hours after explosion 1000 families were evacuated.
- 71 villages within 18 miles evacuated only next day.
- 135000 moved by buses and trucks.
- Medical care given to the evacuated 1.25 million.

✓ *The steps taken after the accident:*

- Reactor was encased in a concrete tomb, but not air tight, if lid slides off radioactive dust would escape.
- Tunnels were dug beneath the reactor to install cooling pipes carrying liquid nitrogen;
- Tunnels also prevented leakage of radioactive water.

**42. What were the similarities about the reactors in Three Mile Island and Chernobyl?**

- ✓ Pressurized water reactor in TMI have strong containment structures, radioactive products of the accident were fairly well contained,
- ✓ RBMK(ReaktorBolshoyMoshchnostiKanalniyl) Reactor at Chernobyl is a much weaker containment, such units depends on special cooling methods to limit pressure rises and to keep radioactive gases within confinement structures.
- ✓ Both are sensitive to perturbations,
- ✓ Three Mile Island PWR has small amount of water and undersized pressurizer, RBMK has positive temperature power feedback

**43. How do you relate the operation procedures in Three Mile Island (TMI) and Chernobyl?**

- ✓ At TMI operating procedures were not continuously reviewed by experts
- ✓ At Chernobyl test protocol were not discussed with plant designers and nuclear engineers
- ✓ In both plants operators were not fully conversant with the operating principles of the plant equipment.
- ✓ Common to both was satisfaction shown by management and operators , “out of sight out of mind” or “it cannot happen here” serious accidents happen in unforeseen ways
- ✓ Physical layout of systems may be different from country to country but managers and operators are never very different in their behavior

**44. Are the public in Three Mile Island and Chernobyl are similar? If so list out the similarities.**

The common similarities between the public in TMI and Chernobyl are listed below:

- ✓ Nuclear industry not been open to public

- ✓ May have felt public cannot be trusted,
- ✓ In France protest against nuclear energy have been hidden by police measures and secrecy,
- ✓ Public has not noticed safe doses of radiation exposure have been lowered over years,
- ✓ Insurance companies are not willing to cover full potential losses incurred by an accident,
- ✓ Residents near nuclear plants know how inadequate emergency evacuation plans are.

**45. Why is safe disposal of dangerous materials required? Give examples for alternative methods of safe exit.**

✓ *Safe disposal of dangerous materials :*

- Safe disposal of dangerous materials is also a means of safe exit
- Provision for safe disposal of dangerous products and materials is mandatory.
- Truck accidents and train derailment expose communities to toxic gases,
- Toxic wastes get into ground water or into hands of children

✓ *Alternative methods of safe exit:*

- To avoid system failure redundant or alternative means of continuing are required when the original process fails
- Back up for computer based databank and
- A water supply system with adequate local reservoir capacity.

**46. How is safe exit related to risk management? Who are involved in providing safe exit?**

*Relation of safe exit and risk management:*

- ✓ To meet and minimize damage identified in a risk assessment exercise.
- ✓ Safe exit should not be omitted
- ✓ Safe disposal of waste and alternative method of working to be provided.

*People involved in providing safe exit:*

- ✓ Co-ordination among producers, users, local communities is required to provide realistic safe exit.
- ✓ Engineers are catalysts to process in motion.
- ✓ It is an added burden for the engineers.
- ✓ Still they have to openly identify risks and communicate to producers and users in spite of Barriers.

**47. What are the causes for the Bhopal gas tragedy?**

- ✓ According to researchers' views, Water leaked into tank from valves while workers were cleaning the clogged pipe which is 400 feet above it.
- ✓ According to theory of Union Carbide Corporation, Water was directly introduced into tank intentionally by a worker via a missing pressure gauge. It resulted in exothermic reaction and finally to an explosion.
  
- ✓ Use of a more dangerous pesticide manufacturing method for decreasing generation cost.
- ✓ Plant location close to a densely populated area.
- ✓ Plant management deficiencies like:
  - Lack of skilled operators.
  - Reduction of safety management.
  - Insufficient maintenance and
  - Inadequate emergency action plans.

**48. Write about the factors that you came to know about the Bhopal gas tragedy.**

- ✓ The flare tower and the vent gas scrubber had been out of service for five months before the disaster.
- ✓ To reduce energy costs, the refrigeration system was idle. The MIC (Methyl IsoCyanate) was kept at 20 degrees Celsius, not the 4.5 degrees advised by the manual.
- ✓ The steam boiler, intended to clean the pipes, was out of action for unknown reasons.
- ✓ Carbon steel valves were used at the factory, even though they corrode when exposed to acid.
- ✓ According to the operators the MIC tank pressure gauge had been malfunctioning for roughly a week
  - ✓ UCC admitted in their own investigation report that most of the safety systems were not functioning on the night of December 3, 1984.

**49. What is the most important ethical mistake made by the Union Carbide which contributed to the Bhopal disaster? (A.U. Nov. / Dec.2008) What are the contributions to negligence?**

***Ethical mistake:***

- ✓ Most important ethical mistake was the move from US standards of safety to lower Indian Standards.
- ✓ It was contrary to Union Carbide's written policies.
- ✓ In designing Bhopal plant, it did not transfer all the safety mechanisms available at that time.

***Contributions to negligence:***

- ✓ UCIL didn't maintained safety rules.

- ✓ The leaked pipe is not get replaced
- ✓ MIC workers needed more training. They could do with less.
- ✓ The MIC tank alarms had not worked for four years.

**50. Are you aware of the effects of Bhopal gas tragedy?**

- ✓ It is estimated that total deaths are about 20,000 up to 20 years after disaster.
- ✓ It is estimated 1, 00,000 to 2, 00,000 people have permanent injuries.
- ✓ Reported symptoms are:
  - Eye problems,
  - Respiratory difficulties,
  
  - Immune and neurological disorders,
  - Cardiac failure secondary to lung injury,
  - Birth defects among children born to affected women.

