



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 5 Examination in Engineering: May 2023

Module Number: IS 5101

Module Name: Engineering Ethics

[Three Hours]

[Answer ALL questions. Each question carries 12 marks]

- Q1 Why should professional engineers adhere to the following clauses of Engineering Ethics? Explain with possible consequences. (about 250 words per each)
- a) Engineers shall not knowingly participate in any act resulting in waste or misappropriation of public funds (Dishonesty). [6.0 marks]
- b) Engineers shall give evidence, express opinions or make statements in an objective and truthful manner (Truthful). [6.0 marks]
- Q2 Discuss the following scenarios while stating whether they are ethical or unethical practices to be followed as future engineers according to the IESL Code of Ethics. (about 150 words per each)
- a) Mr. Dimuthu is a chartered civil engineer who runs his own structural design company. Several other civil engineers work under his guidance in this company. They are involved with structural design works per their clients' requirements for the local construction industry. Recently, Mr. Dimuthu has advised his staff to charge extremely low professional fees for their structural design works from their clients to attract more and more clients for his company. [4.0 marks]
- b) Mr. Herath is a mechanical engineer attached to a chemical manufacturing company. A few harmful chemical by-products have been released to the nearby river with wastewater from the company since last week due to an ongoing maintenance job. This maintenance work will be carried out continuously for another three months. Mr. Herath informed this issue to his Engineering Manager (superior). However, Engineering Manager told Mr. Herath, "Since we have not yet received any complaints from villagers about wastewater, we do not need to worry about this issue too much". So, Mr. Herath neglected this wastewater problem without taking any further action. [4.0 marks]

- c) Ms. Shiromi is an electrical engineer in a leading electrical installation company in Sri Lanka. This company buys large quantities of electrical equipment and wires from local and foreign suppliers. After checking the quality and other requirements, Ms. Shiromi is responsible for providing approval for electrical equipment and wires necessary for the company. However, few equipment supplier companies give extra commissions to Ms. Shiromi to approve their equipment and wire lots. Ms. Shiromi approves electrical equipment and wires supplied by them even without checking the quality.

[4.0 marks]

- Q3 a) Academic dishonest acts are now becoming a severe issue in universities with the development of technology. Most engineering students get the support of artificial intelligent chatbots to do their assignments easily without studying the subject matters on which they should get competent. Use of such techniques by engineering students/engineers will create severe issues in professional practice. Explain the above scenario with respect to Engineering Ethics while mentioning three consequences of this practice to society.

(about 300 words)

[6.0 marks]

- b) Suppose you are an expert in Engineering Ethics. You are asked to develop a code of ethics for politicians (ministers, parliamentarians etc.) in Sri Lanka with respect to the IESL Code of Ethics to minimize the corrupt practices of politicians. Propose at least 3 major clauses from the IESL Code of Ethics and discuss why you have selected them to include in the code of ethics for politicians.

(about 100 words per each)

[6.0 marks]

- Q4 Ms. Jennifer Fernando, an electrical engineer at a large industrial company, has been assigned to fix an electrical problem that recently occurred at one of the company's chemical plants which caused fatal injuries to a few employees. Upon Jennifer's investigation into the situation, she determines the following:

- A large power conditioner caught fire because the installation did not meet electrical engineering standards; it lacked the use of a neutral, the conditioner was undersized given the electrical load demands and inadequate overcurrent protection was provided. The conditioner overheated and caught on fire, causing fatal injuries to a few employees. Further, the fire caused the fire suppressant system to turn on, which again caused damage to other equipment.

- The electrical installation was designed and installed by Mr. Mark Perera, an individual without a recognized engineering background or formal education. He is a close relation to Ms. Jennifer's boss and undertakes small-scale subcontracts of household wiring.

Ms. Jennifer redesigned the electrical installation to meet electrical engineering standards and to ensure it would function properly and not be a safety hazard. Upon completion of the repairs, she wrote a report describing the incompetent and faulty design of the electrical installation. Ms. Jennifer's boss was uninterested in her investigative report and promptly ignored it. Ms. Jennifer's boss further compelled company management to recognize this issue, not as an official safety issue and just wanted to forget it happened. Ms. Jennifer was worried about her boss's behavior and kept silent without going against her boss. However, she was concerned that Mr. Mark Perera would continue to perform engineering services for the company and that other improper engineering designs would be constructed in future. A few months later, Ms. Jennifer got to know that her boss had awarded another electrical installation project of the company to Mr. Mark Perera as a subcontract.

(Original Source: Engineering Ethics ; Real World Case Studies authored by Steven K. Starrett, Amy L. Lara & Carlos Bertha, 2017)

- Identify 4 unethical aspects in this case. [2.0 marks]
- If you are the electrical engineer in that company like Ms. Jennifer Fernando, explain how you will behave when you observe the boss's unethical acts, as mentioned in the case. (About 150 words)
[4.0 marks]
- Discuss why engineers should perform professional services only in competent areas and undertake engineering works only when qualified by education and experience in the specific technical fields involved. (About 300 words)
[6.0 marks]

Q5 Prabath, an environmental engineer, has worked for several years for a company that operates massive production plants. Manufacturing so many products create significant waste, some of which is considered hazardous, requiring extensive documentation, reporting, and proof of proper disposal according to government standards. One year, the Central Environmental Authority (CEA) selected Prabath's manufacturing company for an audit covering the entire waste management and disposal processes used at the plants. As part of the audit, three years' worth of records were to be studied and reported on. Prabath reviewed the thousands of documents and developed the associated reports. His extensive review uncovered a few errors in the past records revealing that hazardous waste disposal was not done correctly by past environmental engineers.

Because an important part of waste management is done essentially with record keeping, he knew the CEA would not appreciate the errors in the reporting processes. Prabath met with his supervisors to inform them of the errors. They also recognized that the CEA would be displeased with these errors, and they feared the consequences. Prabath's supervisors then asked Prabath to make this problem go away. They didn't want to hear any more about these errors and they didn't think the CEA should hear about them either.

- a) Identify two individuals who have violated Engineering Ethics according to this scenario. [2.0 marks]
- b) Identify the ethical violations done by these two individuals? [2.0 marks]
- c) As a professional engineer, what should Prabath do in such a situation? Explain your answer. (About 100 words) [2.0 marks]
- d) Discuss about engineer's ethical responsibilities towards the environment according to the IESL Code of Ethics. (About 300 words) [6.0 marks]