



UNIVERSITY EXAMINATIONS

SECOND SEMESTER 2023/2024 ACADEMIC YEAR

**SECOND YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF COMPUTER SCIENCE AND BACHELOR
OF SCIENCE IN (ICT)**

BICT 224/COMP 224: INTERNET OF THINGS (IoT)

STREAM: R

TIME: 2 HRS

DAY: TUESDAY [11.30 A.M – 1.30 P.M] DATE: 09/04/2024

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

INSTRUCTIONS TO CANDIDATES

1. Answer Question 1 and any other two questions in the answer booklet provided.
2. Do not write on your question papers. All rough work should be done in your answer booklet.
3. Clearly indicate which question you are answering.
4. Write neatly and legibly.
5. Edit your work for language and grammar errors.
6. Follow all the instructions in the answer booklet Question One

QUESTION ONE (30 MARKS)

- a) Define the following as used in IOT **(4 Marks)**
 - i. Internet
 - ii. Sensors
 - iii. Actuators
 - iv. SCADA
- b) Using a diagram differentiate 6LoWPAN and SCHC protocols in IOT **(6 Marks)**
- c) Explain SIX main drivers behind new IoT architecture **(6 Marks)**
- d) Explain FOUR measurement devices used in IoT **(8 Marks)**
- e) Cloud addresses challenges across a wide variety of industries, including manufacturing, utilities, oil and gas transportation, mining and the public sector. IoT cloud is designed around six pillars of technology. State these pillars **(6 Marks)**

QUESTION TWO (20 MARKS)

- a) Discuss data synchronization techniques in Internet of Things **(6 Marks)**
- b) Explain lambda architecture in detail **(6 Marks)**
- c) Briefly explain protocol stack utilization IEEE 802.15.4. **(8 Marks)**

QUESTION THREE (20 MARKS)

- a) Describe the the LoRaWAN security **(6 Marks)**
- b) Explain the smart city security architecture **(8 Marks)**

- c) Using the following hypothetical scenario explain each line of the following code of this IOT temperature sensor. **(6 Marks)**

QUESTION FOUR (20 MARKS)

- a) Distinguish between Raspberry PI and arduino **(4 Marks)**
Raspberry Pi and Arduino are both popular platforms used in electronics and IoT projects, but they have distinct differences:
- b) Describe the Raspberry PI operating system **(8 Marks)**
- c) Using a diagram explain tunneling legacy SCADA over IP networks and SCADA protocol translation. **(8 Marks)**

QUESTION FIVE (20 MARKS)

- a) Define the OSI model and explain its purpose in network communication. **(2 Marks)**
- b) Describe the functions and responsibilities of the Physical Layer and give an example of a device or technology associated with it. **(4 Marks)**
- c) Explain the role of the Transport Layer and how it ensures reliable data transfer in network communication. **(4 Marks)**
- d) Discuss the differences between the Network Layer and the Data Link Layer, and provide examples of protocols used at each layer. **(6 Marks)**
- e) Outline the purpose of the Application Layer, and provide examples of application protocols relevant to this layer. **(4 Marks)**