



**Strathmore**  
UNIVERSITY

SCHOOL OF COMPUTING AND ENGINEERING SCIENCES  
BACHELOR OF SCIENCE IN COMPUTER NETWORKS & CYBER SECURITY  
END OF SEMESTER EXAMINATION  
CNS 3206: EMBEDDED SYSTEMS & INTERNET OF THINGS

**DATE: 19<sup>th</sup> December 2024**

**Time: 13:00-15:00 Hours**

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**Instructions**

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

**Question One [30 Marks]**

- a) Using examples, describe the term 'IoT Platform' in the context of Computer Science. **[4 Marks]**
- b) Discuss at least 3 use cases of the Node-RED software. **[6 Marks]**
- c) Using an example, give a scenario where you would apply Kirchoff's laws in the design of an embedded system. **[10 Marks]**
- d) Using examples, describe at least 4 principles for interfacing actuators to micro-controllers. **[10 Marks]**

**Question Two [15 Marks]**

- a) Explain what an instruction set is in the context of Computer Science. **[3 Marks]**
- b) List and briefly describe at least 4 examples of proprietary microcontroller units. **[4 Marks]**
- c) Describe at least 4 basic components of a microcontroller unit. **[8 Marks]**

**Question Three [15 Marks]**

- a) Explain why the TCP/IP protocol stack is preferred over the OSI protocol stack when describing IoT protocols. **[3 Marks]**
- b) Using examples, differentiate between TCP and UDP protocols, explain why UDP is favoured in many IoT applications. **[6 Marks]**
- c) Using a diagram, explain and illustrate the CoAP protocol. **[6 Marks]**

**Question Four [15 Marks]**

- a) Discuss at least 5 societal challenges that come with adoption of IoT applications. **[5 Marks]**
- b) For each challenge mentioned in Part (a), use examples to describe possible solutions. **[10 Marks]**

**Question Five [15 Marks]**

- a) Explain the difference between a Breadboard and a Printed Circuit Board in the context of Embedded Systems. **[5 Marks]**
- b) Using a diagram, illustrate how a Breadboard can be used to implement an electronic circuit. **[10 Marks]**