



UNIVERSITI KUALA LUMPUR
Malaysian Institute of Marine Engineering Technology

FINAL EXAMINATION
OCTOBER 2025 SEMESTER SESSION

SUBJECT CODE	: LEB31203
SUBJECT TITLE	: ELECTRONICS COMMUNICATION 2
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	: BACHELOR OF ELECTRICAL AND ELECTRONICS ENGINEERING TECHNOLOGY (MARINE) WITH HONOURS
TIME / DURATION	: 9.00 AM - 12.00 PM (3 HOURS)
DATE	: 24 JANUARY 2026

INSTRUCTIONS TO CANDIDATES

1. Please **CAREFULLY** read the instructions given in the question paper.
 2. This question paper has information printed on both sides of the paper.
 3. Please answer **FOUR (4)** questions **ONLY**.
 4. Please write your answer in the answer booklet provided.
 5. Answer should be written in blue or black ink except for sketching, graphic and illustration.
 6. Answer **ALL** questions in English language **ONLY**.
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THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

INSTRUCTION: Answer FOUR (4) questions ONLY.

Please use the answer booklet provided.

Question 1

- (a) A communication engineer is tasked with designing a data transmission system between a remote temperature sensor and a central monitoring station. The data is sent in small packets at irregular intervals.
- i. Identify whether asynchronous or synchronous transmission is more suitable for this system.
(1 mark)
 - ii. Explain **THREE (3)** reasons for your answer.
(9 marks)
- (b) Amazing Inc is a software company with multiple offices across the globe. To ensure smooth operations, the company frequently exchanges sensitive data between its main office in Malaysia and its branch in Singapore. The IT team is asked to ensure error-free transmission of data across the network. The Malaysia office needs to send critical financial data to the Singapore branch. The data to be sent consists of four 8-bit blocks:
10101100, 00110001, 10101010, 11100110
- Determine: -
- i. the necessary parity bits using the two-dimensional parity check method.
(5 marks)
 - ii. the checksum value for the given data.
(5 marks)
- (c) A communication engineer is designing a file transfer system for IoT sensors that generate repetitive readings (e.g., temperature logs). The system must minimize file size without losing data integrity. Explain about Huffman coding that can help reduce transmission size while ensuring data accuracy during transfer.
(5 marks)

Question 2

A company plans to set up a LAN for its 15 employees. The office has two departments: Administration and Technical. The network should allow file sharing, Printer sharing, and internet access.

- (a) Explain the **FIVE (5)** main components required to set up this LAN and their functions. (10 mark)
- (b) After identifying the essential components required for the LAN setup, the next step involves selecting an appropriate network design that meets the organization's operational needs.
- i. Choose a network topology suitable for this office. (4 marks)
 - ii. Justify your choice based on cost, scalability and reliability. (6 marks)
- (c) Discuss a practical solution for a potential LAN issue. (5 marks)

Question 3

Global Tech Solutions, operates three main offices:

- Headquarters (HQ) in Kuala Lumpur
- Branch A in Sabah (rural area)
- Branch B in Singapore

The company wants to establish a reliable Wide Area Network (WAN) that connects all locations for video conferencing, data sharing, and cloud access. The management is considering different connecting media: MPLS lines, fiber optic cables, 4G/5G, and satellite connectivity.

- (a) Explain about these categories of WAN.
- i. Switched. (5 marks)
 - ii. Point-to-point. (5 marks)
- (b) Justify the best combination of connecting media for Global Tech Solutions' WAN based on the given scenario (consider performance, cost, reliability, and geographical factors). (9 marks)
- (c) Evaluate network performance parameters (latency and packet loss) that Global Tech Solutions' network engineer should monitor after implementing the WAN connection. (6 marks)

Question 4

- (a) A ship sailing in the Indian Ocean experiences communication failure during a tropical storm. The captain must rely on ship's Global Maritime Distress and Safety System (GMDSS) to send a distress signal. Explain about GMDSS enables communication in this situation in term:-
- i. GMDSS operation. (4 marks)
 - ii. Identification of Sea Area (2 marks)
 - iii. Equipment involved. (2 marks)
 - iv. Diagram/ logical flow (2 marks)
- (b) A satellite orbits Earth in an elliptical path with a periapsis of 8000 km from Earth's center and an apoapsis of 20 000 km, Determine: -
- i. the semi-major axis of the orbit using Kepler's First Law. (3 marks)
 - ii. the satellite's speed at apoapsis if its speed at periapsis 6 km/s by using Kepler's Second Law. (3 marks)
 - iii. the estimated orbital period assuming the average orbital radius in meters and Earth's mass of 5.97×10^{24} kg using Kepler's Third Law. (4 marks)
- (c) During a satellite communication maintenance task, you are assigned to verify the uplink and downlink frequencies for an INMARSAT system operating in Ka-band. Justify suitable applications of this band that is use for maritime broadband communication. (5 marks)

Question 5

An engineering student is tasked to set up a fiber optic communication system between two building on campus to support high-speed data transfer. The setup involves a transmitter, receiver, and a fiber optic link.

- (a) Explain the operation of fiber optic communication, including the roles of the transmitter, light source, and receiver with diagram.

(10 marks)

- (b) Assume a system with the following specifications:

Light transmitter LED output power: $30 \mu\text{W}$

Light receiver sensitivity: $1.5 \mu\text{W}$

Cable length: 6 km

Cable attenuation: 2.5 dB/km

Six connectors: attenuation 0.5 dB each

LED-to-connector loss: 1 dB

Connector-to-connector loss: 2 dB

Contingency factor: 3 dB

Cable dispersion: 8 ns/km

Determine: -

- i. the total losses

(2 marks)

- ii. power gain needed to overcome the losses in part (i)

(4 marks)

- iii. whether the received signal is sufficient? If not, suggest solutions

(4 marks)

- (c) During installation, the optical signal strength decreases drastically. Determine **TWO (2)** possible causes of attenuation and a corrective measure for that.

(5 marks)

END OF EXAMINATION PAPER