**51. What are the rehabilitation measures taken after the Bhopal gas tragedy?**

- ✓ Immediate relief was decided two days after the tragedy.
- ✓ Relief measures commenced in 1985 when food was distributed for a short period and ration cards were distributed.
- ✓ Widow pension of the rate of Rs 200/per month (later Rs 750) was provided.
- ✓ One-time ex-gratia payment of Rs 1,500 to families with monthly income Rs 500 or less was decided.
- ✓ 2,486 flats in two- and four-story buildings were constructed in the "Widows colony" outside Bhopal.

**Respect for Authority:**

**52. What is meant by authority? List down the sources of authority.**

*Authority:*

- ✓ Authority is the right to make decisions, the right to direct the work of others, and the right to give orders.
- ✓ It is a crucial factor in organization since engineers and employees must be authorized to carry out the jobs assigned to them.

*Sources of authority:*

- ✓ They are the person's position or rank, and the personal attributes such as charisma, knowledge and expertise.

- ✓ Though the authority can have majorly two sources, they are institutional authority and expert authority

**53. What does the institutional authority and expert authority refer to? Distinguish between ‘Institutional authority’ and ‘Expert authority’. Nov 2023**

***Institutional authority:***

- ✓ Institutional authority can be defined as the institutional right given to a person to exercise power based on the resources of institution.
- ✓ It is authority given by the institution to the qualified individuals in order to meet their institutional objects.

***Expert authority:***

- ✓ The authority because of the knowledge and expertise is known as an expert authority.
- ✓ Expert authority is the possession of special knowledge, skill or competence to perform some task or to give sound advises.

**54. Distinguish between authority and power. (A.U. Nov. / Dec. 2011)**

Sl.no	Authority	Power
1.	It is the legal right of a superior, which compel his subordinates to perform certain acts.	It is the ability of the person to influence others to perform an act. It may not have legal sanction.
2.	It is the delegated to an individual by his superior.	It is earned by an individual through his own efforts.
3.	It lies in the position held and the authority changes with change in position.	It rests in the individual. Even when the position has changed, his power remains with him
4.	It is mostly well defined and finite.	It is undefined and infinite.

**55. What are the paramount obligations of an engineer?[Nov/Dec 2022]**

- ✓ As professionals, engineers have obligations to accept their employers’ institutional authority. But this does not mean that they have to obey obligations blindly.



- ✓ The basic moral task of engineers is to be aware of their obligations to obey employers on the one hand and to protect and serve the public and clients on the other hand.
- ✓ Engineers must weigh their obligations to the public, their employers, their colleagues and others when conflicts between such obligations arise.

### **Collective Bargaining**

#### **56. Define the term Collective Bargaining and list its types.(AU May 2014) (Nov/Dec 2016, 2017) (A/M 2023) Define collective bargaining. Nov 2023**

International labor organization (ILO) has defined collective bargaining as “negotiation about working conditions and terms of employment between an employer and one or more representative employee’s with a view to reaching agreement. ‘The process is collective in the sense that the issue relating to terms and conditions of Employment. These issues are solved by representatives of employees and employers rather than individuals.

The term bargaining refers to evolving an agreement using methods like negotiation, discussion, exchange of facts and ideas rather than confrontation.

The process of collective bargaining can be summarized in the following three steps:

1. Presenting the charter of demands by the union on behalf of the constituent elements.
2. Negotiations at the bargaining table
3. Reaching an agreement

#### **57. Are unionism and collective bargaining practices ethical?**

- ✓ It is observed that whether collective bargaining and its tactics are ethical or unethical, only on the basis of the given situation.
- ✓ Though unions often have misused their power and irresponsibly disregarded the public good, the formation of engineering unions should not be considered always unprofessional.
- ✓ The moral assessment of unions is complex.
- ✓ Many morally relevant facts and factors should be considered while judging about any union.
- ✓ Also the number of professional societies has emphasized that loyalty to employers and the public is not possible with any form of collective bargaining.

#### **58. Write about faithful agent argument.**

- ✓ As per the NSPE code of earlier versions, in the first section which dealt with loyalty to employers,

- ✓ “The engineer will be guided in all his professional relations by the highest standards of integrity, and will act in professional matters for each client or employer as a faithful agent or trustee”
- ✓ As per NSPE code 3 i.e, engineers shall not promote their own interest at the expense of the dignity and integrity of the profession.
- ✓ The engineers are said to exhibit a higher standard than self-interest and they are expected to perform an ethical duty to their employer as faithful agent or trustee.

**59. Explain the arguments in favor of unions.**

- ✓ Unions play a vital role in achieving high salaries and improved standard of living of employees.
- ✓ Unions give employees a greater sense of participation in organization decision making.
- ✓ Unions ensure job security and protection against arbitrary treatment to the employees.
- ✓ Unions have the ability to resist any orders from employers to perform unethical acts.
- ✓ Unions maintain stability by providing an effective grievance procedure for employee complaints
- ✓ Unions can act as a counterforce to any radical political movements that exploit the Employees.

**60. State the arguments against unions. (A.U. May/June 2006)**

- ✓ Unions shatter the economy of a country by placing distorting influences of efficient uses of labor.
- ✓ Unions remove person-to-person negotiations between employers and employees.
- ✓ Unions encourage unrest and strained relations between employees and employer.
- ✓ Unions encourage the unhealthy concept of job promotion, salary hike, etc. on the basis of seniority.
- ✓ Unions prevent employer from rewarding individuals for their personal achievements.

**Confidentiality**

**61. What is confidentiality or confidential information? Why it is needed? (A.U. May/June 2006, Nov. /Dec.2006)(April/May 2018)**

- ✓ Confidential information is information deemed desirable to keep as secret.
- ✓ Confidential information may be classified as privileged information and proprietary information
- ✓ The most commonly considered criterion on the confidential information is as follows:

- Confidential information is any information that the employer/client would like to keep secret in order to compete effectively against business rivals.
- Confidentiality covers both sensitive information given by the employer/ client and information gained by the professional in work paid for by the employer / client.

