UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 6 Examination in Computer Engineering: May 2026

Module Number: IS 6102 **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 disclosure is necessary to protect public interest, safety, or welfare.

b) Engineers shall give proper credit for professional work to those to whom credit is due.

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. Tharindu is a computer engineer working as a cybersecurity specialist in a software company. Following a security incident in an online banking system, he is requested to provide a technical report for an investigation committee regarding the possible cause of the breach. Although there is pressure from management to quickly conclude the investigation, Mr. Tharindu carefully reviews system logs, test results, and security records before preparing his report. He limits his conclusions to the available technical evidence and clearly states the areas requiring further analysis. In presenting his opinion, he relies on both his cybersecurity expertise and previous experience with similar incidents.

b) Mr. Nadeesh is a computer engineer working as a technical evaluation committee member in a software company selecting a cloud service provider for a major digital infrastructure project. One of the bidding companies is a startup in which Mr. Nadeesh had previously invested and still holds shares. During the evaluation process, he actively participates in reviewing proposals and recommends the startup due to its innovative features and lower initial cost. He does not disclose his financial involvement to the company

management, claiming that his technical judgment remains objective and that the selected solution would still benefit the organization.

c) Mr. Kasun is a computer engineer working as a project lead in a software company competing for a government digital transformation project. During the proposal evaluation stage, he learns that a competing company had delays in a previous project due to technical issues. Without knowing the full circumstances, Mr. Kasun informally tells clients and industry professionals that the competitor has technical and project management weaknesses. These opinions gradually spread among stakeholders. Later, the competing company faces difficulties in securing projects and maintaining its reputation. Mr. Kasun believes that his actions were intended to protect his company's interests and support better decision-making by clients.

Q3 A software company operates a globally used messaging application that provides instant communication services to millions of users, including individuals, businesses, educational institutions, healthcare providers, and government organizations. The application is widely trusted because users rely on it to exchange personal conversations, confidential documents, financial information, and sensitive business communications on a daily basis.

During a routine cybersecurity audit, the software engineering team discovers a serious security vulnerability within the messaging platform. Initial investigations reveal that the vulnerability could potentially allow malicious attackers to gain unauthorized access to users' private messages and confidential information. Although no actual cyberattacks or data breaches have been reported so far, security experts warn that once the vulnerability becomes publicly known, attackers may rapidly exploit it before corrective actions are implemented.

The engineering team determines that the vulnerability can be completely fixed only by deploying an emergency security update that requires shutting down the messaging service for approximately 24 hours. Such a shutdown would interrupt communication services for millions of users worldwide, affecting businesses, emergency communications, online learning activities, and critical operations that depend on the platform. In addition, the company would likely experience significant financial losses, customer dissatisfaction, reputational damage, and negative media attention.

Company management proposes delaying the security update by one week and releasing it during the already planned maintenance period. Management argues that this approach would avoid public panic, reduce operational disruption, and minimize financial losses while continuing to monitor the situation. However, some engineers express concerns that postponing the fix may expose users to unnecessary risks and could be considered ethically irresponsible if the vulnerability is exploited before the update is released.

The chief software engineer must decide whether to:

- Immediately shut down the platform and deploy the security fix, or
- Delay the fix for one week while continuing normal operations and monitoring the situation.

The decision must balance user safety, cybersecurity responsibilities, professional ethics, organizational interests, 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) *"The Inventor: Out for Blood in Silicon Valley* is a 2019 English-language documentary film based on the Theranos scandal. The documentary highlights various unethical behaviors exhibited by Ms. Elizabeth Holmes, the founder

and CEO of Theranos Corporation. Assuming Ms. Holmes is a professional engineer running her own company (although in reality, she is not), explain three unethical behaviors demonstrated by her in the movie in detail, and discuss their consequences on the Theranos Corporation *(Students enrolled in the IS 6102 – 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) The rapid advancement and widespread adoption of Artificial Intelligence (AI) have created new ethical challenges for engineers and society. As a future Computer Engineer, develop three clauses to be included in a "Code of Ethics for the Fair Use of AI." Critically justify each clause by discussing its significance, ethical implications, and role in ensuring responsible AI development and deployment.

(about 100 words per each)
[6.0 marks]