



GENERAL SIR JOHN KOTELAWALA DEFENCE UNIVERSITY

Faculty of Engineering

Department of Electrical, Electronic and Telecommunication Engineering

BSc Engineering Degree

Semester 8 Examination – 2025 November/December

Intake 39 – ET

INTERNET OF THINGS

(ET4242)

Time allowed: 2 hours

08th December 2025

ADDITIONAL MATERIAL PROVIDED

Nil

INSTRUCTIONS TO CANDIDATES

This paper contains 4 questions on 4 pages

Answer ALL questions.

This is a closed book examination

This examination accounts for 40% of the module assessment. The marks allocated for each question and its parts are indicated in square brackets, totaling 100% for this paper.

If you have any doubt as to the interpretation of the wordings of a question, make your own decision, but clearly state it on the script

Assume reasonable values for any data not given in or provided with the question paper, clearly make such assumptions made in the script

All examinations are conducted under the rules and regulations of the KDU

DETAILS OF ASSESSMENT

Learning Outcome (LO)	Questions that assess LO	Marks allocated (Total 40%)
LO1	Q1	10
LO2	Q2, Q3	10
LO3	Q2, Q3	7
LO4	Q4	8
LO5	Q3, Q4	5

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Question 01

- a. Define IoT and describe the characteristics of IoT. [3 marks]
- b. Briefly explain the usage of sensors and actuators in IoT systems. [3 marks]
- c. List the communication protocols available in IoT and explain the role of them. [4 marks]

Question 02

- a. Identify four characteristics of embedded operating systems that support their use in IoT devices. Give a short explanation of each. [4 marks]
- b. Describe how an ESP32 microcontroller handles data acquisition from multiple sensors. Your answer should explain the role of ADCs, communication buses and task scheduling. [3 marks]
- c. With the aid of a clear diagram, illustrate the data flow in a typical cloud-connected IoT system that uses MQTT. Show the movement of data between the device, gateway, broker and cloud application. [3 marks]

Question 3

- (a) Explain IoT enabling technologies.
- (b) A large manufacturing company plans to transform its factory into a smart industrial environment using IoT. The system will include hundreds of sensors and actuators mounted on machines, a local analytics unit for predictive maintenance, and a cloud platform for long-term data storage and visual dashboards. Using your knowledge of IoT architecture and IoT reference model, analyse how such a system should be designed.
 - (i) Explain how data flows from sensing devices to the final applications, referring to the IoT architecture. [3 marks]
 - (ii) Discuss how the system should distribute processing tasks between the edge and cloud, considering latency, bandwidth, and reliability constraints. [3 marks]
 - (iii) Describe the essential IoT functional blocks that ensure the system's security, management, and service delivery. [4 Marks]

Question 4

A small Sri Lankan town located near a river frequently experiences sudden water-level rises during the monsoon seasons. The local council required the implementation of an IoT-based flood-monitoring and early-warning system to improve public safety.

The system should:

- Continuously monitor river water levels, rainfall intensity, and soil moisture at several critical points along the river.
- Send real-time alerts to an emergency-management center when thresholds are exceeded.
- Operate reliably during harsh outdoor weather conditions and power failures.
- Cover a wide geographical area (up to 5 km radius) with minimal maintenance.
- Ensure secure data transmission and low power consumption.
- Provide dashboards for authorities to check historical and real-time trends.

Design an IoT solution architecture to meet the above requirements, covering the following points:

- The sensing devices (types and placement).
- Connectivity technologies (short-range/long-range).
- Communication protocols (IoT and networking).
- Cloud/edge platforms for data storage and visualization.
- Methods to ensure system security, reliability, and low power usage.

[10 Marks]

- End of the Question Paper -