**Needs:**

- ✓ It helps to build and develop trust.
- ✓ It potentially allows for the free flow of information between the client and worker and acknowledges that a client's personal life and all the issues and problems that they have belong to them.

**62. What are the external responsibilities of an engineer?**

External responsibilities refer to the responsibilities of the engineers to the outside world.

The responsibilities to the outside world include:

**Confidentiality**

It refers to keeping the information on the employer and clients, as secrets. it is one of the important aspects of team work

**Conflict of interest**

It occurs when the employee has more than one interest.

**Occupational crimes**

It may be committed by wrong actions, crime by an employee to promote one's own or employer's interest or theft or pilferage (heft of part of the contents of a package) by the employee.

**63. On what basis the confidentiality obligation rest?**

The obligation of confidentiality can be justified at two levels

First level: It focuses on three moral considerations –

- respect for autonomy,
- respect for promises
- Regard for public well – being.

Second level: It focuses on the major ethical theories.

It includes

- Justification of confidentiality by right ethicist
- duty ethicists
- Utilitarian's.

**64. What does respect for autonomy refer and what does respect for promises refer? [Nov/Dec 2022]**

**Respect for autonomy** refers to respect the autonomy freedom and self-determination of individuals and companies in order to recognize their legitimate control over some information.

- ✓ Without the legitimate control, the individual and companies cannot maintain their privacy and protect their self – interest. This belongs to first level of obligation of confidentiality

**Respect for promises** refers to respect the promises (in the form of signing contracts) made by employees to the employer.

- ✓ It is the duty of the employee to respect the promises made to the employer.

**Conflicts of Interest**

**65. What is meant by conflict of interest? (A.U. Nov. / Dec. 2011) (Nov/Dec 2018) (A/M 2022) Nov 2023**

- ✓ In general, conflicts of interest means an individual has two or more desires that all interest cannot be satisfied given the circumstances
- ✓ Professional conflicts of interest are situations where professionals have an interest, if pursued, could keep them from meeting one of their obligations to their employers.
- ✓ Such an interest involves serving in some other professional role.
- ✓ For example, as a consultant for competitor's company.
- ✓ Other times it is a more personal interest, such as making substantial private investments in a competitor's company.

**66. What are the types of conflicts of interest?**

The three important types of conflicts of interest are:

*i. Actual conflicts of interest*

It arises when an employee compromise objective engineering judgement

*ii. Potential conflicts of interest*

It may corrupt professional judgement in the future, if not in the present.

*iii. Apparent conflicts of interest.*

It actually not corrupting the professional judgement. however it decreases the confidence of the employer and the public in the objectivity and trustworthiness of professional services.

**67. What do actual conflicts of interest refer?**

- ✓ The actual conflicts of interest arise when an employee compromise objective engineering judgment.
- ✓ It refers to the loss of objectivity in decision – making and inability to faithfully discharge professional duties to employer.
- ✓ It can corrupt professional judgment.
- ✓ Example: A mechanical engineer working in the purchase department of an automobile industry might have his personal influence while offering contract the contract for supply of raw materials to a vendor.
- ✓ In this case, pursuing his financial interest with the vendor might lead him not to objectively and faithfully discharge his professional duties to his industry.

**68. What is moonlighting? Does it create conflicts of interest? (A.U. April / May 2008) Define moon lighting. Nov 2023**

- ✓ The term moonlighting is used when an employee of a company works for another company during his spare time.
- ✓ Moonlighting creates conflicts of interest only in special circumstances, such as working for competitors, suppliers, or customers.
- ✓ In rare situations, an employer sometimes gives permission for exceptions.
- ✓ A special kind of conflict of interest arises
- ✓ However, when moonlighting leaves one exhausted and thereby harms job performance.

**69. What are the possible ways of avoiding the conflicts of interest?**

Some of the effective ways to avoid conflicts of interest are as follows:

- ✓ To follow the guidance of company policy.
- ✓ In the absence of company policy, one can go for a second opinion from a coworker or manager.
- ✓ In the absence of above two options, it is better to examine one's own motives and use ethical problem solving techniques. Finally,
- ✓ One can follow the statements in the professional code of ethics.
- ✓ Some of the ethics codes have given clear statements to identify whether the given situation is a conflict or not.

**70. Which information creates an unfair market advantage, and thus constitutes a conflict of interest and how it accomplishes organization development?**

- ✓ Insider information creates an unfair market advantage, and thus constitutes a conflict of interest.
  - ✓ An especially sensitive conflict of interest consists in using “inside” information it is to gain an advantage or set up a business opportunity for oneself, one’s family, or one’s friends.
  - ✓ This information might concern one’s own company or another company with which one does business.
- 
- ✓ The use of any company secrets by employees to secure a personal gain threatens the interests of the company the employees are supposed to serve.

### **Occupational Crime**

**71. What is meant by Occupational Crime? (AU May 2014)[Nov/Dec 2022] Define occupational crime.**

**Nov 2023**

Occupational crimes are illegal acts committed through a person’s lawful employment. It is the secretive violation of laws regarding work activities. Most of the occupational crimes are special instances of conflicts of interest. These crimes are motivated by

- personal greed,
- corporate ambition,
- Misguided company loyalty, and many other motives.

**72. Are you aware of the word ‘white collar crime’?. Explain it with examples.**

- When professionals or office workers commit the occupational crime it is called as ‘white collar crime’
- It is a non – violent crime that is committed by someone, typically for financial gain.
- White collar crime is punishable by fine, imprisonment or both.

**Examples:**

- Securities fraud (the misrepresentation of investment information),
- Embezzlement (misuse of funds),
- Corporate fraud (dishonest and/or illegal actions by a company employee or
  - executive) and
- Money laundering (giving criminally-obtained funds the appearance of having a
  - legitimate source).

**73. Give examples of occupational crime.**

- re aimed at promoting the interests of one's employer rather than oneself are also considered as occupational crimes.
- Occupational crimes impinge on various aspects such as professionalism, loyalty, conflicts of interest and confidentiality.
- Three cases of occupational crimes that are commonly observed are:
  1. Price fixing
  2. Endangering lives and
  3. Industrial espionage ((i.e) industrial spying.

