



GENERAL SIR JOHN KOTELAWALA DEFENCE UNIVERSITY
Faculty of Engineering
Department of Electrical, Electronic and Telecommunication Engineering

BSc Engineering Degree
Semester 8 Examination – December 2022
(Intake 36 – ET/MC)

ET 4242 – INTERNET OF THINGS

Time allowed: 2 hours

8th December 2022

ADDITIONAL MATERIAL PROVIDED

NILL

INSTRUCTIONS TO CANDIDATES

This paper contains **FIVE** questions and answers all the questions on answer booklets.

This paper contains 4 pages with a cover page.

This is a closed book examination.

This examination accounts for 40% of the module assessment. The total maximum mark obtainable is 100. The marks assigned for each question and parts thereof are indicated in square brackets.

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.

Question 1

- a) Explain the communication process of Message Queue Telemetry Transport (MQTT). [4 marks]
- b) Using two facts discuss why is MQTT the best protocol for IoT. [6 marks]
- c) Explain one use case of MQTT protocol. [4 marks]
- d) State three differences between MQTT and HTTP? [6 marks]

Question 2

According to the latest research report "Status of the IoT Spring 2022" from IoT Analytics, the IoT market is expected to grow 18% and reach 14.4 billion active connections by 2022.

- a) There are five characteristics of IoT such as Connectivity, Sensing, Active Engagements, Scalability, Artificial Intelligence. Explain these five characteristics with suitable examples. [10 marks]
- b) What are the different layers of the IoT protocol stack? Write the classification of IoT protocols. [10 marks]

Question 3

It is identified that with a bulging world population and increasing urbanization which is set to grow by more than 10% in the next 30 years resulting in a total of 70% living in cities by 2050. The concept of Smart City become a major initiative by various governments in making cities more navigable and welcoming to the expected population increase and providing city dwellers a better living experience.

- a) Using the Smart City as an example, explain the following components of it based on the aspects of collection of data, transmission/reception, storage, and analysis. [16 marks]

- Smart Agriculture
- Smart City Services
- Smart Health
- Smart Home

- b) Explain how IoT is useful in creating the smart city components which are given in part a). [4 marks]

Question 4

- a) Explain the importance of Wireless Sensor Network (WSN) in IoT applications. [4 marks]
- b) Give two challenges in WSN. [2 marks]
- c) State two differences between Wireless Ad-hoc Network and WSN. [4 marks]
- d) Let's assume that the following components/equipment are provided for you to design a simple Wireless Sensor and Actuator Network. Using a block diagram show the steps of implementing a WSN and troubleshoot it. [10 marks]

The provided components/equipment:

- Breadboard
- DC Power Supply (Micro USB Port (5V @ 2A) - Raspberry Pi)
- Router with an internet connection
- Personal Computer / Smartphone
- Raspberry Pi 3 or better
- DHT11 Temperature and Humidity Sensor Module
- Jumper Cables

Question 5

- a) Describe the concept of IoT in security using a real time IoT application. [5 marks]
- b) Explain why encourage of IPv6 deployment is useful in IoT security concern. [5 marks]
- c) 'The rapid rate of change in IoT technology could outpace the ability of associated policy, legal, and regulatory structures to adapt.' Discuss this statement using the Smart Phone as an example. [5 marks]
- d) Use a suitable example and explain how the IoT technology useful in Emerging Economy and Development in a country. [5 marks]

End of question paper