UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 8 Examination in Engineering: December 2025

Module Number: IS8201 **Module Name: English for the Professional World [C-18]**

[Three hours]

[Answer **all questions** in the answer booklet provided. Each question carries 10 marks]

Q1. a) Complete the following sentences with the correct form of the verb in the brackets.

i. At present, the software development team _____ (integrate) artificial intelligence features into an existing industrial automation system.

ii. The mechanical engineers _____ (test) the turbine continuously for six weeks before reporting performance data to the foreign client.

iii. The project director _____ (review) the design calculations when the international consultants arrived at the Colombo office.

iv. Over the past decade, local civil engineers _____ (gain) valuable experience through joint ventures with overseas construction firms.

v. The electrical engineering graduates _____ (attend) professional certification workshops throughout their final academic year.

vi. By next July, the company _____ (launch) a new engineering research centre focusing on sustainable infrastructure development.

vii. At the time of graduation, many engineering students _____ already _____ (secure) employment with international companies.

viii. During the conference, researchers _____ (present) innovative findings related to smart transportation systems and urban mobility.

ix. The quality assurance team usually _____ (conduct) routine inspections every week during the final phase of construction.

x. Before relocating overseas, the engineer _____ (complete) advanced training in project management and safety compliance.

[5.0 Marks]

b) Transform the following sentences into passive voice.

i. The research team is conducting extensive trials on advanced composite materials.

ii. The laboratory technicians calibrated the testing equipment before the experiment.

iii. The R&D department will publish the findings in an international engineering journal.
iv. Scientists have identified several limitations in the existing prototype design.
v. The laboratory staff recorded all observations throughout the testing phase.
vi. The innovation team has designed a new algorithm for predictive maintenance.
vii. The scientists had completed preliminary experiments before external funding arrived.
viii. Researchers must validate the prototype before large-scale deployment.
ix. The researchers were analyzing test data during the system failure.
x. The engineering team aims to improve battery efficiency through advanced simulations.

[5.0 Marks]

Q2. Read the passage and answer the questions given below.

Learning from Engineering Failures in History

Engineering history is shaped not only by outstanding achievements but also by significant failures that have influenced modern professional practice. These failures rarely arise from a single mistake; instead, they emerge from complex interactions between technical limitations, human judgement, organizational culture, and environmental conditions. For engineering undergraduates preparing to enter professional roles, studying historical engineering failures is essential for developing technical competence, ethical awareness, and an informed approach to risk management.

One of the most frequently discussed engineering failures is the collapse of the Tacoma Narrows Bridge in the United States in 1940. Soon after its opening, the bridge began to exhibit severe oscillations under moderate wind conditions. At the time, engineers did not fully understand the aerodynamic behaviour of long-span suspension bridges. The failure was not caused by weak materials but by inadequate consideration of dynamic wind effects. This event fundamentally changed bridge engineering practice and led to the routine use of wind tunnel testing and advanced aerodynamic modelling in structural design.

Another landmark failure occurred during the Space Shuttle Challenger disaster in 1986. The accident resulted from the failure of rubber O-rings in the solid rocket boosters, which lost elasticity in unusually cold temperatures. Engineers had previously expressed concerns regarding these conditions, but management decisions prioritized launch schedules over technical warnings. The disaster emphasized the consequences of ineffective communication and organizational pressure, reinforcing the ethical responsibility of engineers to prioritize public safety. Subsequent reforms improved safety procedures, decision-making structures, and quality assurance

processes in aerospace engineering.

The Hyatt Regency walkway collapse in Kansas City in 1981 provides a critical lesson on design responsibility and verification. A seemingly minor change in the connection detail significantly increased the load on supporting elements, yet the modification was not adequately reviewed. During a public event, the walkways collapsed, resulting in extensive loss of life. This failure demonstrated the importance of thorough design checks, clear documentation, and accountability at every stage of the engineering process.

Large-scale civil engineering failures have also had devastating consequences. The Banqiao Dam failure in China in 1975 remains one of the deadliest infrastructure disasters in recorded history. The dam collapsed following extreme rainfall that exceeded its original design assumptions. Factors such as insufficient spillway capacity, poor maintenance, and limited consideration of rare but severe weather events contributed to the disaster. This failure highlighted the necessity of conservative design margins, long-term monitoring, and robust risk assessment in major infrastructure projects.

Marine engineering has similarly experienced failures that have reshaped industry standards. One notable example is the sinking of the Herald of Free Enterprise ferry in 1987. The vessel capsized shortly after leaving port due to the bow doors being left open, allowing seawater to flood the car deck. While the immediate cause was human error, deeper investigation revealed serious organizational failures, including inadequate safety procedures, poor communication, and unclear responsibility structures. The tragedy led to major improvements in maritime safety regulations, vessel design standards, and operational protocols, emphasizing that engineering safety extends beyond design to include management and operational discipline.

More recently, the Deepwater Horizon oil spill in 2010 illustrated how failures in complex engineering systems can lead to widespread environmental and economic damage. Multiple safety barriers designed to prevent a blowout failed due to flawed testing practices, cost-driven decisions, and insufficient oversight. The incident reinforced the importance of systems engineering, redundancy, and strict compliance with safety standards in high-risk industries.

In conclusion, these historical failures demonstrate that engineering success depends on more than technical knowledge alone. Sound judgement, ethical responsibility, effective communication, and an awareness of environmental and social consequences are equally critical. By studying past failures, future engineers can gain a deeper understanding of the limitations of technology and the importance of professional responsibility. Such lessons enable engineers to design safer, more resilient systems and contribute responsibly to society's continued technological development.