**74. What is meant by Price fixing?(A.U. April / May 2011)**

- ✓ While fixing price for any commodity/ product/service, sometimes all competitors come together and jointly set the prices to be changed. These are called as pricing cartels.
- ✓ The above price fixation is unfair and unethical practice.
- ✓ This leads to restraint the free trade and open competition.
- ✓ Thus the above kind of price fixing is an example of occupational crime.

**Professional Rights**

**75. What are professional rights? [Nov/Dec 2022]**

- ✓ Professional rights are the rights by virtue of being professionals having special moral responsibilities. Examples: The professional rights include
- ✓ Right to exercise one's professional judgment on the basis of his conscience
- ✓ Right to refuse to involve in unethical activities
- ✓ Right to warn the public about harms and dangers
- ✓ Right to express one's professional judgment, including his right to disagree and
- ✓ Right to fair recognition and remuneration for professional services.

**Employee Rights**

**76. What are employee rights?(A.U. Nov. / Dec. 2005)**

Employee rights are the rights that apply or refer to the status or position of employee.

Types of employee rights are:

***Contractual employee rights,***

- ✓ These employee rights are institutional rights that arise only due to specific agreements in the employment contact.

***Non – contractual employee rights***

- ✓ These are rights existing even if not formally recognized in the specific contracts of company policies.

**77. List the fundamental human rights adopted by UN.**

1. Right to life
2. Right to liberty.
3. Right to security of person.
4. Right not to be held in slavery.
5. Right not to be tortured or subjected to inhuman or degrading punishment.
6. Right to political participation
7. Right to live and exist
8. Freedom of speech and forming association.

**Intellectual Property Rights (IPR) (May/June 2016)**

**78. What are the benefits of intellectual property rights? (A.U. Nov. / Dec. 2005)**

The benefits of implementing IPRs are given below:

- ✓ IPRs promote technological, industrial, and economical developments of a country.
- ✓ IPRs provide incentives for the inventions and ensure adequate returns on commercialization of the invention.
- ✓ IPRs prevent the competitors from using one's invention.
- ✓ IPRs are useful in identifying unprotected areas to avoid violation.
- ✓ IPRs grant exclusive rights to the inventors.

**79. Differentiate copy right , trade mark and patent.(A.U. Dec. 2004, May/ June 2006) Define copy right. Nov 2023**

- ✓ A copyright is the right to copy and make use of literary, dramatic, musical, artistic works, cinematographic films, records and broad casts.
- ✓ The copyrights protect the expression of the idea, not the idea themselves.
- ✓ Trade marks are words, phrases, sounds or symbols associated with goods or services.
- ✓ Patents are the legal right approved for new inventions .
- ✓ It involves scientific and technical knowledge.

**Discrimination**



**80. What do discrimination and preferential treatments mean? [Nov/ Dec 2022] Define Discrimination. Nov 2023**

- Discrimination is the unequal treatment of an individual intentionally or unintentionally.
- Discrimination refers to treating people unfairly because of one's sex, race, skin color, age, or religious outlook.
- Discrimination is defined as a morally unjustified treatment of people on arbitrary or irrelevant ground.
- Preferential treatments mean giving an advantage to a member of a group that in the past was denied equal treatment, in particular, women and minorities.
- The preferential treatment are also referred as reverse preferential treatments, as it 'reverse s' the historical order of preferences.

**81. Define risk benefit analysis. (Nov/Dec 2021)**

Risk benefit analysis is a technique, similar to cost benefit analysis, used to analyze the risk in a project and to determine whether the project should be proceeded or not.

In risk benefit analysis, the risks and benefits of a project/product are assigned money values, and the most favorable ratio between risks and benefits is determined.

**82. What is mean by whistle blowing? (Nov/Dec 2021) [Nov/Dec 2022]**

Whistle blowing is the act by an employee of informing the public or higher management of unethical or illegal behavior by an employer or supervisor.

It is the act of reporting on unethical conduct within an organization to someone outside of the organization in an effort to discourage the organization from continuing the activity.

**PART-B**

1. What is meant by conflict of interest? Distinguish between General and professional conflicts of interest and discuss the various types of conflicts of interest. (Nov/Dec 2017)
2. What are intellectual property rights? Explain the elements of intellectual property rights in detail and list out its benefits. (Nov/Dec 2017) (or) Explain how elements of intellectual property rights benefits people. (A/M 2022) [Nov/Dec 2022] (A/M 2023) what is patent? List the types. Also list out requirements for granting patent. Nov 2023
3. Discuss the testing strategies' for safety with suitable examples. Mention the difficulties in assessing the personal risks. (April/May 2018) / Assessment of safety and risk is helpful in improving the workers morality, work culture and work atmosphere (A/M 2023)
4. Safety in a commodity comes with a price.' Substantiate with explanation. Discuss how the knowledge of risk is always better for safety with suitable examples. (April/May 2018) (part –

C, Nov/Dec 2018)

5. Explain in detail about the assessment of safety and risk. (Nov/Dec 2017) List out code of ethics executed by engineer in safety risk and assessment. Nov 2023
6. Explain in detail about 'safe exit 'and 'risk benefit analysis'.

Explain the procedure in risk benefit analysis and discuss its role in reducing risk with suitable examples. (Nov/Dec 2018, 2021) (or) Explain how the risks are reduced. (A/M 2022) (or) Explain the concept of risk benefit analysis. (A/M 2022)

7. What are the safety lessons one can learn from 'The challenger'.

8. Explain the safety lesson with a case study.

Chernobyl, Near Kiev, Russia (April 1986)

9. Explain in detail about Human rights.

10. Discuss the faithful agent argument and public service argument of collective with suitable examples. (Nov/Dec 2018, 2021) What does conflict bargaining arises? Nov 2023

### UNIT-V

#### **Define Multinational Corporation with Example? (Apr'2004)[Nov/Dec 2022]**

When a company operates its business in several countries, it is known as a multinational corporation. For example, Smith line Beecham, Hindustan lever Ltd., Ford, Toyota etc. are multinational corporations.

