UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 5 Examination in Engineering: March 2026

Module Number: IS 5101 **Module Name: Engineering Ethics (C23)**

[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 appropriate examples and possible consequences.

(about 250 words per each)
[6.0 marks per each]

a) Engineers shall neither disclose nor use confidential information gained in the course of their employment without express permission, except where public interest and safety are involved.

b) Engineers shall not use the advantage of a privileged position to compete unfairly with other engineers.

Q2 Discuss the following scenarios and state whether each scenario represents ethical or unethical conduct, with justification based on the IESL Code of Ethics.

(about 150 words per each)
[4.0 marks per each]

a) Mr. Dimuthu is a reputed engineer working in a public sector organization in Sri Lanka. With the rise of the living cost in Sri Lanka, he has started an online pyramid scheme as a new business to earn extra money. He has requested from many people around him to invest in his business and recruit many investors continuously while emphasizing that at the end they can receive a massive profit. Since Mr. Dimuthu is reputed engineer in the society, many people believe his promise and keep on investing and recruiting many more investors to this business expecting a massive profit at the end.

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 take immediate action". So, Mr. Herath

neglected this wastewater problem without taking any further action.

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.

Q3 A municipal water purification plant supplies drinking water to a large urban area. During a routine quality inspection, engineers detect a low level of contamination caused by a minor filtration system fault. According to initial assessments, the contamination is unlikely to cause serious harm to the majority of the population if consumed over a short period. However, vulnerable groups such as infants, elderly individuals, and patients with weakened immune systems may face potential health risks. To completely eliminate the contamination, the plant must shut down operations for approximately two days to repair and recalibrate the filtration system. This shutdown would significantly disrupt water supply to critical institutions such as hospitals, schools, and emergency services, potentially affecting patient care, sanitation, and daily community activities. The plant management faces financial and operational pressures, as a shutdown would incur high costs, damage public reputation, and require emergency water distribution measures. Some stakeholders suggest delaying the repair for a few days while continuing to monitor water quality, arguing that the risk is minimal and manageable. At the same time, professional engineering guidelines emphasize the responsibility to ensure safe and clean drinking water, and failure to act promptly could be seen as negligence if the situation worsens. The chief engineer must decide whether to:

- Shut down the plant immediately to fix the issue, or
- Delay the shutdown while implementing temporary measures and monitoring the situation.

The decision must balance public safety, professional responsibility, community impact, and practical constraints.

a) Define the following three major ethical theories used in Engineering Ethics.
   i) Consequentialism
   ii) Deontology
   iii) Virtue Ethics

[3.0 marks]

b) Analyze this situation using the above mentioned three ethical theories separately and clearly mention what decision should be made under each theory.
(about 100 words per each)
[6.0 marks]

c) Based on your analysis above,

i) Which ethical theory do you think provides the most appropriate guidance in this situation?
[0.5 mark]

ii) Justify your answer with clear reasoning.
(about 100 words)
[2.5 marks]

Q4 In the early 2010s, the automobile manufacturer Volkswagen aimed to become the world's leading car producer by promoting its diesel vehicles as environmentally friendly and fuel-efficient. The company publicly committed to meeting strict international emission standards, particularly in markets such as the United States and Europe, where environmental regulations were becoming increasingly stringent. However, during the vehicle development process, engineers encountered technical challenges in meeting these emission standards without compromising engine performance, fuel efficiency, and production costs. Internal discussions revealed that achieving compliance through conventional engineering solutions would require significant redesign, increased costs, and delays in product launch. Under pressure to meet market targets, regulatory deadlines, and competitive expectations, a software solution was developed. This software could detect when a vehicle was undergoing laboratory emissions testing and temporarily reduce emissions to comply with legal standards. During normal driving conditions, however, the emission control system was reduced, resulting in significantly higher levels of pollutants being released into the environment.

The decision to implement this software was known to certain engineers and managers within the company. While some employees reportedly raised concerns about compliance and long-term consequences, the issue was not escalated effectively. The company continued to market these vehicles as "clean diesel", emphasizing their environmental benefits to customers. At the time, internal company policies emphasized innovation, performance, and market leadership, but also included general statements about compliance with regulations and corporate responsibility. Despite this, there was a strong organizational culture focused on meeting targets and avoiding failure, which discouraged open dissent. Regulatory bodies relied on standardized laboratory testing procedures to verify emissions compliance. The software exploited these testing conditions without being easily detectable under existing regulations. As a result, millions of vehicles were sold globally before the issue was eventually exposed by independent researchers and regulatory investigations. The scandal led to significant legal consequences,

including fines, recalls, and damage to public trust. It also raised serious questions about ethical responsibility, transparency, and accountability within engineering practice.

Engineers involved in the project faced a difficult situation:

- Comply with internal expectations and remain silent, or
- Challenge decisions that could potentially violate regulations and ethical principles.

a) Briefly define the four components of the PLUS ethical decision-making model
[2.0 marks]

b) Analyze the above case by applying the PLUS ethical decision-making model to determine the actions of Volkswagen were ethical or unethical.
[5.0 marks]

c) If you were working at the Volkswagen company as a design engineer during 2010, what actions would you take step by step as an ethical engineer to stop the wrong doing of Volkswagen. Explain your answer.
(about 200 words)
[5.0 marks]

Q5 a) *Bhopal: A Prayer for Rain* is a 2014 Indian English-language historical drama film based on the Bhopal disaster. The film highlights various ethical and unethical behaviors exhibited by different groups, including engineers, business owner, doctors, journalists, politicians, and the general public. Explain in detail the unethical behaviors of three of these groups as depicted in the film, providing specific examples of their actions and the consequences of their misconduct. *(Students enrolled in the IS 5101 – Engineering Ethics module were requested to watch this film before the examination. To facilitate this, the lecturer provided necessary instructions and resources on the LMS).*
(about 100 words per each)
[6.0 marks]

b) Engineers are expected to be ethical leaders in their workplaces. Reflect on your previous industrial training experience. Assuming that you are the Chief Engineer in that organization, explain how you would develop an ethical work environment by addressing three unethical situations you observed during your training.
(about 100 words per each)
[6.0 marks]