(Source: https://interestingengineering.com)

a) According to the text, what key factors commonly interact to cause major engineering failures? [1.0 Mark]

b) How did the Tacoma Narrows Bridge failure influence modern bridge design practices? [1.0 Mark]

c) What role did organizational decision-making play in the Space Shuttle Challenger disaster? [1.0 Mark]

d) List two professional lessons highlighted by the Space Shuttle Challenger accident. [1.0 Mark]

e) List four environmental and design factors that contributed to the Banqiao Dam failure. [1.0 Mark]

f) What design-related issue led to the Hyatt Regency walkway collapse, according to the text? [1.0 Mark]

g) What underlying organizational problems were revealed by the sinking of the Herald of Free Enterprise? [1.0 Mark]

h) Based on the text, list three non-technical qualities that are essential for engineering success. [1.0 Mark]

i) Write grammatically correct sentences to bring out the meaning of the following words (Do not take sentences from the above text).
   i. Reinforce
   ii. Compliance

[2.0 Marks]

Q3. a) You are a junior software engineer involved in deploying a web-based application for a client. During the deployment process, you identify critical bugs that could compromise system security. Write a formal email to the project lead explaining the security issues identified, emphasizing the potential risks of proceeding with deployment, recommending that the deployment be postponed, and requesting approval to resolve the bugs before release.

[5.0 Marks]

b) Write appropriate answers for the following questions asked in an engineering job interview.

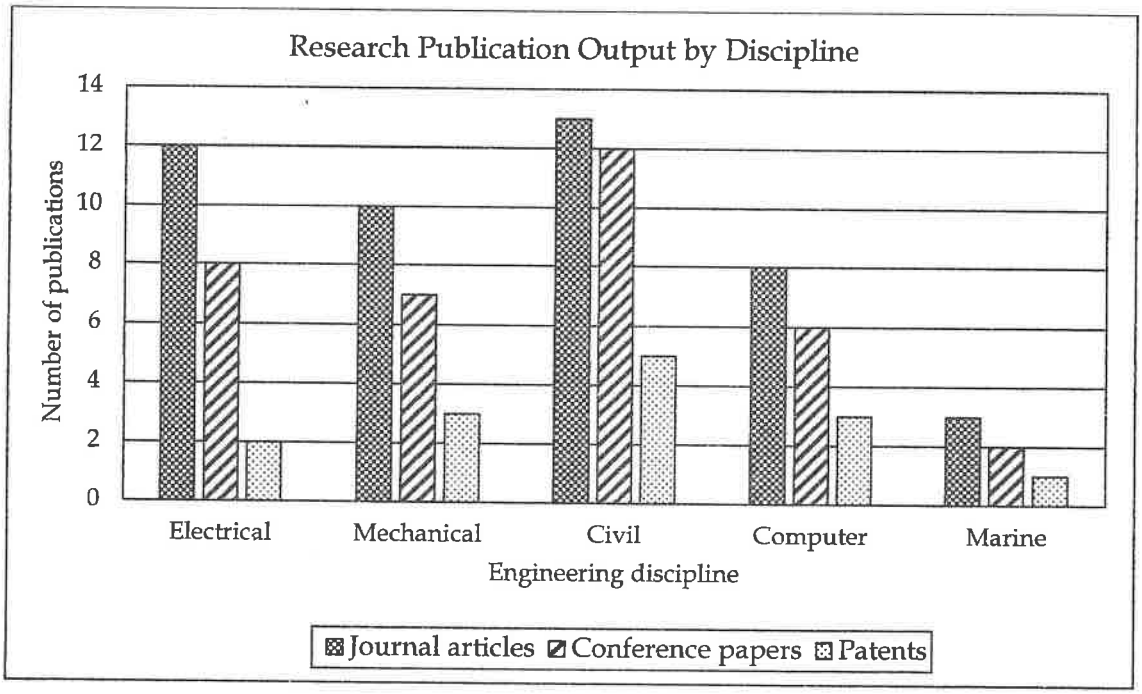
i. Which part of your industrial training did you find most beneficial, and why?
ii. How do you stay up-to-date on your technical certifications and knowledge?
iii. You are working under tight budget constraints while maintaining engineering standards. How would you approach decision-making in this situation?
iv. A senior technician suggests bypassing a standard procedure to save time during installation. How would you handle this situation, and why?
v. Tell us about a time when you faced communication difficulties with a team member. How did you handle the situation to achieve your project goals?

[5.0 Marks]

Q4. a) You are a recent engineering graduate applying for an entry-level engineering position at a company of your choice. Write a formal job application letter addressed to the Human Resources Manager of the selected company. In your letter, highlight your qualifications, relevant experience, and technical skills that align with the job requirements.

[5.0 Marks]

b) The graph below presents data on the research publication output of final year engineering students at the Global Institute of Technology in 2025, classified according to engineering disciplines. Summarize the information by selecting and reporting the key features, and make comparisons where relevant. Write about 150–160 words.



[5.0 Marks]

Q5. You are the President of the EngineX Club in your faculty and have been invited to deliver a speech at the Young Engineers' Forum 2026. Prepare a formal speech of approximately 250 words on <u>one</u> of the following topics.

a) The role of young engineers in strengthening Sri Lanka's industrial sector
b) The role of engineering exhibitions in bridging academia and industry

[10.0 Marks]