#### **2. What is meant by Relative Values in multinational Corporation issues?**

Relative values mean relative principles. These relative values help in deciding how the multinational corporations and individuals have to act in foreign or host countries.

#### **3. What are the different forms of relativism in existence of the formation of a multinational corporation?**

- ✓ Ethical Relativism
- ✓ Descriptive Relativism
- ✓ Moral Relativism or Contextualism

#### **4. What is known as technology transfer? (Nov'2006) (Nov/Dec 2017) What is meant by technology**

**transfer. Nov 2023**

- ✓ Technology Transfer is a process of changing the technology to a new setting and implementing it.
- ✓ Technology includes hardware such as machines and installations as well as techniques such as technical, organizational and managerial skills and procedures.

#### **5. What is meant by appropriate technology?**

- ✓ Appropriate technology means identification, transformation and implementation of the most suitable technology for a new set of conditions.

#### **6. What are the general effects of Acid rain?**

- ✓ Bacteria's that are essential for life systems to be active are killed.
- ✓ High acidity results in reduced growth and killing of fishes.
- ✓ Accumulation of organic matter in lake and streams increases the degree of water pollution.
- ✓ Concentration of heavy particles like copper, zinc, lead, and manganese are increased in water.

#### **7. What are the ethical issues or questions that arise in environmental protection?**

The questions that arise in this sort of ethical issues are:

- ✓ -Who is affecting? Who are affected? Does the environment get disturbed? When does the disturbance take place? And how does it happen?

#### **8. What does a Right ethic stress for a liveable environment?**

- ✓ Right ethics' stresses that the fundamental right to life enforces a right for liveable environment in a particular period of time, when pollution and depletion of resources has reached a dangerous proportion.

#### **9. What are the different categories of problems that exist in computer ethics?**

There are basically three categories of problems in computer ethics.

- ✓ Computer happened to be the instrument of an unethical act.
- ✓ Computer is the object of an unethical act. This act is properly known as hacking.
- ✓ Problems connected with autonomous nature of computer.

#### **10. How is the computer ethics problems classified? (Apr'2008,Nov'2010)(A/M 2023)**

- ✓ When computers are used for unlawful activities, it makes it easier to steal from a variety of the people.

**For e.g:** Computers can be used to steal from an employer, an outsider can get into a system, and a company can use the computer to steal from its clients and customers.

- ✓ Computer leads to the elimination of some jobs.
- ✓ Computers create problems of public accountability of business which use computer based services.

#### **11. What are the professional issues in computer Ethics?**

- ✓ Computer Failures
- ✓ Computer Implementation

- ✓ Health Condition

**12. What are the principles for conflict resolution?**

- ✓ People must be separated from the problem.
- ✓ Focus must be only on interest and not on positions.
- ✓ Various options must be generated.
- ✓ An evolution criteria should be established

**13. What are the abuses of Engineers as expert witnesses?**

- ✓ Hired Guns
- ✓ Financial Prejudices or Financial Influences
- ✓ Sympathy Biases.

**14. What are the normative models for advisors?**

- ✓ The normative models for advisors are: a) Hired Guns b) Value-Neutral Analysts c) Value-Guided Advocates.

**15. What is meant by moral Leadership? [Nov/Dec 2022]**

- ✓ Leadership points out the success in leading a group of persons towards the achievement of goals and objectives. Whenever the goals of a leader become permissible and also morally valuable, it is known as moral leadership.

**16. What are the rules of practice framed in the codes of Ethics?**

- ✓ Engineers shall perform services only in the areas of their competence.
- ✓ Engineers shall issue public statements only in an objective and truthful manner.
- ✓ Engineers shall act in professional matters for each employer or client as faithful agents or trustees.

**17. What are the Professional Obligations in codes of Ethics? [Nov/Dec 2022] What is a professional obligation? List out any four professional obligations of Engineers. Nov 2023**

- ✓ Engineers shall be guided in all their professional relations by the highest standards of integrity.
- ✓ Engineers shall at all times strive to serve the public interest.
- ✓ Engineers shall avoid all conduct or practice which is likely to discredit the profession or deceive the public.
- ✓ Engineer shall avoid all conduct or practice the deceives the public

**18. What is Ego Biases?**

- ✓ Many of the adversarial circumstances establish some competitive attitudes among engineers who acts as expert witness

**19. List some of the environmental issues of concern to engineers?**

- ✓ Releasing harmful substance into water and air
- ✓ Using toxic substance in food processing
- ✓ Disturbing land and water balances

**20. What are the international Rights? (Apr'2007)[Nov/Dec 2022]**

- ✓ Freedom of physical movement of people
- ✓ Ownership of properties
- ✓ Freedom from Torture.
- ✓ Fair Trial on the products.

**21. How is environment degraded?**

1. By causing injuries to nature
  - i. Usually this damage is caused slowly
  - ii. Sometimes this also happens in sudden strikes
2. Misuse of our resources, fouling our environment
3. Practicing growths in consumptions and population leading to non-availability of resources
4. Industrial activity denudes land(to destroy all plant and animal life), pollutes atmosphere and water, and reduces the yield from sea and land

**22. What are the questions to be answered by Engineers in their role as experimenters?**

- ✓ How does an industry affect the environment?
- ✓ How far it can be controlled?
- ✓ Whether protective measures are available and implemented?
- ✓ Whether engineers can ensure safe & clean environment?

**23. What are the other problems caused to the environment?**

- ✓ Build-up of CO<sub>2</sub> from the use of fossil fuels by Industrial nations could result in Greenhouse effect.
- ✓ Damage to protective OZONE layer due to the release of Freon is related to technological products used by the people of these nations.

