The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical and Computer Engineering

Study Programme	: Bachelor of Software Engineering Honours
Name of the Examination	: Final Examination
Course Code and Title	**: EEX5376 Embedded Systems and IoT**
Academic Year	: 2020/21
Date	: 11th February 2022
Time	: 1400-1700hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.

2. This question paper contains three (3) questions in SECTION A and three (3) questions in SECTION B on three (3) pages.

3. Answer <u>ALL questions</u> in SECTION A. [60 Marks], and answer <u>any TWO</u> questions from SECTION B. [40 Marks]

4. The answer to each question should commence from a new page.

5. This is a Closed Book Test (CBT).

6. Answers should be in clear handwriting.

7. Do not use Red colour pen, and clearly state your assumptions if any

SECTION A: Answer ALL questions. [60 Marks]

Smart Elevator: *A Lift That Thinks Ahead by Giving IoT a Lift*

The following description is about the Smart Elevator: *A Lift That Thinks Ahead by Giving IoT a Lift*. Your task is to analyse the following specifications and design the Smart Elevator.

"High-rises and skyscrapers only exist due to elevators. As more and more people move to modern-day megacities, the need for rapid transport not only to, but also within, buildings is growing. Here, "smart" elevators will play an increasing and increasingly vital role." *Therefore, ordinary elevators are becoming intelligent and connected. "When you enter a building with an appointment, the system will already know where you are heading for. Through a smartphone or a wearable, you will be informed which lift to take." There are many advantages such as Avoiding Unauthorised Access, Predict Destination, Live Elevator Monitoring, Remote Controlling, etc.*

[Reference: https://www.smart-industry.net/smart-elevators-giving-iot-a-lift/]

Design and develop the Smart Elevator IoT application by answering the following questions.

[Q1]

(i)	Draw a complete diagram describing the proposed system.	[05 Marks]
(ii)	Draw a block diagram and show how to integrate each input and output of each module/unit in the diagram in Q1 (i).	[05 Marks]
(iii)	Draw flowchart(s) to represent the algorithm for the proposed system	[10 Marks]
(iv)	Write a program[pseudo-code, C, Java, Python, any (mention the name)] for the high-level functions of the proposed system.	[10 Marks]

[Q2]

(i)	Identify three security concerns in the proposed design.	[06 Marks]
(ii)	Briefly explain how to mitigate those identified concerns.	[09 Marks]

[Q3] Design the following dashboards to visualise the data in the Smart Elevator IoT application.

(i)	Mobile Interface for users.	[07 Marks]
(ii)	PC Interface for monitoring elevators.	[08 Marks]

SECTION B: Answer any TWO questions. [40 Marks]

[Q4]

    (i)   Briefly explain Lightweight data transfer techniques and how you incorporate them into IoT applications.   [10 Marks]

    (ii)   Briefly explain data management techniques and how you incorporate them into your application.   [10 Marks]

[Q5]

    (i)   What is MQTT, and briefly explain how you incorporate MQTT for your application.   [12 Marks]

    (ii)   List three (3) cloud tools available for data visualisation for IoT applications.   [08 Marks]

[Q6]

    (i)   Briefly explain what the fourth industrial revolution (4IR) is and how it relates to IoT.   [10 Marks]

    (ii)   Briefly describe the main challenges you would have to face when applying the IoT concept to the Smart Elevator IoT application.   [10 Marks]