

THE OPEN UNIVERSITY OF SRI LANKA
 B.SC. HONOURS (IT) DEGREE PROGRAMME – 2024/2025
 FINAL EXAMINATION
 ITU5306 – INTERNET OF THINGS
 DURATION: TWO HOURS ONLY (02 HOURS)



Date: 11.11.2025

Time: 01.30 p.m. – 03.30 p.m.

Answer any **FOUR** Questions **ONLY**.

Q1.

- a) Define the term “*Internet of Things*”. [03 Marks]
- b) Briefly describe three (03) characteristics of an IoT system. [06 Marks]
- c) Explain three (03) challenges of IoT adoption. [07 Marks]
- d) Explain how the IoT field has contributed/affected the following areas.
 - i. Manufacturing Industry
 - ii. Agriculture
 - iii. Retail Chains / Super Markets [09 Marks]

Q2.

- a) Briefly explain the two (02) sensor classifications based on the operating principle? [03 Marks]
- b) Briefly describe what an actuator is, and explain how it differs from a sensor. [05 Marks]
- c) List five (05) key factors that should be considered when selecting an appropriate actuator for a specific application. [05 Marks]
- d) What are the six (06) layers of IoT architecture? Briefly explain each layer. [12 Marks]

Q3.

- a) What is the role of a *Data Lake* in an IoT system? [3.5 Marks]
- b) Briefly describe *centralized* and *decentralized* IoT architectures and illustrate each with a simple sketch. [07 Marks]
- c) List three (03) advantages of Device-to-Device (D2D) Communication. [4.5 Marks]
- d) Briefly explain two (02) advantages and three (03) disadvantages of centralized IoT architecture. [10 Marks]

Q4.

- a) What is identified as FOG Computing? [04 Marks]
- b) List the four (04) functions of IoT gateways? [06 Marks]

- c) Name four (04) standard protocols commonly used in IoT for communication and edge device management. [04 Marks]
- d) State five (05) advantages of gateways in IoT. [05 Marks]
- e) Why is cloud computing important for IoT, and what advantages does it offer over traditional computing models? [06 Marks]

Q5.

- a) Define the term “*Edge routers*”. [04 Marks]
- b) Explain why *hardware security* is important for edge devices in IoT with two (02) factors. [06 Marks]
- c) List five (05) key design issues in edge computing for IoT. [7.5 Marks]
- d) Briefly explain three (03) bad effects occur due to interoperability and reliability issues in IoT. [7.5 Marks]

Q6.

The city of **EcoSmart** is facing increasing energy demands due to rapid urbanization. Many commercial and residential buildings have inefficient energy usage, with heating, cooling, and lighting systems often running unnecessarily, resulting in high electricity costs. Additionally, the traditional power grid struggles to balance supply and demand, causing occasional blackouts and energy wastage. Building security is also a concern, as access is largely manual and lacks real-time monitoring.

To address these issues, the city council has implemented an **IoT-based smart building and smart grid system**:

- **Smart building devices:**
 - Smart thermostats adjust heating and cooling based on occupancy and weather conditions.
 - Connected lighting systems automatically control brightness based on occupancy and ambient light.
 - IoT-enabled access control systems enhance security by monitoring and controlling entry points.
- **Smart grid integration:**
 - Buildings are connected to a smart grid that collects real-time energy consumption data from IoT devices.
 - The smart grid optimizes energy distribution, reduces peak load, and integrates renewable energy sources efficiently.

Impacts of this system:

- Reduced energy consumption and costs through intelligent automation.
 - Improved occupant comfort with optimal temperature and lighting.
 - Enhanced security via real-time monitoring.
 - Better city-wide energy management, sustainability, and resilience.
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- a) In this scenario, what are the main **challenges in building energy management and security** that IoT technologies aim to address? [04 Marks]
 - b) How do IoT devices like smart thermostats, connected lighting, and access control sensors help overcome these challenges? [5.5 Marks]
 - c) List two (02) benefits of implementing IoT-based building automation and smart grid integration. [04 Marks]
 - d) State four (04) limitations of the traditional power grid that IoT-enabled smart grids can help overcome. [04 Marks]
 - e) Briefly explain three (03) challenges in deploying IoT-enabled smart grids. [7.5 Marks]

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