**24. What is Greenhouse effect?**

“Greenhouse Effect” is defined as the progressive warming up of earth’s surface due to blanketing effect of manmade CO<sub>2</sub> in the atmosphere. A greenhouse is that body which allows the short wavelength incoming solar radiation to come in, but does not allow the long wave outgoing infra-red radiation to

escape. The earth's atmosphere bottles up the energy of the sun and it acts like a green house, where CO<sub>2</sub> acts like a glass windows.

**25. What are the advantages of MNC's to host country? (April/May 2018)**

- ✓ Employment generation
- ✓ Automatic inflow of foreign capital
- ✓ Proper use of idle resources
- ✓ Improvement in balance of payment position
- ✓ Technical and Managerial development
- ✓ Improvement in standard of living.

**26. What is code of conduct and mention its significance? (April/May 2018) or Define code of conduct. (Nov/Dec 2021) [Nov/Dec 2022]**

A code of conduct is a set of rules outlining the social norms, religious rules and responsibilities of, and or proper practices for, an individual.

Significance:

- ✓ A well-written code of conduct clarifies an organization's mission, values and principles, linking them with standards of professional conduct.
- ✓ The code articulates the values the organization wishes to foster in leaders and employees and, in doing so, defines desired behaviour.

**27. Point out the responsibilities of consulting Engineer. (Nov/Dec 2017) [Nov/Dec 2022]**

- ✓ Implementation of services associated with the network solutions
- ✓ Application of project management
- ✓ Analysis and assessment of technical issues
- ✓ Researching, planning and executing advanced technical solutions
- ✓ Preparing documentation
- ✓ Delivering appropriate solutions as per the needs of the clients

**28. What are the demerits of MNC to host country? (Nov/Dec 2018)**

- ✓ Loss of national sovereignty, as the host nation cannot control what an MNC does in other nations, which may be inimical to its interest.
- ✓ Political interests of MNCs may mirror the political interest of their respective home nations, and this may be detrimental to the host nation. For instance, an American MNC may serve the interest of America, while operating in India.
- ✓ The host nation may lose control over its own economy.

- ✓ Negative impact on the host's balance of payments because of heavy imports of spares and components.
- ✓ Exploitation of the hosts' irreplaceable natural resources leading to the dwindling of these.
- ✓ Exploitation of labour of the host when the country needs it.

**29. What is meant by Corporate Social responsibility (CSR)? (Nov/Dec 2018) (or) State the role of Corporate Social Responsibility. (A/M 2022) (A/M 2023 write a short notes on CSR. Explain its scope in detail.**

- ✓ According to European Union Commission, "CSR is a management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stake holders on voluntary basis".

**Scope:**

- ✓ The purpose of CSR is to make corporate business activities sustainable in three dimension Economic, Social, Environmental

**30. What is mean by computer ethics? (Nov/Dec 2021) [Nov/Dec 2022]**

- ✓ Computer ethics is the study of ethical issues that are associated primarily with computing machines and the computing profession.

**31. What Professional Issues arise in Computer ethics?**

- ✓ Owing to the high degree of job complexity and technical proficiency required, a lot of issues arise in engineering ethics.

**1. Computer failures:**

- ✓ Failures can occur due to either hardware or software
- ✓ Hardware errors do not occur frequently.
- ✓ Software errors are the major failures of the computers.
- ✓ Hardware errors are easily detected.
- ✓ Software errors are difficult to detect.
- ✓ Trial runs are absolutely essential to check the program.

**2. Computer Implementation:**

- ✓ New computer system should be attempted successfully before the old one becomes inoperative. Many failure cases have been reported while switching over to a new system.

**3. Health Conditions:**

- ✓ Ergonomic conditions should be implemented to reduce back problems, provide wrist support, to become good looking.

**32. Give one argument each for and against Weapons Development?**

- ✓ Weapons Development is a defensive measure against greater destruction by political adversaries, terrorists and enemy states.
- ✓ They are devices to kill human beings, innocent civilians or equally unwilling soldiers on the other side.

**33. What should engineers do in taking part in Weapons development?**

- ✓ Engineers need to examine one's conscience to take part in any form of weapon development.
- ✓ They have to consider the circumstances leading to the specific conflict and decide whether it is justified to take part in associated weapons development.
- ✓ If necessary, they should refuse to be a part of it and be prepared to face consequences.

**34. What are the Problems of Defence Industry in brief?**

- ✓ 1. Large military build-ups, massive projects all lead to unethical business practices and the urgency of completion of the weapons projects does not allow proper controlling and monitoring.
- ✓ 2. "Technology creep" – development of cruise missiles alters diplomatic arrangements
- ✓ 3. The impact of secrecy surrounding any defence activity
- ✓ 4. Overall effect of defence spending on economy

**35. What are the most common conflicts?**

- ✓ Conflicts over schedules, depending mostly on support depts. but where managers do not have any control.
- ✓ Conflicts over which is the most important dept or function at a given time
- ✓ Conflicts over personnel resources
- ✓ Conflicts over technical issues
- ✓ Conflicts over administrative procedures
- ✓ Personality conflicts
- ✓ Conflicts over costs

**36. Can conflicts be managed by force or authority? How are different conflicts resolved?**

- ✓ "I am in-charge - see it my way or I will fire you". This is generally perceived as self-defeating.
- ✓ Conflict arrangement sometimes means tolerating and even inviting some forms of conflict



- ✓ Manager's task is to create climate in which conflicts are addressed constructively
- ✓ Personality conflicts are ranked relatively low in intensity but they are most difficult to resolve.
- ✓ They are generally woven with technical/communication problems
- ✓ Properly managed technical and ethical conflicts are usually fruitful and not harmful. Differing views provide opportunity for improved creativity.

**37. What are the 4 ways to resolve conflicts among persons suggested by Harvard Negotiation Project?**

1. People: Separate people from the problem.  
Even though both the people and the problem are important, the personal aspect of the conflict should be separated from the problem to deal with it better. On personality clashes, the focus should be on behaviour and not on people.
2. Interests: Focus on interests and not positions  
This principle applies most clearly to personnel matters and ethical views, rather than technical disputes. Positions are stated views but these may not really express their best interests.
3. Options: Generate a variety of possibilities before deciding what to do.  
Create a wide range of options especially in technical and ethical issues and facilitate discussions.
4. Criteria: Insist that the result be based on some objective standard.  
Beyond the goals of efficiency, quality and customer satisfaction, it is important to develop a sense of fair process in how the goals are met.

