UNIVERSITI KUALA LUMPUR
MALAYSIA ITALY DESIGN INSTITUTE

FINAL EXAMINATION

MARCH 2026 SEMESTER

COURSE CODE	:	PWB30303
COURSE TITLE	:	RAILWAY COMMUNICATION
PROGRAMME NAME	:	BACHELOR OF ENGINEERING TECHNOLOGY (RAILWAY SYSTEM) WITH HONOURS
DATE	:	25 JUNE 2026
TIME	:	2:00PM - 4:30PM
DURATION	:	2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of ONE sections.
4. Section A consist of five questions. Answer FOUR (4) questions only.
5. Please write your answer on the answer booklet provided.
6. Please answer all questions in English only.
7. Refer to the attached Formula/ Appendies. ☐ *Tick if applicable*

SECTION A (Total: 100 marks)

Answer FOUR (4) questions.

Please use the answer booklet provided.

Question 1

Fiber optics are another way of transmitting information, but instead of physical cables or radio waves, fiber optic uses light to transmit the information.

(a) Along with the aforementioned evolution, the means of interconnecting various equipment were also developed. Explain the limitation of Initial transmission medium (copper) in transmitting information.Also,discuss one of the fiber optics features that make the cable more reliable for indoor and outdoor use.

(10 marks)

(b) Cable termination is one of the key elements that need to be considered before cable installation process. Explain the difference of this termination in copper and fiber optic installation.

(8 marks)

(c) In railway application, explain how fiber optics are installed especially at viaducts and bridges.

(7 marks)

Question 2

Synchronous Digital Hierarchy (SDH) and Plesiochronous Digital Hierarchy (PDH) are terminologies associated with digital multiplexers used in exchanges.

(a) Synchronous Digital Hierarchy (SDH) and Synchronous Transport Modules (STM) are widely used in fiber-optic backbone communication systems. Briefly explain the working principle of SDH and list all possible STM levels used in this system.

(10 marks)

(b) Earlier, Plesiochronous Digital Hierarchy (PDH) was widely used but due to some of its weakness, Synchronous Digital Hierarchy (SDH) has replaced the used of Plesiochronous Digital Hierarchy (PDH). Define Plesiochronous Digital Hierarchy (PDH) and also state three (3) advantages of SDH over PDH.

(8 marks)

(c) State the meaning of 'Bit-Rate' in data transmission. Also state the difference between STM-1 and STM-4 in bit-rate.

(7 marks)

Question 3

Radio system can provides voice and data communication in railway environment.

(a) Discuss ALL possible operational modes that are used in Professional Mobile Radio (PMR) of Terrestrial Trunked Radio (TETRA).

(8 marks)

(b) GSM-R is a radio system that provides voice and data communication in railway environment. Using one example, briefly explain the bidirectional transferring information process from on-board to Operation Control Center in GSM-R system. Give two (2) information that being transferred from wayside to ATS system using GSM-R.

(7 marks)

(c) Briefly explain the service offered in Professional Mobile Radio(PMR) and in TETRA Release 2.

(5 marks)

(d) LTE is natural evolution of GSM-R, explain the need of this evolution. Also discuss the advantages of LTE system in railway environment.

(5 marks)

Question 4

Communication is an essential means to operate and maintain a railway system in a safe and reliable manner.

(a) The communication methods are vital for the performance of a railway system. Discuss the importance of communication system in multimodal railway system. Also,explain the difference between static and dynamic communication in sending information to the passenger in railway environment.

(8 marks)

(b) If Station A has an emergency situation such as fire; discuss the specific example of the responsibilities of Public Information System (PIS) and Public Address System (PAS) in this situation. Also explain the possibility of the nearest fire station will be triggered during this scenario.

(7 marks)

(c) Briefly explain the function of each Public Address component, particularly in station area.
Ambient noise sensors are normally installed in station areas, discuss the contribution of these sensor to the intelligibility of the information transferred to the passenger/customer within this area.

(10 marks)

Question 5

Data transmission is the process of sending digital or analog data over a communication medium from one device to another, using either wired or wireless.

(a) Define ISDN and PSTN. State the difference of these technology.

(8 marks)

(b) Briefly explain the difference of VOIP and SIP in voice or data transmission.

(7 marks)

(c) Most businesses that are still using ISDN lines are in the process of switching to VoIP. State and discuss three(3) reasons for this migration. Is PSTN become obsolete? if yes, state your reason.

(10 marks)

END OF EXAMINATION PAPER