**38. What are the types of cases, expert witnesses are called upon to testify in court & what are the stakes?**

**33.1. Types of Cases**

- ✓ Airplane crash
- ✓ Defective products
- ✓ Personal injury
- ✓ Property damage
- ✓ Traffic accident

### **33.2. Stakes**

- ✓ Legal liabilities
- ✓ Economic interests

### **39. How should the expert witness exhibit one's 'confidentiality responsibility'?**

- ✓ The expert witnesses must not divulge their investigations unless called upon to do so by the court not volunteer evidence favourable to the opponent
- ✓ Answer questions truthfully when opposing attorney puts forth pertinent questions
- ✓ But he should not just be the client's mouthpiece.

### **40. What are the aims of a legal system?**

- ✓ Aims of A Legal System is to administer a complex system of legal rights that define legal justice achieved through adversarial relationships, with rules about admissible forms of evidence and permissible forms of testimony

### **41. What is the role of an expert in a court system consistent with Professional standards (codes of ethics)?**

#### Role of an Expert in a Court System

- ✓ Experts must earnestly try to be impartial in identifying and interpreting complicated data thrown up by the complexity of modern science and technology to help the courts
- ✓ Ideally, if courts pay the expert witness, the expert will become totally unbiased.

But it is a very costly issue

- ✓ So parties to the dispute are called upon to pay and hire them on both sides and also allow them to be cross examined by both sides.

### **42. What are the benefits of Multi-National corporations doing business in less developed countries for both the MNCs and the host country? (A/M 2023)**

#### **Benefits to MNCs:**

- ✓ Inexpensive labour
- ✓ Availability of natural resources
- ✓ Favourable tax conditions

- ✓ Fresh markets for products

**Benefits to developing host countries:**

- ✓ New jobs
- ✓ Greater pay and greater challenge
- ✓ Transfer of advanced technology
- ✓ Social benefits from sharing wealth

**43. What are the three senses of relative values? What are the three versions of Relativism? Nov 2023**

**I. Ethical Relativism**

- ✓ Actions are morally right in a particular society if they are approved by law, custom, or other conventions of the society.

**II. Descriptive Relativism**

- ✓ Value beliefs and attitudes differ from culture to culture and this is a fact.

**III. Moral Relationalism or Contextualism (Ethical pluralism)**

- ✓ Moral judgements should be made in relation to factors that vary between issues. Hence it is not possible to formulate rules that are simple and applicable to all situations.

**44. What are the International Rights as enumerated by Thomas Donaldson?**

- ✓ The right to freedom of physical movement
- ✓ The right to ownership of property
- ✓ The right to freedom from torture
- ✓ The right to a fair deal
- ✓ The right to non-discriminatory treatment
- ✓ The right to physical security
- ✓ The right to freedom of speech and association
- ✓ The right to minimal education
- ✓ The right to political participation
- ✓ The right to subsistence

**45. What can MNCs do to promote morally just measures? Or What are Richard T. De George's guidelines for moral promotion by MNCs?**

- ✓ MNCs business should do more overall good than bad towards the economy of the host country than doing well to a few corrupt leaders in oppressive regimes.
- ✓ They must respect laws and regulations of the local country as long as they do not violate basic moral rights.
- ✓ They must pay a living wage, even when local companies fail to pay such a wage, but otherwise pay only enough to attract competent workers.
- ✓ It is permissible for the US to transfer dangerous technology like asbestos production to another country and then simply adopt that country's safety laws only under the following conditions.
- ✓ Workers may be so desperate for income to feed their families that they will work under almost any conditions
- ✓ Pay workers for the extra risk
- ✓ Good judgements exercised in good faith, than abstract principles, is the only way to address practical problems.

**46. Write in brief about Technology Transfer and Appropriate Technology? [Nov/Dec 2022]**

**Technology Transfer:**

The process of moving technology to a novel setting and implementing there.

- ✓ Novel setting is any situation containing at least one new variable relevant to success or failure of given technology.
- ✓ Transfer of technology from a familiar to a new environment is a complex process.

**Appropriate Technology:**

- ✓ Identification, transfer, and implementation of the most suitable technology for a new set of conditions.
- ✓ Conditions include social factors that go beyond routine economic and technical engineering constraints.
- ✓ Identifying them requires attention to an array of human values and needs that may influence how a technology affects the novel situation.
- ✓ Intermediate technology.

**47. What is acid rain? What are its effects?**

**Acid rain:**

- ✓ PH of normal rain is 5.6
- ✓ PH of rainfall in north eastern areas of North America is 3.9 to 4.3.

- ✓ It is 10 to 100 times more acidic than normal. This is “acid rain”.
- ✓ Snowmelt into water releases huge amount of acid which got frozen during winter.

**Effects:**

- ✓ “Acid shock” from snowmelt causes mass destruction of fish. On long term it also harms fish eggs and sources of food.
- ✓ Thousands of lakes were killed by acid rain in Scandinavia and North America.
- ✓ The causes are burning of fossil fuels leading to release of SO<sub>2</sub> in particular and Nitrogen oxides.
- ✓ Problems of Sweden caused by Industrial plants in England and North Europe.
- ✓ Problems of North America caused by utilities in Ohio valley, the largest polluter of SO<sub>2</sub> in USA.
- ✓ Some of the potential changes are still unknown Microorganisms in soil are being affected Groundwater is polluted but its ultimate effects are not known The effects may be known only after another 100 years
- ✓ Effect on food sources are also unclear

**48. What are the effects of Greenhouse?**

- ✓ The temperature effect of the CO<sub>2</sub> and water vapour combined together has a long range impact on the global climate.
- ✓ Because of increased concentration of CO<sub>2</sub> and due to much warmer tropical oceans, there may occur cyclones and hurricanes and early snow melt in mountains will cause more floods during monsoon.
- ✓ Increase in global temperature can adversely affect the world food production.
- ✓ At higher altitudes in the atmosphere, CO<sub>2</sub> undergoes photochemical reactions producing CO, which is drastically dangerous.
- ✓ CFCs are responsible for 20% increase in warming. This may increase the chances of diseases in humans and animals.

**49. How can we internalise Costs of Environmental Degradation?**

- ✓ Time cost of a product – includes numerous factors like effect of pollution, the depletion of energy and raw materials, social costs, etc.
- ✓ If these costs are internalized (added to the price), then the cost can be charged directly to the beneficiary of the degradation of environment.

- ✓ It is better to make the user to pay for all its costs than to levy higher taxes.
- ✓ An acceptable mechanism for price fixing must be found by the engineer with the help of the economist, scientist, lawyer and politician which could protect the environment through self-correcting procedures.
- ✓ Good design practices may give better environmental protection without added cost.

**50. Give a brief account of Technology Assessment?**

- ✓ Engineers are said to be finding the right answers for the wrong questions
- ✓ Finding the right questions is much more difficult than finding the right answers to these questions
- ✓ Engineers should try to assess the technology and its environmental impacts and focus on containing the major adverse effects.
- ✓ During assessment even if engineers were strongly believe that the projects have no adverse effect, they should continue to monitor the outcome even after its implementation which only would give the complete picture of the consequences of the project.

**51. Explain briefly about Data and Software with respect to property problems.**

- ✓ “Data” is information stored in a computer.
- ✓ “Software” or “program” consists of i) an algorithm, ii) a source code and iii) an object code.
- ✓ Software can be protected by Copyrights and Trade secret laws. Patenting on software is limited to detailed coding sequences but not final products. Algorithms and object codes cannot be copyrighted. But source code can be copyrighted.
- ✓ E.g. Buying one copy and reproducing dozens of copies.

**52. Describe how and in what ways ‘violation of privacy’ occurs in and through Computers.**

- ✓ Computers make more information available to more people. This makes protection of computer privacy difficult.

**1. Inappropriate Access:**

- ✓ Documents recorded for a crime which one did not commit but was arrested.
- ✓ As a child you were arrested for drinking alcohol
- ✓ Medical data about visits to a psychiatrist
- ✓ A loan default to a National Bank. Any of the above information can be accessed by, let us say, a prospective employer during a security check.

## 2. Data Bank Errors:

- ✓ Even erroneous information when generated by computers is taken to be authenticated.
- ✓ Immediate reaction to such wrong information may mostly prove to be incorrect.

## 3. Hackers:

- ✓ “Hackers” are people who compulsively challenge any computer security system, choke networks, give out false information, etc.
- ✓ This can be extremely harmful.
- ✓ It is a violation of property rights.
- ✓ At the least, it reduces productivity by shutting down systems
- ✓ Individual privacy, national security, freedom to protect proprietary information are three values requiring limits on access to information.

## 53. How has law responded to computer abuses?

- ✓ A series of laws enacted to prevent abuse of information.
- ✓ Information can be accessed only by consumer consent or court order.
- ✓ Consumers have the right to examine and challenge information contained in computers.

## PART-B

1. Explain the significance of environmental ethics for an engineer by giving an examples of environmental issue. (Nov / Dec 2021) OR Brief on the importance of Environmental ethics. (A/M 2022)
2. Write short notes on Sentient – Centered Ethics, Bio – Centric Ethics, Ecocentric Ethics and Human – Centered Environmental Ethics. Sentient – Centered Ethics
3. What is meant by computer ethics? State and explain the categories of ethical problems and unethical acts computer as an instrument of unethical behaviour. What is meant by hacking?(Nov/Dec 2017, 2021) or Discuss the ethical issues related to computer ethics. (Nov/Dec 2021 )(or) Enumerate on the moral and ethical issues involved in use of computers. (A/M 2022) (A/M 2023)
3. State the types of concern for environment by the Engineers. Discuss the approaches to resolve environmental problems. What do professional codes of ethics say about environment?(Nov/Dec 2017)[Nov/Dec 2022](A/M 2023)
4. How much is being spent in Defence expenditure and how Arms Trade gets promoted by private manufacturers of arms?
5. Describe the destructive nature and power of weapons and their development?
6. Illustrate the involvement of engineers in Weapons Development with examples.
7. Explain the problems of defence industry with examples.
8. What are the difficulties in Decommissioning Weapons?
9. Which studies are more useful to ‘engineer managers’ than even engineering?

10. Why managements prefer to make engineers as managers than non-engineers? / Why engineers find management positions attractive? [Nov/Dec 2022]

11. Explain how Ethical Climate is promoted in organizations through examples.

12. Discuss the ethical role of Engineers in weapon development with suitable examples.

(April/May 2018) (Nov/Dec 2018)

13. Discuss the ethical role of Engineers as a consulting Engineer with suitable examples. (April/May 2018) (Nov/Dec 2018) or Discuss the following in detail of Engineers as consultants (Nov/Dec 2021) Point out any six responsibilities of consulting engineering? Nov 2023

14. Discuss the role of Engineers as expert witnesses with suitable examples (Nov/Dec 2018) or Discuss the following in detail of Engineers as expert witness and advisors. (Nov/Dec 2021) (or) Justify engineers as expert witness and advisors with suitable examples. (A/M 2022) [Nov/Dec 2022]

List out various issues and requirements for engineers who act as advisors. Nov 2023

15. Discuss various approaches to resolve environmental problems. Mention any four professional code of ethics concerning to environment. Nov 2023

16. Explain the Bhopal Gas Tragedy. Discuss the violation of moral, ethical and professional codes of standard in it. Write a conclusion to avoid such strategy in future. (April/May 2018)

[Nov/Dec 2022]

17. Explain the Challenger space shuttle disaster. Discuss the violation of moral, ethical and professional codes of standard in it. Write a conclusion to avoid such strategy in future. (April/May 2018)